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ERRATA.

Page 166, before note on *Irish Psithyri*, insert the sub-heading "*INSECTS.*"
„ 219, line 27, for "ovones," read "ovules."
„ „ line 29, for "Dr. P. Wright," read "Dr. Plowright."
„ „ line 31, for "*Gupa*," read "*Gagea.*"
„ 256, line 9 from bottom, for "*Lithopius*," read "*Lithobius.*"
„ 258, line 6 from bottom, for "*Archotylus*," read "*Orthotylus*"


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A ROCK-POOL AT BUNDORAN.

Purple Sea-Urchins (*Strongylocentrotus lividus*) in their burrows.

From a Photograph by Mr. R. Welch.]

The Irish Naturalist.

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THE ROCK-POOLS OF BUNDORAN.

BY J. E. DUERDEN, A.R.C.SC. (London).

LAST summer, in connection with the Royal Irish Academy Fauna and Flora Committee, I had the opportunity, in company with Prof. Johnson and Mr. Mitchell, of spending a little over a week in and around Bundoran, a delightful watering-place, much frequented by people from the North of Ireland. My object was to collect representatives of all the Zoophytes, embracing under this popular term the Hydroids, Sea-anemones, and Polyzoa, at the same time not neglecting other forms of life which I might chance to come across.

Bundoran lies at the south-east corner of Donegal Bay, about four miles from the historically interesting town of Ballyshannon. Taking the former as our centre, we made collecting excursions to different parts of the bay, and so obtained a good idea of the resources of the locality.

West of Bundoran, cliffs of Carboniferous limestone face the sea, dipping to the south at an angle varying from five to ten degrees; but at low water a considerable extent of shore is laid bare, diversified by numerous rock-pools, caves, and narrow inlets of the sea, the happy hunting-grounds of the naturalist.

In the rock-pools the first object which attracts one is the Purple Sea-urchin *Strongylocentrotus lividus*, Lamk., occurring in great numbers in little hollows, their dark colour contrasting strongly with the light rosy-pink calcareous alga *Lithothamnion polymorphum*[1], which lines most of these pools. This interesting sea-urchin is one of the most striking faunal features of various localities along the west coast of Ireland,

[1] For the name of this alga, and also for the others mentioned, I am indebted to Prof. Johnson and to Mr. Mitchell.

from Donegal Bay to Queenstown Harbour. It occurs nowhere else in the British Isles, but turns up again in the Channel Islands. It is capable of boring holes, probably by means of its teeth, in the soft limestone to a depth of one-half or more of its own height; where, however, the rocks, as at Dog's Bay in Connemara, consist of the harder granite, the urchin is incapable of boring into them, and simply rests upon the bottom of the pools. Many of them are partially covered by empty shells, such as those of *Patella*, *Purpura*, and *Littorina*. Considering the spiny nature of their skeleton it is very difficult to conceive that this feature can be in any way concerned with protection to the individual. Again, they are almost invariably associated in the pools with luxurious growths of the light pink encrusting *Lithothamnion polymorphum*, to which they offer the strongest contrast, almost suggestive of a warning combination.

In some of the shallow pools, some distance above low-water mark, we found numbers of the sea-slug *Aplysia punctata*, Cuv., their dark olive-green colour also contrasting strongly with the light *Lithothamnion*. A few minutes sufficed to obtain two or three dozen, many of them in the act of laying their strings of brown-pink spawn.

On this part of the shore, and still more so on the rocks and cliffs north of Bundoran, are to be found more or less firm masses of sand and fragments of shells built into tubes by the worm *Sabellaria alveolata*, Linn., and almost resembling a honey-comb in appearance. These masses, no doubt, exercise a preservative geological influence on the rocks, the hollows and irregularities about forming also a protection for various forms of life.

In one of the caves with a smooth floor covered by water, and with stalactitic and stalagmitic masses further in, we came across quite a crowd of small hermit-crabs, *Pagurus*, and very interesting it was to watch their little battles over the bodies of some of their unfortunate companions who had been torn from their protective gastropod shell. Here also I met with a few specimens of *Anemonia sulcata* (*Anthea cereus*), Penn., of the variety with iridescent green tentacles tipped with red. This species, not so abundant in Donegal Bay, I have met with in great numbers in Roundstone Bay, giving to the beds of *Zostera* there quite a flowery appearance. *Actinia*

equina, Linn.. of the varieties *hepatica*, *rubra*, *olivacea*, and *viridis* was present everywhere. Under one of the ledges of rock I met with a large group, thirty or forty individuals, of the pretty little *Corynactis viridis*, Allm. This anemone varies much in colour, although those belonging to the same colony are generally alike. In the present case the column was of a light brown colour, the margin a rich bright orange, and the tentacles green at the base, with greenish-brown stems and white knobs. At Roundstone I have met with colonies of the more typical green form. Specimens of *Heliactis bellis*, E. and S. were present in the cavities of the rock-pools, and also the large *Tealia crassicornis*, Müll. in considerable variety of colour. A single example of *Cylista undata*, Müll. was also obtained.

The coast to the north of Bundoran is varied by steep precipices and sandy shores. Around Claddaghlagan not much was obtained, nor along the beach in front of the east portion of the town. Rogy Bay, a narrow inlet, was the best locality for material washed up from the sea. Here were obtained stems of *Laminaria* with quite thick forests of *Sertularia operculata*, Linn., growing on them, presenting almost the appearance of a fox's tail. The roots of the *Laminaria* also yielded several species of encrusting Polyzoa. I may here record one fact in which I have always found the west coast of Ireland to differ from the east coast, namely, in the amount of material from considerable depths washed ashore by storms. On such occasions we find suitable places on the east coast literally strewn with zoophytes and other treasures from the deep. Tangled masses are rolled about on the sandy shores, composed largely of *Hydrallmania falcata*, Linn., *Sertularia abietina*, Linn., *Eudendrium ramosum*, Linn., various species of *Flustra* and *Crisia*, *Vesicularia spinosa*, Linn., and heaps of other smaller forms along with them or growing upon them, the whole forming a very rich and easily obtained harvest. On the west coast, however, I have never found any of the species mentioned above washed ashore. It has often been disappointing upon going to some strand, where, under similar conditions along the east coast, I should have obtained in a few minutes thirty or forty different species of zoophytes, to find practically nothing. Tullan Strand, extending a distance of nearly two miles from the Fairy Bridge to the mouth

of the river Erne, was a good example. Even after a considerable storm during the night there was nothing washed ashore to rejoice the collector. The Rev. W. S. Green, to whom I have remarked this difference, considers that it may be largely due to the fact that on the east coast the greater amount of trawling in the deeper parts disturbs and tears up the objects growing upon the sea-bottom, and then during storms they are washed up on the shore.

The limestone forming the cliffs is very fossiliferous, this feature attracting even the most casual observer. The rock seems in parts entirely made up of crinoid stems, some of them exceptionally large in diameter. Other portions are almost entirely composed of *Productus giganteus*, while various fossil corals are in many places important components of the rock. In the limestone on the north side of Rogy Bay, towards Aughrus Point, the rock-pools are mostly deep vertical hollows, always full of water, and crowded at the surface with a great variety of red, brown, and green sea-weeds. On pulling these aside one is rewarded with a most lovely sight of variously and richly-coloured sea-anemones, covering the sides and crevices of the rock. Especially abundant were "the Orange Disc Anemone," and "the Snowy Anemone," now both regarded as varieties of *Heliactis venusta*, Gosse; also *Bunodes gemmaceus*, E. and S., and in the darker corners large specimens of *Tealia crassicornis*, Müll. A few examples of *Aplysia punctata*, Cuv. were obtained here also in the shallower pools.

The rocks from Aughrus Point to the Fairy Bridge are too precipitous for any work to be done upon them; but in the latter place one can easily collect along the base at low water, and also enter the Cathedral Cave near. We found this, exposed to the full force of the waters of the bay, to be an extremely rich locality. The sand-tubes of *Sabellaria alveolata*, Linn. form, with the rocks, small hollows in which are little forests of zoophytes, such as *Tubularia larynx*, E. and S., *Obelia flabellata*, Hincks, *Campanularia flexuosa*, Hincks, and *Plumularia setacea*, Ell., and numerous smaller forms growing upon these. Here was obtained the rare *Halecium tenellum*, Hincks, the first undoubted record for Ireland. The surface of the rock also serves for the attachment of crowds of *Mytilus edulis*, Linn., and a search amongst these

well rewarded us. On one of the ledges overhanging a pool, on the floor of which were abundant Plaice, almost undistinguishable from their resemblance to the colour of the sand, we came across hundreds of the lovely *Metridium* (*Actinoloba*) *dianthus*, Ell., of the brown and white varieties. Exposed at low water they hung vertically almost like so many shapeless masses of mucus, each with a drop of water at the distal end. Looping about amongst the Hydroids were numbers of the Amphipod *Caprella linearis*, Linn. *Tubularia larynx*, E. and S., was especially the home of the Nudibranch *Eolis coronata*, Forbes, its rosy hues harmonising well with the light red colour of the polypites.

From the Fairy Bridge, Tullan Strand stretches for nearly a couple of miles to the mouth of the Erne, and yielded very little to us, but the sand-hills overlooking it would well repay the entomologist. The shore towards Kildoney Point we found unproductive, and then took our way to Coolmore, a place from which accounts of collections in other branches have already appeared in this Journal. Descending the Blue Stairs we were disappointed to find the shore composed largely of sandstone and limestone boulders derived from the cliffs, and presenting a very meagre fauna. Going a little to the south-west, however, we were again amongst the limestone rock-pools with a great abundance of life. The contrast was most striking. Where the rocks were principally sandstone they presented quite a barren aspect, and life appeared impoverished, while a few yards further when we got on to the limestone, the rock-pools were replete with a luxuriance of animal and plant life, much as we had found west of Bundoran.

Dredging in Donegal Bay with the trawlers did not yield us much. The bottom consists principally of sand, and the dredge and trawl brought up little of what the fishermen regard as refuse, but to the zoologist is a harvest. A day was spent on the east coast of the promontory stretching between M'Swyne's Bay and Inver Bay. Here the shore was again rich in deep vertical rock-pools filled with weeds, such as *Fucus*, *Laminaria*, *Ulva*, *Enteromorpha*, *Bryopsis*, *Codium*, *Cladophora*, *Chondrus crispus*, *Rhodymenia*, *Corallina officinalis*, *Lithothamnion polymorphum*, and other rarer forms. Hundreds of *Metridium* (*Actinoloba*) *dianthus*, Ell., hung from

the under surface of projecting ledges, and most of the other common forms of sea-anemones flourished luxuriously, sharing the decoration of the pools with numerous brightly-coloured sponges. Trawling around the shore our boatmen discovered for themselves a rich locality for Sole, Plaice, and Brill. The *Laminaria* brought up was coated with miniature forests of *Obelia geniculata*, Linn. and other zoophytes. Numbers of shells of *Pecten maximus*, Linn. were obtained encrusted with various Polyzoa. In returning across the bay we were alarmed by the proximity of four or five large cetaceans following the shoals of herring along with flocks of gulls. From the rounded head, large, high dorsal fin, and white under-surface, there is no doubt that they were specimens of the Killer Whale (*Orca gladiator*, Lacpa). In a small interesting book on Ballyshannon[1] containing a chapter on its Zoology and Botany, it is recorded that in the last century whales were so numerous in Donegal Bay that a whale-fishery was established, but owing to the general roughness of the sea it was unsuccessful, although aided by a grant of £500 from the Irish Parliament in 1736, and a grant of £1,500 in 1763.

We left Bundoran and its rock-pools feeling that our time had been most profitably spent, and bearing away representatives of many of its marine treasures preserved in our jars for future study. A more detailed list and description of these will shortly be published.

Mr. Welch, of Belfast, has kindly allowed a reproduction of one of his splendid series of photographs of the shores at Bundoran. The portion represented on the accompanying plate (Plate 1) is one of the rock-pools from which the water has been removed. At the bottom are seen many examples of the Purple Sea-urchin (*Strongylocentrotus lividus*, Lamk.) bristling with spines, but all more or less sunk in their self-made hollows, and in some cases with dead shells upon them. The pink-coloured "Nullipore," *Lithothamnion polymorphum*, coats the remainder of the bottom, and especially in the narrow ridges between the hollows rises into irregular botryoidal masses, often tending to enclose the sea-urchins. To the left of the plate are seen luxuriant bunches of another calcareous

[1]Allingham: Ballyshannon, its History and Antiquities. Londonderry, 1879.

red alga, *Corallina officinalis*. Along the side of the pool are agglutinated masses of sand and fragments of shells presenting the appearance of a honeycomb, each aperture being that of a tube, in which dwells the worm *Sabellaria alveolata*, Linn. The limestone ledges above the pool (to the right) are quite light in colour owing to the great abundance of the common acorn-shell, *Balanus*. Numerous conical shaped limpets, *Patella vulgata*, Linn. are here present resting in the shallow scars excavated by themselves. It has lately been shown[1] that the limpets quit their homes in search of food chiefly as the tide leaves them and when it is returning, the extent of their peregrinations being evidently limited to a distance of between one and two feet. Many of the limpets have the exterior of their shells coated with *Lithothamnion polymorphum*. Scattered about are also numerous specimens of the spindle-shaped *Purpura lapillus*, Linn.

THE DISTRIBUTION OF THE CHARACEÆ IN IRELAND.

BY H. AND J. GROVES, F.L.S.

THE large stretches of comparatively shallow water and the many peat-bogs render Ireland a particularly favourable country for the growth of *Characeæ*, and, although a considerable extent remains almost unexplored and but little has been thoroughly searched, the Chara Flora as at present known is a rich one. During the past year another species, *C. canescens*, has been discovered, and there is little doubt that when the Southern and Western districts have been more completely worked several others will be added to the list.

Every piece of water should be searched, as *Characeæ* occur in rivers and streams as well as in the lakes, pools, pits, and ditches, which are their more usual habitats. We would especially recommend examining small loughs and pools near the sea, as likely to yield new species to Ireland. It is never safe to assume that there is no *Chara* in any piece of water until it has been dragged all over, as oftentimes they occur in only one part and are not visible from the shore.

[1] *Nature*, vol. xxxi., p. 200, and vol. li., p. 127.

We shall be pleased to examine any specimens sent to us for determination, but would impress upon collectors the importance of obtaining fruiting specimens where possible. Often when the first "haul" is sterile, a further search will yield abundance of fruit.

The object of this paper is to give a table of the County distribution on the lines of "Topographical Botany," but in the case of the rarer species the separate localities are mentioned. We have endeavoured as far as possible to cite the earliest collected specimen we have seen from each County.

In consequence of the unreliable character of the earlier determinations of *Characeæ*, we have thought it better in this as in our other papers, to record only those localities from which we have ourselves examined specimens.

The varieties given are not intended to be regarded as subspecies, nor as being all of equal value, as it has been thought desirable to apply varietal names to the more extreme forms, although every intermediate state may occur.

Chara fragilis, Desv.

113. Kerry, S., - Sneem, 1883. H. A. Ridley.
114. ,, N., - Brandon. D. Moore.
116. Cork, N., - Fermoy. T. Chandlee.
117. Waterford, - Dungarvan Bog, 1882. G. Nicholson.
118. Tipperary, S., Croan, 1872. S. Grubb.
121. Queen's Co., - Maryborough, 1893. R. Ll. Praeger.
123. Wicklow, - Murrough of Wicklow, 1849. D. Moore.
125. Dublin, - - Howth, 1860. D. Moore.
128. Limerick, - R. Shannon, nr. Limerick, 1892. H. & J. G.
129. Clare, - - Ennis, 1884. S. A. Stewart.
130. Galway, E., - Castle Taylor. A. G. More.
133. Westmeath, - Ladiston. D. Moore.
135. Galway, W., - Roundstone. Hb. J. Woods.
136. Mayo, W., - L. Cullin. A. G. More.
137. ,, E., - Cong, 1885. E. F. and W. R. Linton.
138. Sligo, - - Lough Gill River, 1884 R. M. Barrington.
141. Fermanagh, - L. Erne, 1837. W. Thompson.
142. Cavan, - - Belturbet. D. Moore.
144. Tyrone, - Arboe, 1891. S. A. Brenan.
145. Armagh, - Bird Island, Lough Neagh, 1882. H. W. Lett.
147. Down, - - Loughinisland, 1887. S. A. Stewart.
148. Antrim, - - L. Neagh. D. Moore.

var. **barbata,** Gaut.

114. Kerry, N., - Nr. Ventry, 1894. D. M'Ardle.
123. Wicklow, - Murrough of Wicklow. D. Moore.
132. King's Co., - Geashill, 1894. R. Ll. Praeger.
133. Westmeath, - Mullingar, 1877. D. Moore.
147. Down, - - Holywood Hills, 1891. R. Ll. Praeger.
148. Antrim, - - Lough Beg, 1846. W. Thompson.

var. **capillacea,** Coss. and G.

113. Kerry, S., - Long Range, 1887. R. W. Scully.
125. Dublin, - - Howth, 1894. R. Ll. Praeger.
135. Galway, W., - Renvyle, 1832. Hb. Shuttleworth.
147. Down, - - Holywood, 1885. R. Ll. Praeger.

var. **Hedwigii,** Kuetz.

125. Dublin, - - Lucan, 1894. R. Ll. Praeger.
135. Galway, W., -
137. Mayo, E., - } Cong, 1885. C. Bailey.
138. Sligo, - - Lough Gill R. 1884. R. M. Barrington.
147. Down, - - Holywood Hills, 1891. R. Ll. Praeger.

var. **delicatula,** Braun.

125. Dublin, - - Clondalkin, 1894. R. Ll. Praeger.
135. Galway, W., - Recess, 1885. E. F. Linton.
137. Mayo, E., - Cong, 1885. C. Bailey.
139. Leitrim, - - Glenade L. 1884. R. M. Barrington.
145. Armagh, - Ardmore Glebe, 1880. Hb. R. Ll. Praeger.
146. Donegal, - L. Sessiagh, 1886. S. A. Stewart
148. Antrim, - - L. Neagh, 1883. S. A. Stewart.

The plants included by us under the var. *delicatula* are the smaller forms with somewhat connivent branchlets and a tendency to produce spine-cells. Braun employs the name for a sub-species, including all the forms having prominent primary cortical cells.

A large proportion of the Irish specimens of *C. fragilis* show a tendency towards the vars. *barbata* and *delicatula*, while the larger forms approaching var. *Hedwigii* seem much less common. We collected a small much incrusted form in Westmeath, which could scarcely be distinguished from *C. contraria* without microscopic examination.

C. fragilis is one of the most widely distributed species, occurring almost all over the world. It is frequent throughout Great Britain.

[*C. fragifera* and *C. connivens*, which occur in the West of Europe and in some of the south-western counties of England, may be expected to occur also in the South of Ireland, and should be searched for in shallow water near the sea. Both resemble *C. fragilis*, but may be readily distinguished by being dioecious, as well as by the strongly incurved branchlets in the case of *C. connivens* and the large compound bulbils on the underground stems of *C. fragifera*.]

C. aspera, Willd.

113. Kerry, S., - Killarney, 1887. R. W. Scully.
114. ,, N., - Castle Gregory Lake. D. Moor
121. Queen's Co., - Farmhill, 1890. R. W. Scully.
123. Wicklow, - Murrough of Wicklow. D. Moore.
124. Kildare, - Near Monasterevan, 1893. R. Ll. Praeger.
130. Galway, E., - Portumna, 1843. D. Moore.
133. Westmeath, - Belvidere, 1846. D. Moore.
135. Galway, W., - Oughterard, 1885. E. F. and W. R. Linton.
136. Mayo, W., - L. Cullin. A. G. More.
137. ,, E., - Foxford. A. G. More.
141. Fermanagh, - L. Erne, 1883. S. A. Stewart.
142. Cavan, - Belturbet. D. Moore.
145. Armagh, - Near Navan Fort, 1892. R. Ll. Praeger.
147. Down, - Clandeboye Lake, 1882. S. A. Stewart.
148. Antrim, - Rathlin. Hb. D. Moore.
149. Londonderry - L. Beg. 1894. R. Ll. Praeger.

C. aspera, var. **capillata,** Braun.

125. Dublin, - Royal Canal, Blanchardstown, 1889. R. W. Scully.

var. **curta,** Braun.

130. Galway, E., - L. Derg, 1881. B. King.

var. **lacustris,** H. and J. G.

135. Galway, W., - Roundstone. Hb., J. Woods.
136 Mayo, W., - L. Cullin. A. G. More.
144. Tyrone, - Arboe, 1891. S.A. Brenan.
145. Armagh, - L. Neagh, Lurgan, 1890. R. Ll. Praeger.
148 Antrim, - L. Neagh, Crumlin, 1894. S. A. Stewart.

var. **subinermis,** Kuetz.

138. Sligo, - Lough Gill R., 1884. R. M. Barrington.
139. Leitrim, - Glenade L., 1884. R. M. Barrington.
148. Antrim, - Rathlin I. D. Moore.
149. Londonderry, R. Bann, 1894. R. Ll. Praeger.

C. aspera is a common species in Ireland, occurring in the lakes and canals as well as in the peat-pits and pools, and is more generally distributed than in England. It occurs throughout Europe and in North Africa and North America. The plant we have referred to the var. *curta* has short incurved branchlets and many short spine-cells, but is not so extreme as some of the continental plants, which have the branchlets only from 2-3 mm. long. In L. Owel, Westmeath, we collected a plant with very long internodes and comparatively very short incurved branchlets, which resembled the Swiss plant much magnified. The var. *capillata* from Co. Dublin is not so extreme as the Holyhead plant. Many of the Irish specimens approach this variety.

[*C. strigosa*, Braun. In the *Journal of Botany*, May, 1887, we suggested the possibility of a specimen collected by Mr. R. M. Barrington in Lough Ree belonging to this species, but being sterile we were unable to determine it. Since then we have not had any further light thrown on the subject, and having in view the curious forms of *C. aspera* which we have collected in the Westmeath lakes, we think the plant is possibly only a state of that species. It would, however, be very desirable for L. Ree to be searched in order to settle the question.]

C. polyacantha, Braun.

116. Cork, N., - Shanagarry Bog. I. Carroll.
124. Kildare, - } Canal, near Monasterevan, 1893. R. Ll. Praeger.
121. Queen's Co., - }
123. Wicklow, - Near Newcastle, 1892. R. M. Barrington and H. and J. G.
130. Galway, E., - Headford, 1832. Hb. Shuttleworth.
133. Westmeath, - Scraw Bog, near L. Owel, 1892. H. C. Levinge.
135. Galway, W., - Moycullen, 1892. H. and J. G.
137. Mayo, E., - Foxford. A. G. More.
145. Armagh, - Loughgall L., 1892. R. Ll. Praeger.

This species was figured by Plukenet in 1691 from a specimen collected by Sherard in "Turf Bogs in Ireland." It usually occurs in peat-pits and ditches. In Britain it is generally much incrusted, but we have had

several beautiful unincrusted forms from the Irish bogs. The distribution of *C. polyacantha* appears to be very limited. It is recorded from Sweden, Denmark, Germany, Switzerland, North Italy, and France.

C. contraria, Kuetz.

113. Kerry, S., - Caragh, 1888. R. W. Scully.
121. Queen's Co., - } Canal, Monasterevan, 1893. R. Ll. Praeger.
124. Kildare, - - }
125. Dublin, - - Glasnevin, 1882. D. M'Ardle.
130. Galway, E., - L. Derg, 1885. E. F. and W. R. Linton.
133. Westmeath, - L. Ennel, 1892. H. and J. G.
139. Leitrim, - - L. Allen, 1883. S. A. Stewart.
145. Armagh, - - Croaghan I., L. Neagh, 1880. H. W. Lett.
147. Down, - - Clandeboye Lower Lake, 1891. R. Ll. Praeger.
149. Londonderry, - Limavady Junc., 1889. W. D. Donnan and R. Ll Praeger.

var. **hispidula**, Braun.

133. Westmeath, - Brittas Lake, 1892. H. C. Levinge and H. and J. G.
135. Galway, W., - } Cong, 1885. C. Bailey.
137. Mayo, E., - }

A common species in Ireland, occurring in great quantity in the large lakes, and varying considerably from the commonest form, which is a small slender plant resembling *C. fragilis*, to the very large lax form in Brittas Lake, Westmeath, which grows three or four feet high and has branchlets 1½ inches long, and to the stout compact form from Loughs Derg, Ennel, and Derevaragh, with short, stout, incurved branchlets resembling the var. *crassicaulis* of *C. vulgaris*. *C. contraria* is world-wide in its distribution, occurring in all five Continents and in Australia.

C. denudata, Braun.=*C. dissoluta*, Leonh.

133. Westmeath, - Brittas Lake, 1892. H. C. Levinge.

This plant resembles the large forms of *C. contraria* from the same lake, but is almost entirely destitute of cortex. The primary series of cortical cells are occasionally partially developed above the whorls, but are usually represented by a single cell above and below, each branchlet growing outwards instead of adhering to the internodal cell. *C. denudata* has been recorded from single localities in Switzerland and Italy, and from Cape Colony; but the Irish form is more extreme than either of these. It is doubtful, however, notwithstanding the apparently important differences, whether these plants may not all be only degraded states of *C. contraria*.

(TO BE CONCLUDED).

SABINE'S SNIPE.

GALLINAGO COELESTIS, VAR. SABINII.

BY G. E. H. BARRETT-HAMILTON.

ON August 21st, 1822, a Snipe was shot near Portarlington, Queen's County, by the Rev. Charles Doyne, and was described by N. A. Vigors as *Scolopax Sabini* (*Trans. Linn. Soc.*, vol. xiv, p. 556). Vigors distinguished his bird from the Common Snipe (*S. gallinago*) by its colour, by its possession of only twelve (instead of fourteen) tail-feathers, by the two exterior toes being "united to the base for a short distance," by the tarsi being $\frac{3}{20}$ of an inch shorter than those of *S. gallinago*, and by the greater stoutness of the tarsi.

Subsequently, additional specimens of Sabine's Snipe were obtained, chiefly in Ireland, so that in 1850, William Thompson (Nat. Hist. of Ireland, vol. ii, pp. 273—277) was able to give notes of ten Irish specimens, while a few others had been procured in England, but in Scotland none at all. The bird had now become, in the words of Thompson, "one of the greatest puzzles in Ornithology," since it was not known out of the British Islands, and *there* only as one of which a few individuals had fallen before the guns of snipe-shooters: of its breeding haunts absolutely nothing had been ascertained.

Enough specimens had now been obtained to enable naturalists to suspect that the structural characters laid down by Vigors as distinguishing Sabine's from the Common Snipe were somewhat unreliable, and Thompson (*op. cit.*), though he gave the bird rank as a species in his work, was compelled to confess that for some time past he "had not felt altogether satisfied respecting its distinctness as a species." After showing the invalidity of Vigors' structural characters, he remarks that in colour Sabine's Snipe "is peculiar and constant." Every specimen of *S. Sabini* that had occurred was coloured much alike, and was remarkable by "the total absence of white from its plumage, or of any of those lighter tints of ferruginous yellow which extend more or less in stripes along the head and back "of the other European Snipes."

In the works of later writers, Sabine's Snipe is regarded merely as a melanic variety of the Common Snipe. I think, however, that it presents several points of interest, which are well worth the attention of naturalists.

In the first place there is its extremely curious distribution. I have been at some pains to make a complete list of all recorded occurrences of Sabine's Snipe, with the result that I have notes of (in all) about fifty-five examples, which have been stated to have been either obtained or observed from time to time.[1] Probably others have been obtained, but they have either been unrecorded or have escaped my notice, as Professor Newton informs me that when he was in Dublin in 1860 there were about half a dozen Sabine's Snipes stuffed (infamously) and placed on a board in the Museum of Trinity College, not one of which had been recorded, nor did anyone seem to know their history. Of the odd fifty-five examples whose capture has been from time to time recorded, thirty-one (or about three-fifths) hail from Ireland, twenty-two from England, one from Scotland, and one from the Continent of Europe. The bird should, therefore, possess a peculiar interest for Irish ornithologists—whose country it favours so strangely in its appearances. The Irish examples have been recorded from sixteen out of the thirty-two Irish counties, and from almost every part of Ireland, except the south-east (the east coast can only claim one). In the North, Derry heads the list with five examples (some of them only *seen*, and not obtained), Donegal claims four, and Tyrone one. In the West, Mayo claims one, Galway one, Clare one, and Kerry two. In the South, Cork claims three, and Waterford one. Of the central counties (taking them from north to south) examples have been recorded from Cavan (one), Westmeath (one), King's County (one), Kildare (one), Queen's County (one), and Tipperary (one). The interesting feature of the distribution of Sabine's Snipe in Ireland would appear to be its apparent absence (at least as far as can be ascertained from the available records) from the eastern counties of Antrim, Down, Armagh, Louth, Meath, Wicklow, Carlow, and Wexford. The only eastern Irish example of which I have any note is that recorded from Dublin by Mr. H. Blake Knox (*Zoologist*, 1866, p. 302). Several Irish examples can not be traced to any particular county.

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[1] Twenty-five occurrences have been collected by Mr. J. E. Harting in the *Field*, for Dec. 10, 1870, p. 521, and I have been much indebted to his list of occurrences up to 1870.

As regards England, nearly all the occurrences of Sabine's Snipe have been in the south and east, and a line drawn across the map of England from the Wash on the east to the junction of the Counties of Gloucester and Somerset on the Severn on the west, would cut off on the north an area from which Sabine's Snipe has only twice been recorded--in both cases in Yorkshire. In Wales it does not appear to have yet been seen or captured, and the solitary Scotch example is that recorded by Colonel Fielden in the *Zoologist* (ss. p. 3,188) from Montrose.

The only continental example I can find any record of is "a light-coloured example now in the foreign collection of the British Museum," and "stated by the late Jules Verraux to have been shot near Paris" (Yarrell's "British Birds" 4 Ed., vol. iii, p. 349). The history of this specimen might well stand on stronger evidence.[1]

To sum up the distribution of Sabine's Snipe, it is confined (with the exception of one somewhat doubtful specimen) to the British Isles, and in them has occurred most frequently in Ireland. In the south and south-east of England it has occurred nearly as frequently as in Ireland, but in the north and in Scotland it is almost unknown.[2]

The distribution of Sabine's Snipe shows a curious resemblance to that of another melanic animal, which was first recorded from Ireland, viz., the melanic variety of the Common Rat (*Mus decumanus*), which was described by Thompson as *Mus hibernicus*. This equally interesting form has occurred in abundance (though sporadically) in many parts of Ireland, and

[1] I have just examined this specimen. It is a very nice example, and rather lighter all through than Vigors' type, which is also in the British Museum collection. On the wooden stand on which it is fixed is a note in pencil that it was obtained in February, 1854, and that it is a male, but I could find no further details of its history at the Museum.

[2] Since writing the above I have had the opportunity of examining two additional Scotch examples of Sabine's Snipe, which are preserved in the collection of the British Museum of Natural History at South Kensington. One of these was obtained at Clackmannan, in December, 1890, and presented by Lord Balfour of Burleigh in 1891. The second, presented by Captain Verner, was obtained on Tiree Island, in the Outer Hebrides, in January, 1887. It is more like a Common Snipe, especially in the head, than any of the seven examples in the collection at South Kensington—but it has no white on the under parts, and is certainly a Sabine's Snipe.

also, although very rarely, in the Outer Hebrides, Scotland, and England. On the Continent I cannot find any record of its occurrence except that of A. Milne-Edwards, who reported black varieties of *Mus decumanus* from Paris (*Ann. Sci. Nat.*, 1871, xv, art. 7).

It is hard, however, to speak with confidence of the distribution in Great Britain of *Mus hibernicus*, since there are three mammals which are reported indiscriminately as Black Rats, e.g. *Mus rattus*, the true black rat; *Mus hibernicus*, a variety of *Mus decumanus;* and (I believe, most frequently of all) the black variety of the Water Vole, *Microtus amphibius*.

The points of resemblance in the distribution of the two melanic animals, Sabine's Snipe and the Irish Rat, and the fact of their much more frequent occurrence in Ireland than in any other country, led me to inquire if in Ireland there might be a general tendency to melanistic forms. I cannot say however, that my investigations have hitherto met with much success. In Vertebrates I think the few cases which have come under my notice might have occurred in any country, and are certainly too meagre to bring forward here. In regard to Lepidoptera, Mr. G. H. Carpenter, of the Science and Art Museum, Dublin, has very kindly replied to my inquiries as follows:—

"With regard to Irish Lepidoptera, among butterflies *Melitæa aurinia* and *Pieris napi* are more deeply marked in Ireland, the latter on the west coast sometimes approaching the alpine var. *bryoniæ*. Noctuid moths are generally dark and rich in Ireland, and so are some Geometers. But all these dark varieties turn up in parts of Great Britain — mountains and northern districts, specially the western Scottish Highlands, Hebrides, and Shetland."

In regard to mollusca, Dr. R. F. Scharff, also of the Dublin Museum of Science and Art, has most obligingly replied in a very similar manner. He writes—"I once thought that there were instances among slugs of melanism confined to Ireland, or even to the British Islands, but similar cases have turned up in a number of places all over Europe." So far, then, I am unable to bring forward any support for the suggestion I put forward that melanism might be more common in Ireland than in Great Britain, but the question cannot yet be regarded as anything like fully worked out.

In time, Sabine's Snipe has been distributed sporadically since Vigors described it in 1822. From that year to the present time examples have been obtained one by one, seldom more than one in any single year, and seldom more than three or four years have intervened between the individual occurrences.

Sabine's Snipe has been shot in every month of the shooting season, that is from September to March, most numerously, perhaps, from October to January. No doubt, were snipe shooting customary all the year round, every month would be able to claim one or two examples. Of the spring, summer, and autumn months, August claims four examples, including two as early as the 5th. To September, however, I can only allot one, and that on the 28th of the month. One in Mr. J. H. Gurney's collection was shot on the 5th of May, but no specimens that I am aware of have been shot in the months of April, June, or July, except one obtained in the breeding season of 1831 or 1832 at Heron Court, Hants (Eyton's "Rarer British Birds," p. 160).

Among the recorded instances of the occurrence of this bird I have been unable to find many allusions to the sex of the examples obtained, but several are stated to have been females, and at least one was a male. This form of plumage is, therefore, not confined to either sex.

It is nearly impossible to examine a series of examples of Sabine's Snipe, since there is no collection that I know of which contains a good series. I cannot, therefore, say much of the plumage of this bird, or to what extent individuals vary from the type. That they do vary to a certain extent is certain, and two birds have been described as being intermediate in coloration between Sabine's and the Common Snipe. One of these was obtained near Waterford, on November 25th, 1883. It was examined by Mr. J. E. Harting, and by him described in the *Zoologist* (1884, p. 272). It was remarkable for its pale tone of coloration. The second was killed in the vicinity of Hastings, and examined by Mr. J. H. Gurney, jun., who remarked that it approximated more closely to the Common than to Sabine's Snipe, but he had seen no variety of the Snipe exactly like it (*Zoologist*, 1884, p. 339). Other specimens have been recorded to vary in the shade of their plumage, thus the specimen, which is stated to have been obtained near

Paris (*vide supra*, p. 14), was a light-coloured individual, while others have been recorded as very dark examples.

Numerous other varieties of the Common Snipe have been from time to time obtained and recorded, and I believe some remarkable varieties are in the collection of Mr. John Marshall, of Taunton. Mr. Whitaker, of Rainworth, Mansfield, Notts, has kindly informed me that he has in his collection nine Snipe, running from Sabine's Snipe to examples with the body white and the wings brown, and with the body brown and wings white, as well as examples which are pale cream, pale brown, dark brown, and brown with white wings and cream back.

It is possible that all the examples of Sabine's Snipe may be birds of the year, which supposition would account for the ovate shape of the dorsal feathers—a point formerly insisted on as showing its distinction from the Common Snipe. Professor Newton informs me that he has never seen an example of Sabine's Snipe which had the appearance of a really adult bird.

The above remarks are a mere summary of the notes I have been so far able to collect on this interesting bird. They are not intended to give a complete account of it, but I think they have touched upon some of the more interesting features in its history. The number of examples killed is only approximate, as it is impossible to trace the authenticity of every reported example. The addition, or subtraction, of one or two examples from the list would, however, in no way disturb the conclusions to be drawn from them.

DONAX VITTATUS, VAR. TRUNCATUS (MARSHALL, MS.).

BY MISS AMY WARREN.

MR. MARSHALL, of Sevenoaks, Torquay, to whom I owe much regarding shells, has drawn my attention to a form of *Donax vittatus* that I have sent him, and which is unlike the English form. He says :—" These Irish specimens partake of some of the characters of the var. *turgida*, which is ' larger, ventricose, and longer,' but in addition the posterior end is abruptly truncate instead of being obliquely so. It is in reality an intermediate form between *D. vittatus* and *D. trunculus*, having the proportions of the latter, but the typical characteristics of the former, to which it belongs without a doubt."

In my district, Killala Bay, this truncated variety is the prevailing form, and the type the rarity. I have some specimens of *D. vittatus* from the North Bull, Dublin, and all belong to the type. It would be interesting if collectors along the coast would note where the truncated variety appears.

Mr. Marshall adds that this form is peculiar to the south and west of Ireland, and he has given it the M.S. name of var. *truncatus*, the characters being :—" Thick and solid, deeper or longer from the beaks, very convex, posterior slope short and abrupt. He adds, " the umbonal area inside the valves of all these Irish specimens is curiously fretted with deep pit-marks which may be caused by an internal parasite. Many years ago in dredging the variety *nitida* on the Doggerbank I found that 50 per cent. of them contained a small parasitic crab, and the presence of parasites may also account for the convexity of both these varieties."

Fig. 1

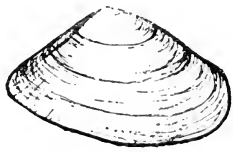
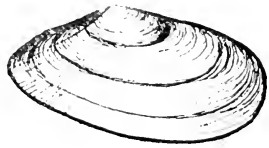


Fig. 2.



In the accompanying drawing, kindly made by Dr. Scharff, fig. 1 represents a characteristic specimen of the new variety gathered by me at Killala Bay ; while, added for sake of comparison, is an example of the type from Torbay (fig. 2), sent me by Mr. Marshall.

IRISH MOTHS.

THE notes on Irish Moths which have appeared in the *Irish Naturalist* (vol. iii., pp. 217, 233), may perhaps be made slightly more complete and exact by publishing the following memoranda. The name of *Hepialus lupulinus* Hb., rightly recorded in Mr. Barrett's work as Irish and occurring in Galway, was referred to by me in its place in the list, on p. 13 of vol. xxvii. of the *Entomologist*, as "Abundant and similarly distributed as the former. I have noticed it flying in the sunshine." But by a typographical error the name was not inserted by the printer at the close of my notice of *H. velleda*. This will be corrected in the reprint. Since publishing my notes on the *Cymatophoridæ* I have seen a specimen of *Asphalia flavicornis* taken by Mr. Dillon at Clonbrock, and also received a letter from Mr. Campbell of Derry withdrawing his record of *C. or* published in the *Irish Naturalist* (vol. ii., 1893, p. 22), and stating that the insect turns out to be *A. flavicornis*. This species will have therefore to be added. A second *Stauropus fagi* was taken by me in Kerry this summer and one at Clonbrock by Mr. Dillon's gamekeeper. Mr. E. Porter also writes that he met with some very small larvæ of the same species on the shores of Upper L. Erne this summer, but failed to rear them. None of the larvæ attributed to *Pygæra curtula* taken by me at Galway and Roscommon, and by Mr. Watts in Co. Down in 1893, survived the pupal stage, so that, as those of *P. pigra* are when full fed very similar, the record of *P. curtula* requires further authentication. The following species mentioned in the notice on "Irish Moths" as having been added by Mr. Dillon to the Irish list, had been taken elsewhere in Ireland previously, namely—*Luperina cespitis*, *Pericallia syringaria*, *Eupithecia fraxinata*, and *E. indigata*. This summer however he has added to the extraordinary series of rarities already announced, single specimens each of *Leucania turca*, and *Ophiodes lunaris*; which he tells me were part of the captures of a gamekeeper, Frank Mason, at Clonbrock, in his (Mr. Dillon's) absence this summer. In reply to the comment on my having published a few of the earlier Clonbrock captures without giving the captor's name and exact locality, I would here desire to mention that I know Mr. Dillon at first intended to send a list of them to an entomological journal; but, on further consideration, decided not to do so for fear of attracting undesirable collectors. Under these circumstances I thought it better to announce the captures without making public the name of the captor, rather than suppress information of such interest. But when further remarkable additions to our fauna turned up, Mr. Dillon at once waived all objection, and sent a list, with full particulars of his most important captures up to date, for insertion in the *Entomologist*.

The Editors of the *Irish Naturalist* kindly give me credit for carefulness when identifying the Clonbrock specimens, and I can only say that I have used my utmost endeavours to assure myself that no accidental inclusion of continental specimens has taken place. Indeed my sceptical enquirers have occasionally verged on impoliteness, which has been condoned in a manner my own incredulity has not always experienced from other collectors. In answer to the stricture upon my having attempted to

acclimatise new species in Ireland, I beg leave to assure my brother entomologists that none of the three or four species of Lepidoptera experimented with by me from time to time are such as would be taken to be indigenous in Ireland. Particulars will be given in my Catalogue, and if any of these exotics should turn up at any time their origin will be at once traceable. But I cannot flatter myself that any success has been attained. No erroneous conclusions therefore are possible under these circumstances. All such experiments ought to be conducted with due precautions against such a contingency, and duly recorded to prevent error. I join heartily in reprobating, in the strongest manner, any careless introduction of British species into our island fauna.

WM. FRANCIS DE V. KANE.

NOTES.

BOTANY.

PHANEROGAMS.

Irish Brambles.—In the *Journal of Botany* for January, Mr. Praeger gives a further enumeration of Brambles collected by him in Ireland, and named by Dr. O. Focke and Rev. Moyle Rogers; of these *R. micans* and *R. saxicolus* do not appear to have been noted in Ireland hitherto, and most of the other notes form new district records.

Vicia lathyroides, L., in Co. Wicklow.—In the early spring of this year I gathered this rare plant in some plenty growing on the flats among the sandhills just south of Arklow.

R. W. SCULLY, Dublin.

Erythræa pulchella, Fr., and Polypogon monspeliensis, Desf. on the North Bull.—I was glad to re-find this *Erythræa* last summer near the coastguard's garden. Mr. More tells me it has not been seen on the Bull for some years. One fine tuft of the *Polypogon*—a most beautiful grass—was growing in a neglected patch of the coastguard's garden, no doubt introduced with seeds.

R. W. SCULLY.

Some Cork Aliens.—In the summer of 1891 I came across the following aliens growing on an extensive rubbish heap beside the river Lee, in the City of Cork. The rubbish heap was apparently derived from a large distillery in the immediate neighbourhood. *Alyssum calycinum*, L., *Sisymbrium pannonicum*, Jacq., *Erysimum orientale*, R. Br., *E. repandum*, L., *Camelina sativa*, Cratz., *Lepidium perfoliatum*, L., *Thlaspi arvense*, L., *Anthemis arvensis*, L., *Bromus tectorum*, L. Of these *Erysimum repandum*, *Sisymbrium pannonicum* and *Bromus tectorum* occurred in great abundance. Several other plants I have not yet been able to name. It will be interesting to note how long the above will hold their ground, and whether they will spread to neighbouring localities.

R. W. SCULLY.

ZOOLOGY.

INSECTS.

Thecla betulæ in Co. Wexford.—Mr. Moffat in the *Irish Naturalist* for October, 1894, comments upon my having omitted Killoughrum Forest as a locality for this interesting butterfly in my "Catalogue of Irish Lepidoptera." Nevertheless, if he will refer again to it he will find "Killoughrum Wood, Enniscorthy, Moffat," included in my notice of its distribution! I was not therefore unmindful of his courtesy, and only wish that he would send me a local list of Heterocera also. I am much interested to hear of *Nisoniades tages* having been taken there.

WM. F. DE V. KANE, Drumreaske, Monaghan.

Lepidoptera at Howth in 1894.—On Feb. 7th, *Phlogophora meticulosa* and *Phigalia pedaria* came to light, one of each. At the end of the month, *Larentia multistrigaria* began to emerge in the breeding pots. The larvæ were from eggs laid by a Howth moth in March, 1893, and were easily fed upon *Galium* of different species. On March 17th, I took *Tæniocampa munda* at Sallows, but not abundantly; I had not observed it at Howth before, and in Birchall's list it is only down for Killarney. In April I took some larvæ of *Epunda lichenea* which fed upon Primrose, and emerged in due course during September. The *Dianthœcia* seemed very scarce this year; even *D. capsophila* was hardly to be found. On June 30th, I took *Venusia cambrica*, which is probably the first record from Howth; Birchall gives but one locality—Powerscourt. In July, *Aplecta nebulosa* appeared at sugar amid swarms of *Xylophasia monoglypha*. In September, *Agrotis precox* and *Cilix glaucata* came to light.

G. V. HART, Dublin.

BIRDS.

Woodcocks nesting in Co. Wicklow.—Lt.-Col. Bayly writes in *Zoologist* for November, that a note in his diary records that on August 3rd, 1866, five Woodcocks, two old and three young birds, were seen by him in the woods at Ballyarthur.

MAMMALS.

Marten in Co. Westmeath.—I have found an entry in an old game-book that has been kept at this house since the year 1814, to the effect that a Pine Marten was killed at Knock Drin, in the winter of 1845-6. The exact date is not specified; but it was on some day between October 23rd, 1845, and January 3rd, 1846.

H. C. LEVINGE (in *Zoologist* for November).

GEOLOGY.

Kitchen Middens, Co. Donegal.—I think Mr. Harte, County Surveyor, was the first to draw attention to these in N. E. Donegal, in a paper read before the R.G.S.I. Afterwards they were recorded by Mr. Mahony, M.R.I.A., of Ramelton, in a paper read before the Glasgow Society. But neither of the explorers recorded worked implements or pottery. Subsequently, when I saw them I concluded that, as in Antrim, the remains of some of the pots in which the water was loaded ought to be found. I carefully searched, but found none. It is therefore extremely interesting to me to learn that Mr. Welch has been more successful. I hope he will follow up his find with worked implements, as they ought to be there similarly as in the Kitchen Middens of S. W. Donegal.

G. H. KINAHAN, Fairview, Dublin.

PROCEEDINGS OF IRISH SOCIETIES.

Royal Zoological Society.

Recent donations comprise a Chough from R. Brennan, Esq.; a pair of Pigeons from Master W. Stubbs; a Heron from H. C. Carey, Esq; a Guinea-pig from J. Condon, Esq.; a Long-eared Owl and a Sparrow-hawk from Captain Carpendale; a Persian Cat from Miss Maher; a Pheasant from W. J. Williams, Esq.; and a Herring-gull from R. V. Sinclair, Esq. A number of fish, including Gunfish, Catfish, Bass, Carp, Tench, &c., have been purchased for the aquarium.

3,500 persons visited the Gardens in November.

Dublin Microscopical Club.

November 15th.—The Club met at Mr. G. H. Carpenter's, who showed rows of teeth on the front tarsi of species of *Corixa*. These, drawn across the edge of the face of the insect, are believed to produce a stridulation. They were described and figured by exhibitor in the *Irish Naturalist* for December, 1894 (p. 253).

Prof. Cole exhibited a section of a rock found in an old collection, labelled "Pyromerine, I. of Elba." The peculiarity of this specimen lies in the fact that the spherulites consist of a well-developed soda-hornblende, the delicate needles of which spread outward from certain centres through a ground of minute micropegmatite, the latter being formed as usual of quartz and felspar. The spherulites in the old "pyromerides" of Corsica are, on the other hand, of the ordinary felspathic type, but developed on a large scale.

Mr. Moore showed *Chlamydococcus pluvialis*, Br, a curious and interesting species of very varying nature, both as to size and shape as well as colour. Some of the individuals were green, others red or brown, and partially green and partially red. It belongs to the Volvocineæ and is closely allied to the "red snow" *Chlamydococcus nivalis*. The specimens had been found under the down-pipe from the roof of Roman Catholic Church near Glasnevin, the stones under the spout appearing as if they had received a coat of red paint.

Mr. M'Ardle exhibited a specimen of *Herberta adunca*, Dicks (B. Gr.), a liverwort which he collected last May on Connor Hill near Dingle, where it grows in large tufts. The leaves are arranged in four rows of a bright yellow colour, ovate lanceolate in outline, secund, deeply divided into two attenuated lobes. Their structure is interesting; the cells are well defined; those at the base of the leaf and along the centre of its two segments are linear, and of a different shape from the others, and have thicker walls forming a pseudo-nerve; the outer cells are crenated, with the surface raised into delicate striæ. This distinct plant is held by many good authorities to be the Irish form of a Himalayan liverwort collected by Sir J. D. Hooker, known under the name of *Sendtnera juniperina*, Swartz.

Dr. M'Weeney showed cultures and slides of *Streptothrix nigra* Gasperini, a peculiar form intermediate in position between the Schizomycetes and the higher Fungi, found by him in a brownish stratum of clay about three feet below the surface at the Richmond Asylum, Dublin. The organism consists of tufted masses of branching threads resembling mycelium, were it not for their extreme tenuity (.5—1μ). The colonies on various nutrient materials become surrounded by a very conspicuous brownish-black pigment. When they have attained a certain age they become whitish and flocculent at the periphery. This corresponds to the formation of aerial branches the apices of which swell up, and come to contain minute spores. The ray-fungus, to which the now well-known Actinomycosis is due, belongs to the genus *Streptothrix* and is closely allied to the present species, which was first found in earth and soil about two years ago by Gasperini and subsequently rather abundantly in the air of Rome and other places in Italy by Rossi Doria. This is the first note of its occurrence in the British Isles.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

NOVEMBER 13th.—The seventy-fourth session was opened in the Museum, College Square North, when the inaugural address was delivered by the President (Mr. ROBERT LLOYD PATTERSON, J.P., F.L.S.)

Mr. PATTERSON said that, on assuming the presidential chair at that the opening meeting of the seventy-fourth session of their Society, he was pleased at being able to congratulate his fellow-members on its continued vitality and activity, notwithstanding its advancing years. To the thoughtfulness of a lady—a life-long friend and well-wisher of the Society, the late Miss Thompson—they were indebted for the bequest of an admirable portrait of her brother, Mr. William Thompson, one of the most distinguished of their former Presidents. A member had presented a very good likeness of another former President, Mr. Robert Patterson, while to a valued and useful member, Mr. Swanston, they were much indebted for the recent gift of a bust of one of the most eminent naturalists the century had produced—Professor Edward Forbes—a man of truly remarkable powers and brilliant genius. The three had been united in bonds of the closest friendship, cemented by a community of taste and of interest in certain branches of science, a pursuit which was to Forbes a profession: to Thompson—a man of means and leisure—an occupation; but to Patterson—a man of business—merely a relaxation. It occurred to him (the President) that the acquisition by the Society almost simultaneously of these mementoes of the three friends might fittingly be made the occasion of a brief review of their lives. He could not recall Mr Forbes. He knew he had seen him; but he remembered Mr. Thompson very well indeed. He was the first of the three to be called away. After speaking of the early life of Mr. Thompson, the President pointed out that his first contribution to the proceedings of one of the English learned societies seemed to have been in 1833—a communication on the Arctic Tern and other rare birds observed in Ireland, made to the Zoological Society of London. From that period up to the time of his premature and lamented death he was a frequent and valued contributor to the different English scientific journals.

As to Robert Patterson, he should for obvious reasons say less. He survived his friend Thompson exactly twenty years. His was an uneventful, busy, happy life, passed in a business to which he had been brought up, which he inherited from his father, and left to his eldest son. With him literature and science, although a passion, were merely a relaxation, not an occupation. His books were written in the leisure of his evenings at home, and published with the hope of enlisting more general interest in the study of Natural History. He was one of the earliest, strongest, and most consistent advocates for the adoption of Natural History as a regular part of the education of our youth, and he lived to see the realisation of much of his dream. Mr. Patterson was one of the seven founders of the Society in 1821. He passed through almost every minor office in it till 1852, when on Mr. Thompson's death he was elected President, an office which he subsequently filled on more than one occasion. Referring to Professor Forbes, the speaker said he was an original and commanding genius, and a most interesting personality. He was born at Douglas, Isle of Man, on the 12th February, 1815, and died at Edinburgh on the 18th November, 1854, aged only thirty-nine years and nine months. During his short life he accomplished an enormous amount of work. Mr. Patterson then gave some very interesting particulars of Forbes's life, taken from his biography. Of him it was no exaggeration to say that his was a most original, versatile, and brilliant intellect of the highest order. His early death was an irreparable loss to the whole scientific world of the period.

The President of the Belfast Queen's College (Rev. Dr. HAMILTON) moved a vote of thanks to the President for his address.

Mr. ROBERT YOUNG, J.P., seconded the motion, which was passed by acclamation, and the meeting then concluded.

BELFAST NATURALISTS' FIELD CLUB.

NOVEMBER 20TH.—The President (Mr. F. W. LOCKWOOD, C.E.) delivered his opening address. He congratulated the Field Club upon its continued prosperity and the recent great increase of zeal as indicated by the formation of various subsections, such as the Microscopical Committee, the Celtic Class, the Photographic Committee, and the Geological Committee, all of which were doing good work. He then went on to comment at greater length upon the investigations by the Geological Committee into glacial phenomena generally. The various changes of opinion on this question were commented upon, and the principal theories upon the Great Ice Age described at some length. In conclusion, the speaker remarked that it was singular how little use appears to have been made of the microscope in these investigations. Marine clays almost invariably yield specimens of foraminifera and kindred forms, which are strictly sea-water genera, yet except by their fellow-member, Mr. Joseph Wright, the Boulder clays do not appear to have been systematically searched for them. So far as this section of the country was concerned the Geological Committee of the Club could not do better than in continuing the work they had so energetically commenced, and if they could persuade a sufficient number of competent observers in Great Britain to take up the microscopic investigations of the Boulder clays there, the geologists of Britain would be in a fair way to solve the great glacial problem.

Mr. JOSEPH WRIGHT, F.G.S., mentioned that with geologists in the North of Ireland it had always been considered as a marine deposit, and so long ago as 1841 General Portlock, in his report on the geology of Londonderry, recorded the occurrence of marine shells in this drift. Subsequently Mr. S. A. Stewart published in the Club's Proceedings a list of the mollusca of the Boulder clay in which he recorded the occurrence of shells from a number of North of Ireland localities, proving that the clay in question was fossiliferous. Some of the bivalve mollusca, especially two species of *Leda*, were found by him having the valves united, showing that these species must have lived on the spot in which they were found. Mr. Wright made a microscopic examination of the same clays, and in every case he found them to contain foraminifera. He also met with foraminifera in many samples of the clay which were devoid of molluscan remains, these tiny rhizopods being as perfect as when brought up by the dredge from our existing seas. From that time up to the present further examinations of the Boulder clay have been made and always yielded similar results. He also stated that, through the courtesy of a Scotch geologist, Mr. James Neilson, he received five samples of Boulder clay from the vicinity of Glasgow, in all of which foraminifera were present. In addition to these, he received from Mr. John Stears, of Hull, a packet of Boulder clay from that locality. This sample of English Boulder clay was also found to contain foraminifera. These results are interesting by reason of the common occurrence of these marine microzoa, most English and Scotch geologists having been hitherto of the opinion that the Boulder clay was the result of land ice, and had not a marine origin.

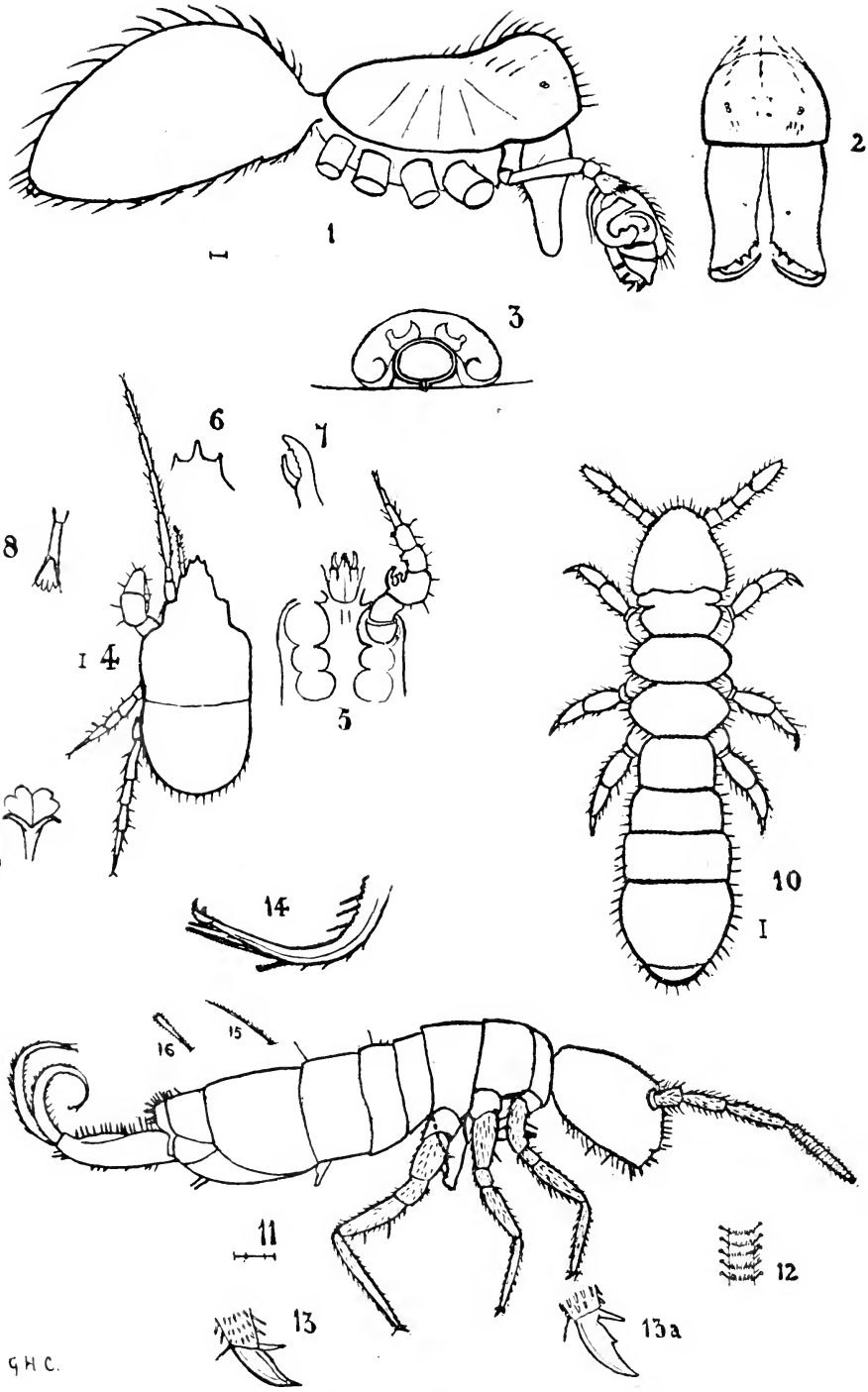
Mr. A. PERCY HOSKINS, F.I.C., F.C.S., read a carefully-prepared analytical paper on a sample of glauconite from Woodburn, Carrickfergus.

Mr. R. LLOYD PRAEGER made some general remarks on the history and work of the different Irish Clubs, and brought forward a scheme for a union of all the Field Clubs of Ireland, and for a general conference next summer.

The PRESIDENT and Mr. JOSEPH WRIGHT spoke in favour of the scheme, and Mr. WILLIAM GRAY, M.R.I.A., offered some criticisms.

Mr. F. J. BIGGER, Honorary Secretary, in supporting the scheme, said it was not contemplated that the individuality of the clubs, nor their power over their own work, should be interfered with in any way, but that a Central Committee of all the Clubs should be appointed for carrying on general work.

Mr. W. H. PATTERSON, M.R.I.A., also spoke in favour of the scheme.



ANIMALS FROM THE MITCHELSTOWN CAVE.

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ANIMALS FOUND IN THE MITCHELSTOWN CAVE.

BY GEORGE H. CARPENTER, B.SC.

(Read before the Dublin Naturalists' Field Club, December 11th, 1894.)

THE joint meeting of the Dublin, Cork, and Limerick Field Clubs, held at Fermoy during the past summer, will remain a pleasant memory to all who were privileged to take part in it. Of the various excursions undertaken on that occasion, the most novel and fascinating to the majority of those present was, doubtless, the exploration, on the afternoon of July 6th, of the famous caverns situated in the Carboniferous Limestone, near Mitchelstown. An interesting account of the topography of these caves, illustrated by a map, has recently been published[1] by Rev. Courtenay Moore, Rector of Mitchelstown. Upon the occasion of our visit, an early start was made from Fermoy, the distance to Mitchelstown being about fifteen miles. Before arriving at the entrance to the cave, our party made a circuit and drove a short distance up one of the gorges on the southern slope of the Galtees. This fine mountain-range rising to a height of 3,000 feet, is, like most of the ranges of southern Ireland which run from east to west, composed of sandstones, grits, and conglomerates, ascribed to the Old Red or basement-Carboniferous formation, and thrown into an anticlinal fold. The synclinal areas between the ranges are outcrops of the Carboniferous Limestone, and it is on the face of a hill of this rock, opposite the Galtees, at a few miles' distance, and about 400 feet above sea-level, that the entrance to the cave is situated. The excavation of such caves in limestone through the chemical action of gases dissolved in subterranean streams, and their subsequent adornment with stalactites and stalagmites by the deposition of salts held in solution by

[1] *Journ. Cork Hist. Arch. Soc.* vol. iii., 1894, pp. 1-5.

waters percolating through the rock, are sufficiently familiar. The Mitchelstown Cave will not disappoint either geologist or artist in search of interesting or beautiful forms among its arches, pendants, and columns.

To the zoologists of our party, however, the interest of the place centred in the fact of its being the only cave in the British Isles known to be inhabited by a member of the peculiar blind, subterranean fauna, which, through explorations of the European and North American caverns, now includes some hundreds of species. In 1857, Dr. E. Perceval Wright and the late Mr. A. H. Haliday discovered here a minute insect of the order Collembola, which they described in a paper read before the British Association meeting at Dublin that year,[1] and identified doubtfully with *Lipura stilicidii*, Schiödte, inhabiting the Aldesberg grotto, Carniola. To re-find this species was therefore our object, and we hoped also that the discovery of some other inhabitants of the place might reward our search.

The hill in which the cave is situated forms part of a small farm, the occupiers of which are well acquainted with the passages, and act as guides. After an informal luncheon on the roadside, our party, provided with candles, descended the sloping passage, and ladder which lead to the depths below. The time at our disposal was only two hours—far too short to explore all the galleries and chambers—and we did not reach the underground river, in which Dr. Wright and Mr. Haliday sought vainly for blind crustaceans. The rate of progress was necessarily slow, so that we were able to examine the floor and sides of the passages with some thoroughness, in our search for insects. At no great distance from the entrance, I was delighted to find three small pale spiders (a male and two females) crawling over one of the large blocks of rock on the floor. I recognised them as belonging to the genus *Porrhomma*, and hoped they might prove to be referable to *P. myops*, Simon, described from a cave in southern France, and with only the female known. Subsequent examination proved this hope well-founded. Collecting underground was somewhat difficult, the necessity for carrying a candle seriously reducing the number of fingers available for seizing and bottling specimens. Under these conditions we willingly came to each other's help

[1] *Nat. Hist. Rev.*, vol. iv., 1857, Proc. pp. 231-241, pl. xviii.

in the matter of showing a light. My friends and colleagues, Messrs. A. R. Nichols and J. N. Halbert, were indefatigable in searching during the whole time of our stay below-ground, and their efforts were heartily seconded by several of the Cork members, and Mr. F. Neale from Limerick. Mr. Nichols took the single specimen of the interesting species of mite, *Gamasus attenuatus*, described below; while it was Mr. Halbert who, in one of the large chambers at a distance from the entrance, found the first specimen of the *Lipura* discovered by Messrs. Wright and Haliday. A fair number of examples of this insect were secured. They occurred, mostly beneath stones, among the very fine, moist red clay which, in many places, carpets the floor of the chambers. Only a minority of the specimens proved to be adult—a similar experience to that of Dr. Wright. In the farthest chamber which we reached, much amusement was caused by the discovery of an animal which was clearly not a member of the cave fauna, but, like ourselves, a visitor from the outer world. This was a common Frog, whose sojourn in darkness was brought to a startling end by the advent of our candle-bearing procession. On the way back, I was so fortunate as to find beneath a stone a fully-grown specimen of another blind Collembolan, readily differentiated from the *Lipura* by the possession of a well-developed "spring." Subsequent examination revealed the presence of one or two young individuals of the same species among the specimens of *Lipura* which had been collected. This "spring-tail"[1] is perhaps the most interesting animal which we found. It belongs to the genus *Sinella*, Brooks,[2] though it is hard to find any good character by which to separate it from *Degeeria cavernarum*, Packard, described from specimens taken in various caves in the United States. The latter species, however, according to Packard, has, on the feet, distinct clubbed (tenent) hairs which are never present in *Sinella;* so I feel compelled to describe the Mitchelstown insect as new to science.

[1] In the preliminary report of the expedition (*Irish Nat.*, 1894, p. 183), this insect was wrongly recorded as *Templetonia crystallina*, Müll. I was led into this error, on a hurried examination, by the white colour and ringed terminal joint of the antenna. Subsequent study showed an entire absence of scales, effectually removing the insect from *Templetonia*.

[2] *Journ. Linn. Soc.* (*Zool.*), vol. xvi., 1883, p. 541.

Near the entrance we found two or three earthworms, one of which I have sent to the Rev. H. Friend, who pronounces it to be *Allurus flavus*, a form described by himself and not hitherto recorded from Ireland. He has kindly furnished a short account of this worm, which will be found at the end of the present paper (p. 35).

I now proceed to describe in detail the four other animals which we found.

ARACHNIDA.

ARANEIDA.

THERIDIIDÆ.

Porrhomma myops, Simon.

(Plate 2, figs. 1-3.)

THIS species was described by M. Simon[1] from a female taken in the cavern of Espezel, Department Aude, in southern France Another female has since been found in Dorsetshire by Rev. O. P. Cambridge (probably in some underground locality), and this specimen has recently been recorded and (in part) figured by Rev. F. O. P. Cambridge.[2] One of my females has been compared by Rev. O. P. Cambridge with his specimen (which was named by M. Simon), and he kindly informs me that he cannot differentiate them. It is possible, in this genus, that two indistinguishable females might have to be referred to distinct species, were their males known. I think it better, however, to consider the spider from Mitchelstown as *P. myops* until a male shall have been discovered in the French cave, and shown to be distinct from that now described.

Length of male, 2 mm.; of female, 2.5 mm.

Cephalothorax and falces, pale orange; head-portion high and convex, specially in the male, clothed with rows of hairs, which are longer in the male (fig. 1).

Eyes very small; hind-centrals two diameters apart, fore-centrals nearly in contact; laterals in contact, four or five diameters from centrals. In my male the centrals are almost obsolete. Clypeus twice the width of ocular area (fig. 2).

Palpal organ of male with strong rounded prominence beneath falciform process (more marked than in the nearly allied species *P. egeria*, Simon); apex of bulb regularly conical, somewhat blunt (obliquely conical and sharp in *P. egeria*), with two strong curved spines (one bent in form of S, not present in *P. egeria*) (fig. 1).

Legs very pale straw colour, long and slender; metatarsi without spines. Femur of first pair with one dorsal spine about the middle, and one lateral towards the apex. Femur of second pair with one dorsal spine (female); without any spine (male). The femora of the male, specially the first pair, longer and more slender than those of the female.

[1] Les Arachnides de France, vol. v., p. 358. Paris, 1884.

[2] *Ann. Mag. Nat. Hist.* (6), vol. xiii., 1894, pp. 100, 107, pl. ii., fig. 6.

Abdomen very pale greenish. Epigyne of female with large cavity, front margin rounded, hind margin straight, with small central prominence (fig. 3).

M. Simon describes thirteen species of this genus, of which no less than five are inhabitants of caves, while most of the others are found under stones and in similar concealed situations. A colony of a British species, *P. micropthhalmum*, Cb., was found in 1860, by Dr. Meade,[1] established at the bottom of a Durham coalpit. Quite recently,[2] Rev. F. O. P. Cambridge has recorded *P. egeria* from the Somerset cavern known as Wookey Hole, and remarks that sometimes the hinder, sometimes the front pair of central eyes, are aborted. *P. egeria* has, however, been taken in numbers near Edinburgh,[3] running on railings in sunshine, and thus appears to live indifferently above or underground. *P. myops*, on the other hand, seems a true subterranean species. It is very nearly allied to *P. egeria*, but may be distinguished by the characters of the male palp, given above. Moreover, *P. egeria* has three spines on the first, and two on the second femur. It is also a somewhat larger spider than *P. myops*, and decidedly less pale and washed out in appearance. Even the specimens from Wookey Hole (a pair of which Mr. F. Cambridge has generously sent me for comparison) do not show the sickly aspect which characterises *P. myops* from the Mitchelstown cavern.

The excessively small eyes of this spider, and their tendency to become altogether obsolete, are in accordance with the subterranean dwelling place. The small size of the eyes is, however, characteristic of the entire genus, even for those species which live in the open air.

It is remarkable that the underground species of *Porrhomma* are omitted from the list of European cave animals given in Prof. Packard's exhaustive memoir upon the cave-fauna of North America.[4] There is, however, a spider described (by Mr. J. H. Emerton) in that memoir under the name of *Linyphia incerta*, which certainly belongs to the genus *Porrhomma*, and is, I believe, identical with our Mitchelstown *P. myops*. Mr. Emerton's figures of the male palpal organs of his species show the regular conical apex of the bulb and the two curved apical spines which characterise those organs in *P. myops*. If a comparison of types should justify this opinion, Mr. Emerton's name, having been first published in 1875,[5] will take priority of M. Simon's, and our species will have to be known as *Porrhomma incerta*. This North American spider—which, at any rate, is extremely near the Mitchelstown species—has occurred in the Fountain Cave, Virginia, and in the Bat Cave, Kentucky. Mr. Emerton states that in different individuals a variable number of the central eyes may be wanting.

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[1] *Zoologist*, 1860.

[2] *Ann. Mag. Nat. Hist.* (6), vol. xv., 1895, p. 36, pl. iv., fig. 13.

[3] *Proc. R. Phys. Soc. Edin.*, 1894, p. 560.

[4] *Mem. Nat. Acad. Sci.* (Washington), vol. iv., 1888.

[5] *Amer. Nat.*, vol. ix.

AGARINA.

GAMASIDÆ.

Gamasus attenuatus (Koch), Berlese.
(Plate 2, figs. 4–9.)

My best thanks are due to Mr. A. D. Michael, F.L.S., for kindly suggesting, from my rough sketches, this identification. He states the species to be not uncommon in England among dead leaves, &c.

Length, 1·3 mm. Pale fawn colour. Body elongated. Epistome (fig. 6) terminating with three points, of which the central is the longest. Mandibles (fig. 7) with evenly rounded fingers, the upper with a tooth near apex. Second pair of legs (fig. 5) greatly thickened, third joint with a long, curved blunt tooth beneath at base, and a shorter bifid process; fourth and fifth joints with short, blunt processes at apex; sixth joint without any process.

This mite is closely allied to *G. magnus*, Kramer[1], with which the form of the epistome agrees almost exactly. It differs from that species however in the even shape of the mandibles, which have no projection above. From *G. subterraneus*, Kramer[2], it may be distinguished by the sides of the epistome being straight, not convex, as well as by the armature of the second pair of legs. In this last character, as well as in general aspect, our species agrees nearly with a Carniolan cave species, *G. niveus*, Wankel[3], but in that form the epistome is figured as ending in a single pointed process.

All the Gamasidæ are blind; several species are known from caves, and many live in concealment beneath stones, dead leaves, &c.

INSECTA.

COLLEMBOLA.

ENTOMOBRYIDÆ.

Sinella cavernicola, sp. nov.
(Pl. 2, figs. 11–16.)

Length of head and body, 2·5 mm. White. Eyes wanting. Antennæ nearly twice as long as head; terminal joint the longest, slender, ringe with clubbed hairs (fig. 12). Tarsal joints without tenent hairs, large claw of first pair of feet with small tooth (fig. 13a), others without distinct tooth (fig. 13). Fourth abdominal segment hardly as long as the three preceding. Spring two-thirds as long as body; terminal claws evenly curved, with a small tooth as in *S. curviseta*, Brook. No clubbed hairs on thorax, but a large number of short ones on hindmost abdominal segments and on spring.

The genus (*Sinella*) to which this species evidently belongs, is distinguished from *Isotoma* by the possession of clubbed hairs, from *Entomobrya* (*Degeeria*) by the absence of tenent hairs on the feet. It is very similar to

[1] *Arch. fur Naturgeschichte*, xlii., 1876, p. 91. pl. iv., fig. 9, pl. v., ff. 14, 33.

[2] *T. c.*, p. 92, pl. v., fig. 24.

[3] *Sitz. Kaiserl. Akad. Wien.* (*Mat.-Nat.-Class*), vol. xliii., 1861, p. 262, pl. iv., ff. 8–10.

the type species *S. curviseta*, Brook, but may be readily distinguished by the absence of eyes, of teeth to the hinder foot-claws, and of long clubbed ciliated thoracic hairs; and by the possession of distinct rings of hairs on the terminal joint of the antennæ. There are some long tapering finely-ciliated hairs (fig. 15) on the second and third abdominal segments. As in *S. curviseta*, there are a pair of long ciliated sheath-hairs at the apex of the spring (fig. 14).

Sinella curviseta has occurred both in the north and south of England, as well as on the Continent, but I do not think it has yet been recognised in Ireland. The presence of a cave-species so nearly related makes it likely that this or another open-air insect of the genus will be found here too.

For a long time I was disposed to consider *S. cavernicola* identical with *Degeeria cavernarum*, Packard; but the presence of a tenent hair on the feet in that species obliges us to consider it a true *Entomobrya*. It is hard to find any other distinction which warrants the separation of our insect from the North American spring-tail.

LIPURIDÆ.

Lipura Wrightii, sp. nov.

(*L. stilicidii*, Wright and Haliday).

(Plate 2, fig. 10.)

Length 2 mm. White. Antennæ as long as head; terminal joint the longest, conical. No ocelli or post-antennal organ. Head longer than broad, with hind-margin sinuate. Pronotum with a constriction on either side. Legs moderately long and stout. No anal spines.

When recording the capture of this insect, and describing its structure, in Dr. Wright's paper already mentioned, the late Mr. A. H. Haliday referred it with doubt to Schiödte's species, and pointed out various particulars in which it differs from that form. The most striking of these is the entire absence, in the Mitchelstown insect, of the ocelli (according to Tullberg and Sir J. Lubbock, really the post-antennal organ), of which Mr. Haliday could find no trace. After so accurate an observer, it is needless to say that I have also failed to find the organ. The legs and antennæ of our species, moreover, are not relatively so long and slender as those of *L. stilicidii*. I am quite inclined to agree with Mr. Haliday's suggestion that Schiödte was mistaken in figuring all the thoracic segments in his form as divided into an anterior and a posterior part by a transverse constriction. When one is examining specimens by transmitted light, the lateral extensions of the thorax which bear the legs are readily to be mistaken for dorsal segments. There is on either side of the pronotum a constriction running in for a very short distance. This is shown in Haliday's figure, which represents the side view of the insect. I have drawn the dorsal aspect, which will enable comparison to be made with Schiödte's figure copied by Haliday. The Mitchelstown species in the length of antennæ and legs seems to be intermediate between *Lipura stilicidii* and *L. fimetaria*, Lubb.—another white species common in damp mould. While not so slender as those of

the former, the appendages of *L. Wrightii* are not so short and stumpy as those of the latter, which, however, our species resembles much in general structure, and in the absence of anal spines. It seems probable that it may be really an offshoot of *L. fimetaria*, modified for cave-life, the lengthening of antennæ being a common occurrence in subterranean insects. These considerations have induced me to give the insect a new name, and none could be more suitable than that of the naturalist whose earliest paper announced its discovery, and who has since done so much to advance the knowledge of Irish Natural History.

Reviewing these animals, we notice that (except the mite) they all present the characters of true troglodytes. All are more or less bleached, the two insects being perfectly white. The two insects are totally blind (the mite, of course, cannot be reckoned, as it belongs to a blind family), and the spider is clearly in process of becoming so. The peculiar modifications which cave animals have undergone have been variously explained, and have been much used by recent writers in discussions upon the factors of evolution. The bleaching and loss of eye-sight which these creatures exhibit are by some attributed solely to their life in total darkness, by others to the action of natural selection with regard to some portions of their organization and its necessary cessation (panmixia) with regard to others, in the new surroundings.

No naturalist doubts that these cave-dwellers are the modified descendants of inhabitants of the upper air, which were provided with eyes, and coloured after the usual manner of their genus. There can be no doubt that the production of pigment is largely dependent upon the presence of light, and it seems very likely that a life in darkness is alone sufficient to account for the bleaching characteristic of cave-dwellers. Instances are given by Professor Packard of individuals belonging to the open-air fauna being quite bleached when found in caves, the loss of colour having here occurred during the life-time of the individual. On the other hand, colour must be absolutely useless to dwellers in total darkness, to conceal them either from enemies or prey, and would therefore tend to disappear through the cessation of selection of individuals coloured in any particular way. Similarly, the loss of eyes may be attributed either directly to disuse through a life in darkness, or to the cessation of selection with regard to those organs, since they can be no longer of use to their possessors. Professor Ray Lankester has suggested that animals with

defective vision would become segregated in caves, since those with the best eyesight, when carried in, would be most easily able to find their way back to daylight. There is another factor to be taken into account, that known as "economy of nutrition." There is a general tendency among cave-animals to a decrease in size, and their food supply is undoubtedly very limited. Hence, to get rid of any useless organ would seem to be of considerable benefit; and this last factor would be more likely to produce some effect among cave-dwellers than among species living in the open air.

A word as to the nourishment of these cave animals may be of interest. Springtails live on vegetable refuse. The food canal of every specimen of the *Lipura* which we collected was filled with the fine red earth already mentioned as lining the bottom of the cave. The species of *Lipura* are generally found in damp mould, &c., and with this their intestines are filled; it appears therefore that they obtain their nutriment from the vegetable substances contained in the mould. But one would think that the amount of organic matter in the red earth of the cave must be excessively small. No doubt it is, but fragments of wood, &c., must be often carried in by water, while some of the lower fungi find in the caverns a congenial home. From the disintegration of these, diffused through the earth, the insects have to win their precarious livelihood. Dr. E. Perceval Wright has kindly told me that collectors in the Carniolan caves secure insects by leaving pieces of wood as traps. The creatures must gladly leave their precarious nourishment for the opportunity of such a feast. The spiders, of course, live by prey, though it seems they can have but little to ensnare. The habit of the family to which *Porrhomma myops* belongs is to spin a web of irregular, intercrossing threads. If the cave-dwelling spider has maintained this habit, it probably lives on insects which stray into its dark abode from the outer world. But the fact that the specimens taken were found walking on the rocks rather suggests that they hunt for the cave-insects. Gamasid mites are stated by Mr. A. D. Michael[1] to devour Lipuridæ, so *Gamasus attenuatus* must find suitable food in the Mitchelstown cave.

The apparent geographical distribution of the animals demands a short consideration. The *Lipura* is hardly to be

[1] *Journ. Linn. Soc.* (*Zool.*) vol. xv., 1881.

separated from a species found in the caves of Carniola, and the *Sinella* is almost identical with one inhabiting the caves of North America; while the spider is apparently the same as a cave-dweller from the Mediterranean district of southern France, which probably occurs in the North American caverns also. Had we to do with animals of the upper fauna, these results, though highly interesting, would not be without parallel in species already known. The identity of certain Irish animals and plants with south European (Pyrenean and Mediterranean) forms has long been one of the most marked peculiarities of our fauna and flora; while we possess at least a few North American plants found nowhere else in Europe. But the occurrence of cave-dwelling species with so wide a range is a truly remarkable phenomenon. The caves cannot be of any great geological age. Any possible geographical connection which would permit the migration of subterranean animals between southern Europe and Ireland, or between Ireland and North America seems altogether out of the question within any period during which the fauna can have been specifically identical with that of the present day. The only conclusion is that from ancestors, presumably of the same genus, which took to an underground life in such widely-separated localities, the similar conditions of the caves have evolved descendants so similar that when compared, they cannot or can hardly be specifically distinguished from each other. Should the identifications suggested in this paper stand the test of a comparison of types, we shall have proof that the independent development of the same species, under similar conditions, but in widely distant localities, has taken place. It must be granted, however, that cave-conditions are so marked and exceptional, that it might not be safe to argue from them as to what may have occurred in the upper world.

With the exception of Mr. F. Cambridge's record of *Porrhomma egeria* from the Wookey Hole, I am not aware of the observation of members of the subterranean fauna in any British cave except Mitchelstown. It seems almost certain that a careful search would reveal further localities and new species. The great development of the Carboniferous Limestone area in Ireland, and the number of caverns known to exist in the formation, marks the country out as

a specially fruitful field for a research into cave-life. If a couple of hours' collecting in one cave has yielded such interesting results, what may we not expect when we have adequately searched all the underground chambers which the streams of ages have hollowed out in the limestone of our great central plain?

EXPLANATION OF PLATE 2.

Fig. 1.	*Porrhomma myops*, Sim.,	-	Male, side view, legs removed.
,, 2.	do.	-	do., front view, showing eyes and falces.
,, 3.	do.	-	Female, epigyne.
,, 4.	*Gamasus attenuatus*, Koch,	-	Male, dorsal view.
,, 5.	do.	-	do., ventral view, with leg of 2nd pair.
,, 6.	do.	-	do., epistome.
,, 7.	do.	-	do., mandible.
,, 8.	do.	-	do., foot of leg of 2nd pair.
,, 9.	do.	-	do., ,, ,, 3rd ,,
,, 10.	*Lipura Wrightii*, sp.n.,	-	Dorsal view.
,, 11.	*Sinella caverniola*, sp.n.,	-	Side view.
,, 12.	do.	-	Portion of terminal joint of antenna.
,, 13.	do.	-	Foot of 3rd pair of legs.
,, 13A.	do.	-	,, 1st pair of legs.
,, 14.	do.	-	Apex of spring.
,, 15.	do.	-	Ciliated hair from 3rd abdominal segment.
,, 16.	do.	-	Ciliated hair from spring.

A NEW FORM OF IRISH EARTHWORM.

BY REV. HILDERIC FRIEND, F.L.S.

THROUGH the kindness of Mr. Carpenter I have received a specimen of an earthworm which has not hitherto, I believe, been recorded for Ireland. It was found in Mitchelstown Cave, Co. Tipperary, and being a perfectly developed adult form was readily identified. It is the golden Allurus, *Allurus flavus*, Friend (*Naturalist*, Jan., 1893, p. 20), and is worthy of a brief notice. I first found this worm in the river Calder a couple of miles from Carlisle, Cumberland, where its colour was a rich orange yellow. It was abundant, and had the girdle extending over segments 22–27, while segments 23, 24, 25 bore the clitellar papillæ. Later on I found a solitary specimen in a little stream near Apperley (Calverley Woods),

in Yorkshire. When preserved in alcohol this specimen from segments 14 to 16 was darker in colour than the rest of the worm, which on dissection proved to be the result of a mixture of quartz granules and vegetable matter intermixed in the intestines, and showing through the semitransparent body. I found an opening in the middle of segment 10 with a pair of penial setæ, which differ widely from those which are arranged in pairs on each segment of the body. In other particulars it differed considerably from the type, and though it is difficult to specify any characters which entitle it to rank at present as a distinct species, it is undoubtedly a distinct form or variety. Eisen found specimens which he named var. *luteus*, but from his brief description this differed from the present form. We do not yet know enough of the habits, habitats, structure and distribution of this interesting genus to determine the number of species which exist, as every writer finds some particular in which the specimens examined by him differ from the descriptions of others. Rosa's "Revisione dei Lumbricidi" (Torino, 1893) contains (pp. 71 seq.) one of the latest summaries, but *A. flavus*, Fr., is not included. The following are the external characters of the Mitchelstown Cave specimen, and to this account I shall be glad to add a further diagnosis if further specimens can be obtained for dissection and microscopic examination.

Allurus flavus, Friend.

Found at Mitchelstown Cave, July, 1894. Length in alcohol 1 inch, total number of segments 80, yellow in colour. Girdle extending from segment 22 to 26, with papillæ on one side only of segments 28, 29. On the under side of the girdle the clitellar band extends over segments 23, 24, 25 on either side. Perhaps to be regarded as only a well-marked variety of *A. tetraedrus*, Sav., the variation being due to some peculiarity of soil or habitat yet to be determined.

THE DISTRIBUTION OF THE CHARACEÆ IN IRELAND,

BY H. AND J. GROVES, F.L.S.

(*concluded from page* 11.)

Chara tomentosa, L.

130. Galway, E., R. Shannon, below Portumna, 1843. D. Moore.
133. Westmeath, - Belvidere Lake (L. Ennel), 1841, D. Moore. Coosan Lough, 1886, R. P. Vowell. L. Derevaragh and L. Owel, 1892, H. C. Levinge and H. and J. G.

This is perhaps the most interesting and characteristic of all the Irish *Characeæ*, and in the British Isles is apparently confined to Ireland.[1] All the localities cited above belong to the Shannon drainage, although L. Owel is now used as a reservoir for the Royal Canal. The small form with most of the joints of the branchlets uncoated and much swollen, which was first discovered by Dr. D. Moore, and figured by Hooker as *C. latifolia*, Willd., is that occurring in rather shallow water with a comparatively hard bottom, but the large well developed form three or four feet high is plentiful in the deeper muddy bays of several of the lakes. We found a very curious slender form in L. Owel. *C. tomentosa* is recorded from Sweden, Denmark, Germany (in many places), France (Normandy) Switzerland, Austria, Turkey, Russia, Persia and Algiers.

C. hispida, L.

113. Kerry, S., - - Killarney, 1887. R. W. Scully.
114. ,, N., - - Near Ventry, 1894. D. M'Ardle.
121. Queen's Co., - - Near Farmhill, 1890. R. W. Scully.
123. Wicklow, - - Murrough of Wicklow, 1877. D. M'Ardle.
124. Kildare, - - - Below Athy, 1890. R. W. Scully.
125. Dublin, - - - Raheny, 1893. R. Ll. Praeger.
127. Louth, - - - Dundalk, 1883. J. F. Crofts.
128. Limerick, - - Near Foynes, 1884. S. A. Stewart.
129. Clare, - - - Near Ennis, 1884. S. A. Stewart.
130. Galway, E., - - L. Derg, 1881. Bolton King.
133. Westmeath, - - Belvidere L. D. Moore.
135. Galway, W., - - Roundstone, 1868. C. Bailey.
138. Sligo, - - - Coolgagh L., 1883. S. A. Stewart.
140. Roscommon, - - L. Ree, 1886. R. M. Barrington.
145. Armagh, - - Near Grange, 1892. R. Ll. Praeger.
147. Down, - - - Downpatrick, 1891. R. Ll. Praeger.
149. Londonderry, - R. Bann, Coleraine. D. Moore.

[1] A curious sterile plant collected in Norfolk, in 1881, by Mr. Arthur Bennett, was referred by Dr. Nordstedt to this species and, at the time, we concurred in this view. It has not so far as we know been collected since, but in the same locality we have found some intermediate plants, which we think may be hybrids, and which in some characters approach closely to Mr. Bennett's specimen though they do not look so much like *C. tomentosa*. We are, therefore, inclined to doubt whether we were right in recording the Norfolk locality for the species.

C. hispida, var. **macracantha,** Braun.

123. Wicklow, - - Hb. Moore.
125. Dublin, - - - Maynooth, 1890. D. M'Ardle

var. **rudis,** Braun.

125. Dublin, - - - Royal Canal near Lucan, 1889. R. W. Scully.
130. Galway, E., - - L. Derg, 1881. Bolton King.
133. Westmeath, - - Brittas Lake, 1892. H. C. Levinge and H. and J. G.
135. Galway, W., - - Arranmore, 1891. S. A. Stewart.
140. Roscommon, - - L. Ree, 1886. R. M. Barrington.
145. Armagh, - - - Quarries near Navan Fort, 1892. R. Ll. Praeger.
147. Down, - - - Loughinisland, 1887. S. A. Stewart.

C. hispida is a common European species, but outside Europe it has only been recorded from Tunis and Siberia. The var. *rudis* is a very well-marked plant and is more entitled to notice than most of the named forms; indeed it has sometimes been regarded as a separate species. It is much commoner in Ireland and Scotland than in England.

C. vulgaris, L.

113. Kerry, S., - - Caragh, 1888. R. W. Scully.
114. „ N., - - Castle Gregory. Hb. Moore.
121. Queen's Co., - - Near Farmhill, 1890. R. W. Scully.
123. Wicklow, - - Near Bray, 1866. R. M. Barrington.
124. Kildare, - - - Near Athy, 1890. R. W. Scully.
125. Dublin, - - - Sutton, 1871. W. T. T. Dyer.
126. Meath, - - - Navan, 1879. C. Bailey.
128. Limerick, - - Rinekirk, 1885. S. A. Stewart.
129. Clare, - - - Ballyvaughan, 1885. R. P. Murray.
133. Westmeath, - - Near Belvidere Lake, 1871 W. T. T. Dyer.
135. Galway, W., - - Kilronan, Aran, 1890. J. E. Nowers.
138. Sligo, - - - Bartragh I., near Moyview, 1870. A. G. More.
145. Armagh, - - - Bird Island, 1882. H. W. Lett.
147. Down, - - - Loughinisland Lake, 1887. S. A. Stewart.
149. Londonderry, - - Magilligan, 1892. M. J. Leebody.

var. **longibracteata,** Kuetz.

114. Kerry, N., - - Blennerville, 1888. R. W. Scully.
116. Cork, N., - - Middleton, 1872. T. Allin.
123. Wicklow, - - Base of Sugar Loaf Mtn., 1894. R. Ll. Praeger.
125. Dublin, - - - Swords, 1848. D. Moore.
127. Louth, - - - Dundalk, 1883. J. F. Crofts.
130. Galway, E., - - L. Derg, 1881. Bolton King.
138. Sligo, - - - Glencar Lake, 1884. R. M. Barrington.
147. Down, - - - Near Belfast, 1886. S. A. Stewart.
148. Antrim, - - - Springfield, 1857. W. M. Hind.

var. **papillata,** Wallr.

113. Kerry, S., - - Ferry, Waterville, 1889. R. W. Scully.
121. Queen's Co., - - Near Farmhill, 1890. R. W. Scully.
133. Westmeath, - or 140. Roscommon, - } Lough Ree, 1886. R. M. Barrington.

C. vulgaris though a fairly common species in Ireland is not, judging from the number of specimens we have received, so abundant as it is in England. It seems to be a common plant almost throughout the world.

C. canescens, Loisel.

114. Kerry, N., - - Castle Gregory Lake, 1894. R. W. Scully.

A very interesting addition to the Flora of Ireland The plant from Co. Cork (Shanagarry Bog), circulated by Mr. Carroll as *C. crinita*, is *C. polyacantha*. *C. canescens* is recorded from various parts of Europe, North Africa, temperate Asia, and North America. In Britain it has only been found in Dorset and Cornwall.

Tolypella glomerata, Leonh.

124. Kildare, - - - Maynooth, 1894. R. Ll. Praeger.
125. Dublin, - - - Canal, near Glasnevin, 1857. D. Moore.
133. Westmeath, - - L. Ennel, 1892. H. and J. G.
138. Sligo, - - - Glencar Lake, 1884. R. M. Barrington.
139 Leitrim, - - - Glenade Lake, 1884. R. M Barrington.

T. glomerata is widely distributed in Europe, and occurs also in Algiers, Persia, India, Tasmania, and North America. We think it will probably be found in many other localities in Ireland, being often a very inconspicuous plant.

[*Tolypella nidifica*, Leonh. Braun, in "Fragmente einer Monographie der Characeen," p. 94, describes the plant collected in Lough Neagh, near Langford Lodge, by Dr. Moore in 1840, as the var. *intermedia* of this species; but this appears to need confirmation]

T. prolifera, Leonh.

125. Dublin, - - - Canal near Glasnevin. D. Moore.

Dr. Moore's specimen is the only one we have seen from Ireland. *T. prolifera* is recorded from a few scattered localities in Central and Southern Europe and in North and South America. In Britain it is apparently confined to a few counties in the East of England.

T. intricata, Leonh.

125. Dublin, - - - Glasnevin. D. Moore.

T. intricata occurs in many localities in Central Europe, from Sweden to N. Italy, in Algiers and in Canada. It has been found in the eastern counties of England from Durham southwards.

Nitella Nordstedtiana, H. and J. Groves.

113. Kerry, S., - - Caragh Lake, 1889. R. W. Scully.
Killarney, Lower Lake, Muckross Shore, 1890.
Near Swallow Island, 1892. R. W. Scully.

This species is recorded from Finland, Sweden, Germany, France, Spain, and Italy, and from North America and Australia. In Britain it has only been found in the Outer Hebrides. The Caragh Lake plant is larger and laxer than that from Scotland, and we referred it in the first instance to *N. gracilis*.

N. tenuissima, Kuetz.

130. Galway, E., - - Near Ballindooley, 1892. H. and J. G.
133. Westmeath, - - Scraw Bog near L. Owel, 1892. H. C. Levinge, and H. and J. G.

This occurs in Europe, Asia, North Africa, and North America. In Britain it has only been found in the widely separated counties of Cambridgeshire and Anglesey. It occurs in peat-pits and dikes, but on account of its dark colour and slender stem is often very inconspicuous. As we found it in the only two sets of peat-pits which we had the opportunity of examining during our short visit to Ireland, and as the country abounds in similar habitats, we have no doubt it will be found to be much more generally distributed.

N. gracilis, Ag.

123. Wicklow, - - L. Luggela and L. Dan, 1892. R. M. Barrington and H. and J. G.
125. Dublin, - - Near Ballybetagh, Glencullen, 1872. D. Orr.

The Luggela plant is a remarkably fine form with very long branchlets. *N. gracilis* is found nearly throughout Europe. in Asia, Africa, and North and South America.

N. translucens, Ag.

113. Kerry, S., - - L. Caragh, 1876. A. G. More.
114. Kerry, N., - - Mannabone Mtns. D. M'Ardle.
135. Galway, W., - - Clifden, 1869. A. G. More.
145. Armagh, - - - Cashel L., 1892. R. Ll. Praeger.
147. Down, - - - Derry L., 1887. R. Ll. Praeger.
148. Antrim, - - - Lissanorn Castle. D. Moore.
149 Londonderry, - - Kilrea, 1836. D. Moore.

N. translucens occurs principally in Western Europe, but reaches to Sweden in the north, and to Algiers, &c., in the south, and a variety or sub-species is found in New Zealand. It grows usually in ponds, lakes, and canals, but occasionally in running water.

N. flexilis, Ag.

113. Kerry, S., - - Caragh Lake and L. Acoose, 1889. R. W. Scully.
115. Cork, S., - - - Glengarriff. I. Carroll.
137. Mayo, E., - - Cong, 1885. E. F. and W. R. Linton.
139. Leitrim, - - - L. Allen, 1883. S. A. Stewart.
141. Fermanagh, - - Rossford Point, 1837. W. Thompson.
148. Antrim, - - - Carnlough River, 1892. R. Ll. Praeger.

Probably a commoner plant than the above list would seem to indicate, but many specimens we have seen which may belong to this species are sterile and we have not been able to determine them. *N. flexilis* is widely distributed in Europe, and has been recorded from Siberia and North and South America.

N. opaca, Ag.

113. Kerry, S., - - Killarney. Hb. Moore.
114. ,, N., - - Mannabone Mountains. D. M'Ardle.
116. Cork, N., - - Fermoy. T. Chandlee.
117. Waterford, - - Dungarvan, 1882. G. Nicholson.
123. Wicklow, - - Kilmacurragh, 1884. F. W. Moore.
125. Dublin, - - - Hill of Howth, 1860. D. Moore.
135 Galway, W., - - Kylemore Lake, 1870. D. Moore.
139. Leitrim, - - - L. Boffin, 1871. W. T. T. Dyer.
141. Fermanagh, - - L. Erne, 1882. R. M. Barrington.
145. Armagh, - - - L. Neagh, near Lurgan, 1874. S. A. Stewart.
146. Donegal, - - L. Naminn, 1892. M. J. Leebody.
147. Down, - - - Clandeboye Lake, 1883. S. A. Stewart.
148. Antrim, - - - Rathlin I. D. Moore.
149. Londonderry, - Kilrea, 1839. W. Thompson.

This is the commonest species of *Nitella* in the British Isles, and is also common nearly throughout Europe. It is recorded from Asia, N. Africa, and North and South America

[*N. capitata*, Ag., which occurs in the fenland of Cambridgeshire, and *N. syncarpa*, Chev., which is common in the West of France, should be looked for in Ireland. Both resemble slender states of *N. opaca*, but have a gelatinous covering to the fruits; and *N. syncarpa* is distinguished from *N. opaca* and *N. capitata* by its simple fruit-bearing branchlets.]

THE GEOLOGIST AT THE LUNCHEON-TABLE.

BY PROFESSOR GRENVILLE A. J. COLE, M.R.I.A., F.G.S.

THE Refreshment-Rooms organised by the Misses Gardiner, in a house that actually stands upon the demesne of Trinity College, Dublin, have long been recognised as a daily meeting-ground for the members of the staffs of adjacent institutions. In many ways these rooms have played the part of the old London coffee-houses, not to say of the ever-famous "Mermaid"; and the manuscripts and proof-sheets of public and scientific journals, including those of the *Irish Naturalist*, have often derived an additional sparkle from the conversation carried on around their tables. The opportunity afforded by the reconstruction of the premises has been seized on by several of their confirmed *habitués*, and a New Year's gift of seven ornamental tables has been the result.

Naturally, the polished tops have been made of Irish marbles under the care of Mr. E. S. Glanville, of Lower Erne-street, Dublin. A scientific committee of selection visited the works,

and the stones were chosen as if they were to ornament a museum. While literary and antiquarian visitors cannot fail to appreciate the artistic beauty of the slabs, naturalists will find many points of interest, even in their minuter details.

Two of the slabs are from the Lissoughter quarry in Connemara, and show the unique serpentinous marble in all the perfection of its green and grey streaks and foldings. The highly metamorphosed character of the rock is at once apparent, and in one table the contortion of the bands can be traced, while in the other a more parallel structure has been set up by the continued deformation of the mass. The recent paper by Messrs. Lavis and Gregory (1) on eozoonal structure in limestones from around the vent of Vesuvius has given new interest to these similar altered limestones of Connemara. The green serpentine seems to result from the hydration of bands and knots of olivine, which developed in the heart of the Lissoughter limestone under the influence of an adjacent igneous mass. How far the silica and magnesia required for this change already existed in the limestone, or how far they were transferred from the invading igneous rock, is one of the vexed questions of contact-metamorphism. Messrs. Marr and Harker, working on the alterations round the granite of Shap in Westmoreland, conclude that such transference has only gone on over distances of about $\frac{1}{20}$th of an inch; while Messrs. Lavis and Gregory, in their study of the blocks of Monte Somma, above cited, are forced to believe in a more extended process.

These two handsome green slabs have as companions two from the red quarries of Co. Cork. These also show the effect of earth-movements in brecciating and streaking-out the constituents of a rock. In one, the remains of crinoid-stems are clearly visible, and fragments of yellowish coralline limestone, probably true blocks broken by wave-action from adjacent reefs, lie in the fine red matrix. But pressure has already affected the whole mass, and it has begun to break up and to flow, as it were, under metamorphic influences.

The second slab of "Cork Red" is the typical brecciated variety, with abundant traces of crinoids, in the form of little white circular sections, but with no good connected series of

[1] *Trans. Royal Dublin Soc.*, 1894.

ossicles. Veins of calcite traverse the mass, as in the well-known Devonian marbles of Plymouth, and more delicate thread-like veins, filled with a deep red material, run in the direction of the general movement of the breccia.

The other three tables illustrate the fossiliferous Carboniferous marbles of this country. One is a little known and beautiful variety of "grey fossil" limestone, consisting almost entirely of fragments of crinoid stems. One or two small pieces of coral alone break the uniformity of the great area of encrinites; these sea-lilies must have here grown as a veritable forest. Iron oxides have delicately infilled the hollows of the stems, and have even stained with tender browns and pinks the whole substance of some of the ossicles. This remarkable stone has been quarried in the neighbourhood of Lough Erne.

Another slab comes from the famous quarries of black marble near Galway city. It has been chosen on account of its strong contrasts of effect, the fossils being grouped in it with a certain daring picturesqueness. From one angle, a great branching mass of the tubular coral called *Syringopora* spreads across the stone for a distance of some 25 cm. At the opposite angle is a vertical section of a valve of the brachiopod *Productus*, while in between is a section showing the two valves as circles lying one within the other. The smaller valve, being concave, is thus often traversed by sections which also cut across the larger and convex valve.

Nearer to the *Syringopora* in this table is a bold section of *Productus*, 10 cm. across, which largely influenced the selection of this particular slab. A fine simple coral can be seen growing from its exterior; and here we at once have a picture of the floor of the Carboniferous sea in Co. Galway, with large valves of dead brachiopods scattered upon it, their concave sides characteristically facing downwards, like those of lamellibranch shells on our own shores. Their upper surfaces furnished the abundant simple corals with a fairly stable basis of attachment, while the ramifying and more massive reef-building forms held together and even wrapped round and included other forms. Thus the example of *Syringopora* in this table shows one or two other corals, *Zaphrentis* in all probability, entangled in its spreading meshes.

The seventh table is also of black marble, but is relieved more uniformly by fossil-sections. It is from the Kilkenny quarries, the history of which is associated with that of the energetic family of Colles. Grey sections of detached and unbranching corals are seen everywhere, their septa being beautifully preserved ; they probably represent *Zaphrentis* rather than *Cyathophyllum*. One or two white remains of spiral gastropods, probably *Euomphalus*, also occur, with a section of a turreted form. But the most interesting objects are the conspicuous sections of a brachiopod, evidently a form with external flutings, and with well-marked dental plates and a septum in the larger valve. These sections provide a pleasant problem in reconstruction, such as will rejoice generations of zoologists and geometricians at the luncheon-table. I believe the shell to be a *Cyrtina*,[1] many of the sections passing horizontally across the upper part of the larger valve. We thus have a convex and serrated line produced by the section of the outer part of the shell, with an indentation corresponding to the external median furrow ; the internal median septum is seen running inwards, soon dividing into two portions, which are styled "dental plates." These, however, are often traversed by the section in the region of the broad "area," which runs from the beak to the hinge-margin of the shell ; and hence the white line formed by each dental plate is continued sharply away to right or left by the straight section of the area, which closes in the front of the shell and which unites with the edges of the serrated part of the section. Here and there a vertical section across the valve shows the median septum running on below, and its two diverging portions enclosing a sort of oval space above, the apex of which is in contact with the beak.

The geologist, at any rate, will no longer feel solitary at his luncheon-table ; but, indeed, he is never likely to sit long alone in this favoured home of quip and countercheck, of wise saws and modern instances.

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[1] Davidson, "British Fossil Brachiopoda ; Permian and Carboniferous species," p. 68, and plate xiv., fig. 8.

INSECTS COLLECTED IN THE FERMOY AND BLACKWATER DISTRICT.

BY J. N. HALBERT.

(Read before the Dublin Naturalists' Field Club, November 13th, 1894.)

On the recent joint excursion of the Dublin, Cork, and Limerick Field Clubs to the Fermoy and Blackwater district, I collected insects for the Royal Irish Academy Fauna and Flora Committee. Notwithstanding the short duration of the trip (5th, 6th, and 7th of July last), and owing, no doubt, to the productive localities visited, I was fortunate in taking more than one species of interest, and in making a few additions to our Irish records. There were in all over a hundred species of Coleoptera and forty of Hemiptera observed, and in the present notice it is intended to place on record the most noteworthy of these, giving the localities and circumstances of capture where necessary, but not mentioning a large number that are of common occurrence everywhere. I am indebted to Dr. David Sharp, F.R.S., and E. Saunders, F.L.S., for kind help in the identification of certain critical species, and also to those members of the different Clubs who assisted me in collecting specimens.

Our headquarters were at Fermoy, consequently on arrival little time was lost in the anxiety to begin work. The route taken lay along the south banks of the Blackwater in the direction of the extensive Castle Hyde woods; all this proved to be admirable collecting ground. The river was first tried for Hydradephaga, but previous experience had shown, that midsummer is not a good time of the year for water-beetles, when most of them are in larval condition. Amongst my captures were *Orectochilus villosus*, Müll., *Deronectes depressus*, F., and *Haliplus fluviatilis*, Aube., all of them species peculiar to clear or running waters. The first mentioned is an insect of considerable interest, closely allied to the *Gyrini* or 'whirligig-beetles' so well known to all observers, but differing from these in some essential points. *Orectochilus* is nocturnal, coming out at night only and hiding during the day-time under banks in submerged logs and such like. My specimens were obtained by dragging the water-net about the roots of aquatic plants. Owing to this unusual habit the beetle has probably escaped observation in many localities. Numerous species of the

Staphylinidæ or 'rove-beetles' were common in the damp places, amongst these was a single *Actobius procerulus*, Grav. There is only one Irish example in the Museum collection, taken many years ago in the Mourne Mountains, by that veteran of Irish entomology, the late A. H. Haliday, which, like many other captures of equal interest, he seems never to have recorded. The only other noteworthy representatives of this section taken, were *Homalota elongatula*, Bris., evidently common, and *Tachyporus obtusus*, var. *nitidicollis*, Steph., a very well marked melanic variety, which would seem to almost replace the type in Ireland, and, as we would expect, is much rarer in England where the normal pale-coloured form predominates.

Quite a characteristic insect was *Halyzia conglobata*, L., a local 'lady-bird' commonly obtained off the Alder bushes growing along the bank. In Britain it has a southern distribution, and as regards the north it has only been found in two localities, Belfast, and Ballyhaise, Co. Cavan, where I had the pleasure of taking a single specimen last autumn. By sweeping plants in a marshy place near the Castle Hyde woods, there occurred several examples of a *Galerucella* which were mistaken for the common *G. nymphææ*, but which proved on subsequent examination to be referrable to the rarer *G. sagittariæ*, Gyll., an addition to the Irish list. The two species are closely allied, but when typical examples are compared, side by side, the differences are at once apparent; in the last British catalogue they are evidently considered to be distinct. Amongst other captures I may mention *Cyphon nitidulus*, Thoms., *Bruchus atomarius*, L., *Lema lichenis*, Voet., *Anaspis maculata*, Fourc., *Apion humuli*, Germ., *Sitones sulcifrons*, Thunb., *Eirrhinus acridulus*, L., *Rhinoncus pericarpius*, L., and *R. perpendicularis*, Reich. Mr. G. H. Carpenter found in a meadow, larvæ of the long-horned grasshopper *Leptophyes punctatissima*, Bosc., which he tells me had been only previously recorded from Howth.

The Heteroptera taken at Fermoy were not numerous; the large green 'shield bug' *Pentatoma prasina*, Lin., was the most important, our knowledge of this species as Irish rested on two specimens without locality in the collection of Mr. Haliday; the possession of definitely localised specimens is therefore satisfactory. *Orthotylus flavinervis*, Kb., occurred on the Alders. Several of the members noticed the beautiful dragon-fly

Calopteryx splendens busily 'hawking' for prey along the river-bank.

The following day was fixed for the visit to the renowned Mitchelstown Caves, and was generally considered the *pièce de résistance* of the excursion; owing however, to a rather long drive, the time allowed was insufficient for a thorough investigation. The results, as can be seen in the pages of the present number, have been worked out by Mr. G. H. Carpenter, and the account which he furnishes of these curious cave-frequenting creatures is of high scientific value. We were lucky in escaping the disappointment experienced by an observer in England, Mr. Murray, who many years ago explored the extensive limestone caves of Derbyshire but was obliged to report that he could find nothing blind except the alleys! On the journey to and from the caves only a few short intervals were available for collecting, when the following were taken, chiefly under stones on the low walls bordering the roads: *Calathus cisteloides*, Panz., *Barynotus obscurus*, F.,and *Otiorrhynchus ligneus*, Ol., the last not by any means a common species. Many of the members were anxious to see the magnificent pile of Mitchelstown Castle, so a brief visit was arranged; the entomologists of the party found time for a short walk through the grounds, but though their beauty was evident, the chance of finding rare insects was questioned. Only a few weevils were beaten off the beech trees, *i.e.*, *Phyllobius argentatus*, L. *P. oblongus*, L., and *Polydrusus ptergomalis*, Boh., the latter is a very pretty species, covered with brilliant green scales; I had previously collected it only near Lucan, Co. Dublin.

Lismore formed a promising locality for the third and last day's excursion. In order to have a longer time for collecting I started on an early train from Fermoy with my friend Mr. Frank Neale, Secretary of the Limerick Club. The scenery of the Blackwater Valley only needs mention, to recall it to those who have been fortunate enough to have spent any time investigating the beauties of the 'Irish Rhine,' more especially in the wooded portion surrounding the far-famed Lismore Castle, and indeed the district has many points in its favour as a centre for general natural history observations. All the former localities were rather unfavourable for collecting the Carabidæ or ground beetles; but here in a half dry water-course that joins with the main river *Harpalus rufibarbis*, F.,

Amara familiaris, Duft., *Bembidium decorum*, Panz., *B. atrocæruleum*, Steph., and *B. punctulatum*, Drap., were more or less abundant. Some damp fields near at hand next claimed attention; my first capture by sweeping was *Hydrocyphon deflexicollis*, Müll., a rare insect in England but evidently quite common here. I cannot find a more recent Irish record for this species than 1857 when it was recorded by Mr. Haliday from the river Vartry, and by Dr. Perceval Wright from the plantations about Newcastle, Co. Down. Another interesting find was *Elmis volkmari*, Panz., a small insect measuring only 3 mm. in length, and the largest of the six British species. They are all provided with very long tarsi by which they cling to the undersides of stones, etc., and although unable to swim like true water-beetles, they can thus retain their hold even in the swiftest rivers. As regards the distribution of *E. volkmari*, there are some unlocalised Irish examples in Mr. Haliday's collection, probably taken in the vicinity of Lough Neagh, and Dr. Power has recorded it from Waterford.

We next searched the north bank of the Blackwater above the Castle; the presence of so rich and varied a vegetation led us to expect good results, and in this we were not disappointed. Mr. Neale found a specimen of the very rare moth *Gnophria quadra* clinging to the rough bark of an Oak-tree. I was fortunate in securing two perfect specimens of the local *Lciopus nebulosus*, L., swept from amongst long grass; they had probably fallen from a neighbouring oak; the *Longicornia* are very poorly represented in Ireland, and with few exceptions are rare. In the *Irish Naturalist* for September last I recorded a weevil *Orchestes ilicis*, F., from Lucan which would seem to be the first record of the species; it also occurred here, and will probably be met with in other wooded localities. Many beetles are more or less peculiar to certain varieties of *Salix*, particularly if growing in a wild state; even young plantations will sometimes produce nice species. A small osier-bed near the 'hanging gardens' yielded amongst others *Donacia simplex*, F., *Galeruccella lineola*, F., *Telephorus thoracicus*, Ol., *Stenus tarsalis*, Lynn., and *Crepidodera helxines*, L., etc. Of these the most notable is *T. thoracicus*, only previously recorded from two of the Irish Counties, Armagh and Dublin. The *T. fulvicollis* mentioned in Mr. Haliday's Belfast list, may refer to this species, but it might equally be the

common *T. flavilabris*, as that name is a synonym for both. I find, however, that he did possess *T. thoracicus*, easily recognised from its allies by the clear red scutellum. Three species of the curious genus *Cassida* are represented in the district, *i.e.*, *Cassida viridis*, F., *C. equestris*, F., and *C. flaveola*, Thunb. Other captures were *Anthobium ophthalmicum*, Payk., *Adalia obliterata*, L., *Halyzia xiv.-guttata*, L., *Athous niger*, L., *Phædon tumidulus*, Germ., *Lagria hirta*, L., *Apion cruentatum*, Walt., *Ceuthorrhynchus litura*, F., etc., and a single *Ceuthorrynchus angulosus*, Boh., one of our rarest British beetles; only a few specimens appear to have been taken in Britain, in the Solway district and North of England. Canon Fowler remarks that it is probably attached to some Cruciferous plant; my specimen captured by general sweeping rendered it impossible to tell off what plant it came. The insect both on account of its rarity and distribution, forms an interesting addition to our Irish records.

Some good Hemiptera were taken at Lismore, in the Blackwater. I noticed what looked like a minute and active water-beetle darting about amongst the stones, in the shallow water at edge, but which proved on capture to be the seldom-taken *Sigara minutissima*, Lin. Specimens of *Pentatoma prasina*, Lin., also occurred, and two additions to my list of Irish Hemiptera in *Orthotylus viridinerius*, Kb., and *Labops mutabilis*, Fall.

There only remain to mention two notable insects belonging to the Neuroptera. *Calopteryx virgo*, L., was noticed, especially about the wooded portions of the bank. This is a very brilliant dragon-fly of a beautiful green or blue with dusky wings, which in the male are suffused with a darker metallic colour. It bears a strong resemblance to the species taken at Fermoy, *C. splendens*, Harr. Curiously enough, although so closely allied, they apparently never inhabit the same locality. When searching for ground beetles in the bed of the stream above mentioned, I succeeded in taking, not however without some agility on my part, the large Stone-fly *Perla maxima*, Scop. Although this fine insect is probably common, there would seem to be a scarcity of records from Ireland, and the genus *Perla* is unrepresented in the valuable list of Irish Neuroptera published by Mr. J. J. F. X. King[1]. *P. maxima* occurs in the river Dodder, Co. Dublin.

[1] *Trans. Nat. His. Soc., Glasgow*, vol. ii., 1888.

NOTES.

BOTANY.

CHARACEÆ.

Chara canescens, Loisel, in Ireland.—I found this pretty *Chara* growing in the lake at Castlegregory, Co. Kerry, last August. This is a welcome addition to the range of the plant, hitherto restricted, I believe, to two localities in the S. W. of England.

R. W. Scully, Dublin.

PHANEROGAMS.

Wild Flowers in the Glynns of Antrim in Mid-Winter.—Walking and driving through the Glens near Cushendall on the 16th and 17th of December, with some friends who were spending the week's end there, I collected the following plants in flower. In Glencarp and north side of Glendun the Red Campion (*Lychnis diurna*); Dog Daisy (*Matricaria inodora*); and Sheep's Scabious (*Jasione montana*). On Tornamorey Point, or the old road to Torr, on a very exposed bank facing east, the Bramble (*Rubus fruticosus*); Marsh Ragweed (*Senecio aquaticus*); Marsh Thistle (*Carduus palustris*); and Cat's Ear (*Hypochœris radicata*); on sheltered banks and ditches all over the district, the Primrose (*Primula vulgaris*) was in bloom, and the Gorse (*Ulex europæus*); and I noticed a few plants of a small Umbellifer, which I did not collect, just opening. Owing to the mildness of the winters at Cushendall medical men in Belfast frequently send their patients there now, and few hotels in Ireland are so beautifully sheltered from the north and east or are such "Homes from Home" as the "Glens of Antrim" Hotel there. I have to thank Mr. S. A. Stewart for verifying the plants for me.

R. Welch, Belfast.

ZOOLOGY.

CRUSTACEANS.

The Freshwater Crayfish (Astacus fluviatilis) in Co. Dublin.—On the 30th December last, Mr. Dunlop of Lucan and his sons pointed out to me some remarkable ponds at Collierstown along the banks of the Grand Canal, about nine miles from Dublin. Anyone looking for a town there or even a village, will be disappointed, though large mounds of rubbish may mark the sites of former habitations. Anyhow zoologists and botanists will find this locality well worth a visit. We found the large freshwater Crayfish (*Astacus fluviatilis*) in abundance, and although once before recorded from Co. Dublin, viz.:—from the Tolka near Finglas, yet it is such a rarity that it is worth calling attention to this second locality. It had previously also been taken on the Royal Canal at Maynooth, by the late Dr. Ball, and in several other places in the Co. Kildare.

It is surprising that, as far as I know, no attempt has ever been made in this country to utilize this source of wealth, as it is well known that Crayfish are occasionally imported from abroad, in order to be ground down for the famous "soupe d'ecrevisses," a dish greatly esteemed by connoisseurs. The supply from the Collierstown ponds would hardly be large enough to start a commercial speculation, but I believe they are more abundant in Kildare, and Messrs. Pile, Powell and Mooney assure me that they could promote a trade for them.

R. F. Scharff, Dublin.

BIRDS.

Unusual retreat for Grouse.—A singular incident was recorded to me last week by a gentleman who had been shooting during the Christmas week, as showing the severity of the gales that recently visited the Irish coast. He mentioned that considerable numbers of living grouse had been seen along the sea-shore at Ballywalter and at the Warren at Donaghadee. The inhabitants in these neighbourhoods never remember a similar occurrence, and they think that the birds must have come from Donegal. The lighthouse-keepers on the Copeland Islands report the visit of strange birds not known to them as visiting the islands previously. Perhaps someone else may have similar occurrences to record, and, as far as I can find from inquiries, there are no grouse within a long radius of above-mentioned places.

ARTHUR J. COLLINS, Belfast.

PROCEEDINGS OF IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent donations comprise a rat, from C. J. Patten, Esq.; a weaver-bird, from Lady M'Kenna; a Parrakeet, from Mrs. A. Hillas; a Common Fox, from Mr. Reed; and three Guinea Pigs, from E. M. Solomons, Esq. 3,870 persons visited the Gardens in December.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

NOVEMBER 27TH.—An interesting illustrated lecture on "Sea Fish and Fishing off the West of Ireland" was given by Rev. W. S. GREEN, M.A., F.R.G.S., H.M. Inspector of Fisheries. The President (Mr. ROBERT LLOYD PATTERSON, J.P., F.L.S.) occupied the chair.

Mr. GREEN proceeded with his lecture, which he prefaced by throwing on the screen a map of the British Isles, showing the depths of the sea from near the coast down to the profound abysses of the Atlantic. Fishing grounds were only found at moderate depths, these extending to a distance of from ten to twenty miles off the West of Ireland; but in the North Sea immense fishing areas existed, each having a depth of about fifty fathoms; indeed, these were amongst the finest fishing grounds in the world. While Mr. Balfour was Chief Secretary for Ireland he made an effort with the Royal Dublin Society to start an expedition with the view of developing the Irish fisheries. They had worked for two years from the south of Cork to the north of Donegal and had done some good work. In addition to spring mackerel fishing there was an autumn mackerel fishing carried on by the natives, and the extent of it could be estimated from the fact that last year as much as £50,000 worth of mackerel had been sent to America, and that exportation had been going on for the past seven years. At several places stations had been established for the curing of fish, these numbering eighteen, and they had been successful on the west coast of Kerry. The next branch of the subject, which was of a highly interesting character, dealt with the development of several species of fish. The eggs, he pointed out, floated in the sea near the surface, the swing of the sea being sufficient to keep them from coming to the surface where they would be made the prey of various kinds of little enemies. There was an exception to this in the case of the herring, which laid its eggs in the bottom.

Professor FITZGERALD proposed a vote of thanks to Mr. Green, which was seconded by Mr. JOHN BROWN.

JANUARY 8TH.—An illustrated lecture on "Old Belfast; the Origin and Progress of the City," was given by Mr. J. J. MARSHALL, assisted by Messrs. ALLEN and GRAY. The Secretary exhibited and described two sepulchral urns recently presented to the Society.

Belfast Naturalists' Field Club.

December 18th.—The President (Mr. F. W. Lockwood, C.E.) in the chair. A paper entitled "Notes on Moel Tryfaen," was contributed by Miss Mary K. Andrews, in which it was stated that Joseph Wright, F.G.S, had found a large number of forams in a small quantity of sand from the high level sands there.

The next paper was entitled "A Bit of Foreshore," by Miss S. M. Thompson, Hon. Secretary to the Geological Section. The paper dwelt chiefly with changes on the shore opposite Macedon that have been observed by the writer during the last thirty years, especially recording that the well-known cross-dykes of basalt, opposite Macedon Point, have lost eighteen or twenty inches in height during that period, the result being the sweeping away of deposits of mud with their appropriate plant and animal life. The former condition of the shore was then described, with its predominantly sandy character, and contrasted with its present appearance when the erosion of the numerous dykes leaves free play to the waves, and bare tracts of Triassic marl have greatly taken the place of the old sandy surface. Similar differences further down shore were mentioned, and the influence of these geological changes upon the distribution of plant and animal life referred to, and the melancholy prediction made that another quarter of a century would probably completely level the familiar cross-dykes.

The papers were criticised by Messrs. Wm. Swanston, F.G.S. ;Wm. Gray, M.R.I.A.; John Hamilton, and Alec. G. Wilson.

Mr. Wm. Gray, M.R.I.A., then made a short report as the Club delegate to the British Association at Oxford, when the Club was accorded the thanks of the Association for their valuable contributions of photographs, &c., illustrating the geology of our district.

In pursuance of the recommendation of the British Association, Mr. Gray proposed and Mr. Welch seconded the following resolution, which was unanimously passed :—"That the Belfast Naturalists' Field Club should place themselves in communication with the Belfast Corporation, with a view to extending scientific knowledge by means of lectures and demonstrations in our museums."

Mr. Gray then proceeded with his lecture on the "Missing Beds of Cave Hill," using the geological features of Portland as apt illustrations. The lecture was well illustrated with lantern slides and diagrams shown by Mr. W. Nicholl, the different organic remains being represented by a fine series of fossils on the table.

The President, the Honorary Secretary, and Mr. W. Swanston having complimented the lecturer on his admirable paper, the following new members were elected :—Miss Josephine Buchannan, M.A. ; Rev. Douglas Walmsley, B.A. ; George Smith, and Miss E. Corley.

Dublin Naturalists' Field Club.

December 11th.—The President in the chair. Miss R. Hensman read a paper on "Some Causes of the Disintegration of Shells." Mr. Carpenter lectured on "Animals found in the Mitchelstown Cave." The latter of these papers appears in the present number. The former will shortly be published. Mr. Greenwood Pim described a method of preserving cut flowers in water, by splitting the cut end into four portions for a short length. He exhibited specimens of *Clematis* that had been treated in this manner, and pointed out how they were still quite fresh, while others gathered at the same time, in which the stem had not been split, were faded. Mr. R. Lloyd Praeger exhibited on behalf of a lady member a fungus (*Polyporus*)—stated to have been found below twelve feet of peat in Switzerland. He also showed fine specimens of the Fragrant Coltsfoot or Winter Heliotrope (*Petasites fragrans*) gathered that day at Howth, the usual time of flowering being January to March.

The following new members were elected ;—Michael J. Buckley, Mrs. S. Lowes, B. T. Patterson, C.E., J. C. Rea, B.A., A. L. C. Stuart, LL.D.

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FURTHER NOTES ON THE FLORA OF COUNTY DUBLIN.

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

In compiling the following notes I have endeavoured to select from my memoranda of the past year such items only as appeared likely to be of general interest to County Dublin botanists. Though no very striking results were obtained, only three more or less critical plants being added to the County flora in addition to the two already recorded in these pages (Vol. III., p. 202), the outcome of the year's work cannot be considered altogether disappointing. A large proportion of the rarer plants of the county have been extended to new stations, many of the older records have been verified, and not a few of those curious absences of common species from certain districts which one is tempted to look upon as freaks of distribution have been detected or confirmed. The difficulty of proving a negative is admittedly so great that it seems wiser, for the present, to keep an open mind with regard to these conspicuous absences, and to defer any more particular mention of them until the systematic survey of the county flora shall have been fully carried out.

These Further Notes then will contain nothing more than a selection from my memoranda of the year of some items falling under the two headings:—I. Plants not previously recorded for County Dublin, and II. Rarer County Dublin Plants observed in new Stations.

I. PLANTS NOT PREVIOUSLY RECORDED FOR COUNTY DUBLIN.

Callitriche hamulata, Kuetz.—(1). Quarry pools near Hollywood, Naul Hills, June, 1894. (2.) Pools at Loughlinstown, August, 1894. Apparently rare in the county.

Lamium intermedium, Fries.—Abundant in sandy potato fields near Rush harbour, September, 1894.

Juncus diffusus, Hoppe.—Kilakee Mountain at 1,600 feet, September, 1894. A plant which has all the appearance of a hybrid, yet may be separated without any great difficulty from both of its reputed parents, *J. glaucus* and *J. effusus*.

II. RARER COUNTY DUBLIN PLANTS OBSERVED IN NEW STATIONS.

Nymphæa alba, Linn.—Very sparingly in pits at Portmarnock brick-fields, where there is no appearance of its having been intentionally introduced; July, 1894. In the *Brit. Ass. Guide*, 1878, the species is entered "Royal Canal, &c., rather rare." I have never seen the plant there and can find no other definite county locality on record.

Fumaria densiflora, DC.—Potato field near the brink of the large quarry at Finglas, June, 1894. The only previous county record seems to be Mr. G. C. Druce's for Portmarnock (*J. of Bot.* 1891, p. 304).

Alyssum calycinum, Linn.—A few plants in a sandy field near Rogerstown coast-guard station, May, 1894. This interesting little alien has long held its ground in the county. Mackay records it from Portmarnock in 1817 and 1837, and Mr. H. C. Hart from the same place in 1867-1872. My slender Rogerstown specimens range only from 1 to 2 inches in height, so that the plant is not hard to overlook, and may be expected to occur in other similar stations.

Thlaspi arvense, Linn.—(1) Sparingly in cultivation at Bohernabreena, October, 1893, and (2) abundantly in a sandy turnip field near Rush harbour, September, 1894.

Silene conica, Linn.—In considerable abundance, more than a hundred plants, on a bank by the sea, to the north of Portrane peninsula, September 24, 1894. The plant is well established here over a distance of more than 100 yards, but seems to be quite absent from the adjoining sandy fields, whence it may be presumed to have spread. The only previous record for the county is Portmarnock, 1837 (*Cyb. Hib.*, p. 43).

Scleranthus annuus, Linn.—Road track by the Rathmines Waterworks, Castle Kelly, at the head of Glenasmole, August, 1894, growing vigorously in "freestone," as the disintegrated granite is locally called.

Geranium pusillum, Linn.—A single plant in a sandy field to the north of Portrane, September, 1894. The only other county station is Lambay Island, where it was found by Mr. H. C. Hart in 1882 (*Fl. Lambay*).

Vicia tetrasperma, Mœnch.—Sparingly on the railway bank between Rush and Skerries, July, 1894. Knockmaroon is the only other recorded station (*Cyb. Hib.*)

Arctium intermedium, Lange.—This sub-species or variety, sufficiently distinct in appearance from *A. minus*, so common throughout the county, is apparently rare in Dublin. I found a single plant of it by the edge of a cultivated field above the sea at Malahide in September last. There is a specimen at Glasnevin Herbarium labelled, in the handwriting of the late Dr. Moore: "*Arctium intermedium*, near Baldoyle, 1840." Though the plant is set down in the *Brit. Assoc. Guide*, 1878, as frequent in Dublin, I can find no definite records.

Campanula rapunculoides, Linn.—Well established, at intervals over a distance of 100 yards on a grassy bank by the roadside S.W. of Rush, where I gathered flowering specimens in July, 1893. A few plants were found by Mr. A. G. More near Bray Harbour, Co. Dublin, in 1872. No doubt introduced in both stations, yet well fitted by its creeping root-stock to effect a permanent settlement.

Cuscuta Trifolii, Bab.—(1.) Two large patches on *Trifolium pratense* between Ballyboghil and the Wren's Nest, August, 1894, and (2) abundant in a sandy field at the northern extremity of Portrane peninsula, September, 1894. In the second station the plant attached itself chiefly to *Anthyllis Vulneraria* which appeared to have almost completely driven out a sowing of *Trifolium pratense*. The only previous county record is that of Dr. W. G. Smith for Ballybrack, 1868. (*Dub. Nat. His. Soc. Proc.*, vol. v., p. 198).

Orobanche minor, Sm.—Very abundant (1) in sandy fields to the north of Portrane peninsula on *Anthyllis* and on *Trifolium hybridum* and *T. pratense*, September, 1894, also (2) abundant on *T. pratense* in a field above the hotel at Malahide, where I gathered spikes fully 18 inches in height at the close of September last. The only previous record for Co. Dublin is Shennick's Island, 1893 (*I. Nat.*, Vol. ii., p. 283). This and the preceding species would appear to be spreading in the county.

Mentha sativa, Linn.—(1) Watery places by the roadside near Cockle's Bridge, Garristown, August, 1894, and (2) by the Dodder near Newtown, Tallaght, September, 1894. Often confounded, no doubt, with *M. aquatica*, and perhaps frequent in the county.

Calamintha Acinos, Clairv.—A single well-grown plant in a stubble field by the Royal Canal, E. of Clonsilla, October, 1894. Previously recorded from three other county stations, Portmarnock, Portrane, and near Tulla Church, Carrickmines. Though the first published record is due to Mackay (*Additions*, 1859-1860), a specimen in Glasnevin Herbarium labelled:—"Portmarnock, October, 1854, Thomas Chandlee," seems to show that Mr. Chandlee was the first to observe the plant in the county. A rare species throughout Ireland.

Stachys arvensis, Linn.—This species, apparently spreading in the county, though still uncommon, I observed during the year at three new stations—(1) Garristown, (2) Rush, and (3) Ballyedmonduff.

Anagallis arvensis, Linn., var. **cærulea**. (*A. cærulea*, Schreb.) Of this pretty blue-flowered variety of the Scarlet Pimpernel, I gathered a single plant in September last in a corn-field near Raheen Point, Portrane. There appears to be no previous published record for the county; but Mr. R. M. Barrington of Fassaroe, has shown me a specimen gathered by his uncle, the late Mr. Richard Barrington, at Seapoint in 1858. The variety seems to be very rare in Ireland.

Chenopodium murale, Linn.—A few plants in waste ground at the angle of Oldcourt cross-roads south of Tallaght, 1893. Now very rare in the county, but once much more common if the older records may be trusted.

Lemna gibba, Linn.—In great abundance in the old mill-pond in Balbriggan, August, 1894. The conspicuously buoyant masses of this species often rising distinctly above the surface of the water make it readily distinguishable, by habit alone, from the common *L. minor*.

Ophrys apifera, Huds.—(1) Sparingly in dry pastures among the gravel eskers W. of Drimnagh Castle, June, 1894; (2) on the railway bank at foot of Killiney Hill, July, 1894.

Juncus obtusiflorus, Ehrh.—(1) In a shallow drain at Garristown Bog, August, 1894; (2) very abundant in marshy ground by the northern shore of Portrane, spreading for fully a quarter of a mile, September, 1894; and (3) abundant in a marsh above Saggard, September, 1894. The plant seems to thrive inland quite as well as in maritime stations. At Garristown, 11 miles from the nearest sea, I gathered specimens upwards of 5 feet in height, and those from the Saggard station, fully 13 miles from the nearest sea, seem quite as vigorous as the Portrane plant.

Carex lævigata, Sm.—In a marsh on the S.E. slope of Kilmashogue Mountain at 700 feet, July, 1894.

Festuca myurus, Linn.—A few tufts on a wall top near Lispopple cross roads, August, 1894. Very rare in the county, the only other recorded stations being Howth and Donnybrook, in the latter of which it was gathered by Mr. A. G. More in 1878.

Lastrea Oreopteris, Presl.—This fern, so abundant in parts of Wicklow, seems extremely rare in Dublin. A single plant only rewarded my search in the Dublin Mountains this year (September, 1894), and as this grew directly on the Dublin and Wicklow boundary S.W. of Glencullen Bridge, it is not without hesitation I give it a place here. My friend, Revd. C. F. d'Arcy, who is thoroughly acquainted with the Dublin Mountains, and has made a close study of their ferns, tells me he found a single plant on Glendhu Mountain in or about 1880.

Botrychium Lunaria, Sw.—(1) Very abundant on the summit (1,250 feet), and down the northern slope of Montpelier at intervals to 700 feet, May, 1894; (2) Pastures near the shore below the monument (round tower) at Portrane, April, 1894. Still frequent in Mackay's old station, Kelly's Glen or Glenasmole (*Cat.* 1806) in the upper portion of which Mr. Greenwood Pim tells me he found it in 1889, while Dr. M'Weeney two years later gathered it lower down the glen near Friarstown.

Ophioglossum vulgatum, Linn.—(1) Frequent in damp pastures above Gormanstown woods, April, 1894; (2) Marshy fields near Dunsoghly Castle, abundant, May, 1894; (3) Near the head of Crooksling Glen, above the Slade of Saggard, at 650 feet, June, 1894. Mr. W. H. Bloomer has shown me a specimen gathered by him near the monument at Portrane in April, 1894, and Dr. M'Weeney informs me that he found the plant abundant in 1891 along Glenasmole, from a little above Friarstown to the head of the valley. Near Friarstown, I found it in great profusion and luxuriance on the 24th June last. Appears more widely distributed in the county than the preceding species, as it is now on record from seven out of the eight districts into which I have divided the county for botanical purposes.

Lycopodium clavatum, Linn.—In great abundance and fruiting freely on the flat mossy summit of Slieve Thoul, near the S.W. extremity of the county at a height of 1,300 feet, August, 1894. Perhaps no observation of last season was more satisfactory to me than this, as a 25 years close acquaintance with the Dublin Mountains had failed to give me a single station for this interesting species. Loosely and inaccurately set down in Mackay's *Catalogue*, 1824, as plentiful in the Dublin Mountains, and recorded in the *Irish Flora*, 1833, from Kelly's Glen and Ballynascorney.

In concluding these Notes I wish to express my indebtedness to Mr. A. G. More and Mr. Arthur Bennett for assistance in determining some of the critical forms referred to. Information of further stations for any of the rarer County Dublin species, I shall be always glad to receive, as well as any reference to records, whether in the shape of manuscript, printed matter, or herbarium plants, likely to throw light on the history of the county flora.* Notes of new stations for rare or critical plants should, if possible, be accompanied by specimens.

* Communications on the subject may be addressed to 1, Belgrave-road, Rathmines, Co. Dublin.

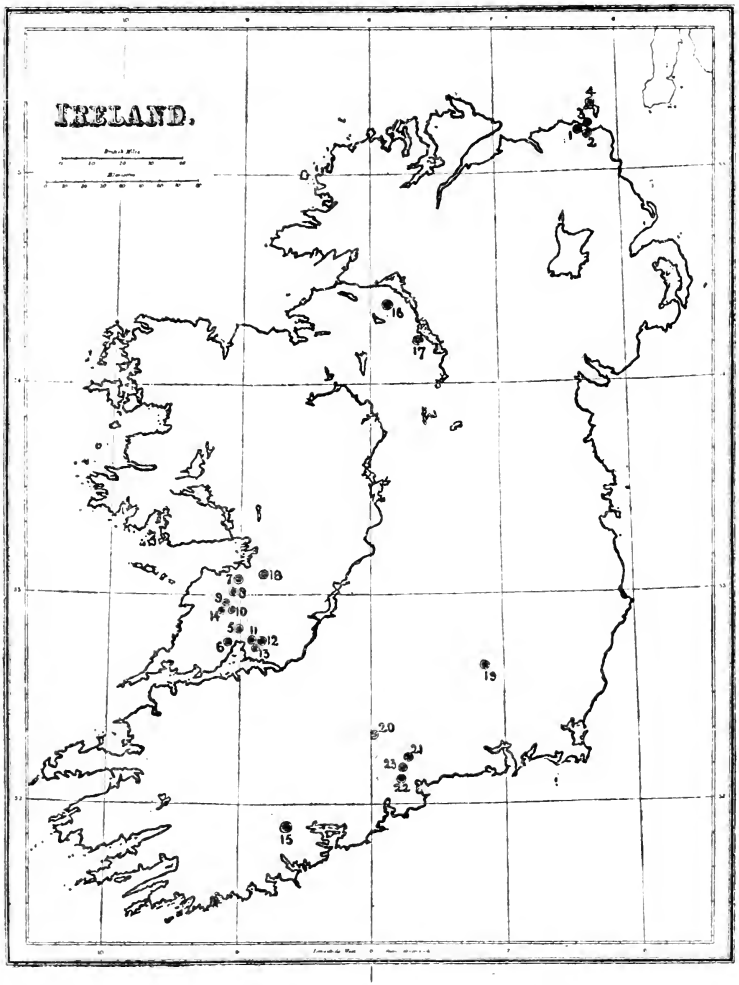
SOME NOTES ON THE IRISH CAVES.

BY R. F. SCHARFF, PH.D.

MR. CARPENTER'S article in last month's *Irish Naturalist*, on the animals found in the Mitchelstown Cave, is one of the most interesting, and at the same time one of the most valuable contributions which has been published in this periodical. I fully agree with his remarks as to the desirability of further investigating the Irish caves. A few of them have been entered with a view to the discovery of bats,—others have been examined by archæologists, but hardly any of them have been systematically worked.

Mr. Carpenter's interest in the researches would be chiefly directed towards finding the living creatures which are hidden in the dark recesses of the caves, but of equal if not greater importance are the remains of extinct animals, which may be buried there. When we consider the vast amount of work which has been accomplished in that direction by Prof. Boyd Dawkins in England, it seems surprising how little has been attempted in Ireland. The late Prof. Leith Adams directed his attention to one or two caves in the South of Ireland, and in the exploration of the Ballynamintra Cave he was joined by Messrs. Kinahan and Ussher. Their united labours were crowned with great success, but the number of extinct mammals hitherto obtained in Irish caves remains surprisingly small, when we compare them with those discovered in England and the South of Wales. Although a thorough exploration of caves is a somewhat costly undertaking, I venture to hope that a commencement will soon be made, as it is probable that it would lead to very important discoveries and additions to our extinct fauna.

As a preliminary towards this exploration, I think we should obtain a complete list of all the Irish caves, with their exact localities and approximate dimensions. I have made a few notes on the position of some of the caves, and with the kind assistance of Dr. Wright I discovered records of several additional ones, but I feel sure that a very much larger number of them exist in Ireland. I therefore append a map on which all the caves known to me are marked, chiefly with a view of eliciting further information from country correspondents who may happen to read this note. I also add to the number referring to any particular cave a list of the



papers in which it has been mentioned. This list naturally is far from being complete, and I hope readers of the *Irish Naturalist* will send to the Editors any additional titles of papers they may come across.

Co. Antrim.

1 & 2. Caves at Ballintoy.

3. Cave on Carrick-a-rede.

Bryce, J. "On some caverns containing bones near the Giant's Causeway." *Brit. Assoc. Report*, 1834.

4. Caves on Rathlin Island.

Andrews, T. "On some caves in Rathlin and adjoining coast." *Brit. Assoc. Report*, 1834, p. 660.

Co. CLARE.

5. Ballyallia Cave.
   Foot, F. J. *Proc. Dublin Nat. Hist. Soc.* Vol. ii. April, 1859, p. 152.
6. Cave at Edenvale.
   Kinahan, J. R. *Proc. Dublin Nat. Hist. Soc.* Vol. iii. June, 1861, p. 97.
7. Glancrawne Cave, Castleton.
   Kinahan, J. R. *Proc. Dublin Nat. Hist. Soc.* Vol. iii. June, 1861, p. 104.
8. Glenallia Cave.
   Kinahan, J. R. *Proc. Dublin Nat. Hist. Soc.* Vol. iii. June, 1861, p. 99.

9 & 10. Caves at Inchiquin Lough.
11, 12, & 13. Caves at Quin.
14. Vigo Cave.

Kinahan, J. R. *Proc. Dublin Nat. Hist. Soc.* Vol. iii. June, 1861, p. 94.

Co. CORK.

15. Ovens near Kilumney.
   Irish Naturalist, 1894, p. 241.

Co. FERMANAGH.

16. Knockmore Cave near Derrygonelly.
   Wakeman, W. F. *Proc. Royal Irish Academy*. Vol. x. 1870, pp. 229-232.
17. Knockninny Cave.
   Plunkett, T. *Proc. R. Irish Acad.* (2). Vol. i. 1870-79, pp. 329-338.

Co. GALWAY.

18. Caves at Coole Park, Gort.
   Scott. "Irish Fossil Mammalia." *Geol. Mag.* Vol vii. 1870, p. 416.

Co. KILKENNY.

19. Dunmore Cave.
   Kinahan, J. R. *Proc. Dublin Nat. Hist. Soc.* Vol. iii. June, 1861, p. 95.
   Mallet, R. "On some stalagmites from the Cave of Dunmore." *Quarterly Jour. Geol. Soc. Dublin.* Vol. iii. 1849.
   Hardman, G. T. "On two new deposits of human and other bones in Dunmore Cave." *Proc. Royal Irish Academy* (2). Vol. ii. (Science). 1875-77, pp. 168-176.
   Foot, A. W. *Jour. Royal Hist. and Arch. Assoc.* (4). Vol. i.
   Robertson, J. G. *Natural History Review.* Vol. i. 1854, pp. 169-174.

Co. TIPPERARY.

20. Mitchelstown Cave.
   Apjohn, J. "On the newly discovered Cave situate between Cahir and Mitchelstown." *Jour. Geol. Soc. Dublin.* Vol. i. 1833, pp. 103-111.

Co. WATERFORD.

21. Ballynamintra Cave, Cappagh.
   Ussher, Adams, and Kinahan. "Report on the Exploration of Ballynamintra Cave." *Proc. Royal Irish Academy* (2). Vol. ii. (Pol. Lit.), pp. 73-78.
22. Shandon Cave, Dungarvan.
   Dawkins, Boyd. "Cave Hunting."
   Adams, Leith. *Sci. Proc. R. Dublin Soc.* Vol. ii., pp. 45-86.
   Scott. *Geolog. Mag.* Vol, vii. 1870, p. 417.
23. Cave at Whitechurch.
   Hull, E. Anniversary address Royal Geol. Society, Ireland, 1877. *Jour. Royal Geol. Soc. Ireland* (N.S.). Vol. iv., pp. 49-51.

WITH THE WILD BEES IN GLENCULLEN.

BY H. K. GORE CUTHBERT.

(Read before the Dublin Naturalists' Field Club, February 12th, 1895.)

GLENCULLEN, on the boundary between the counties of Dublin and Wicklow, might be described in the poet's phrase as

> "A populous solitude of bees and birds,
> And fairy-formed and many-coloured things";—

in soberer language it is a very interesting valley which the Cookstown river in recent, and more violent agencies in former times, have scooped out of the granite wall of South Dublin and the drift overlying its hollows. The geologist and the botanist may spend a profitable day in Glencullen. Let us visit it for the nonce as entomologists, and, rambling thither some sunny afternoon in June, take note of the wild bees that we meet. We can watch their doings, study their habits, and thereby teach ourselves something of their economy and the complex workings of their instinct.

At starting, leaving the woods at the Enniskerry end of the glen, we notice how the air seems full of bees. Their brisk hum is everywhere, they seem to hover over every bush and flower, and to rise up before us in protest as we brush through the grass. There is a mossy bank just before us where the commotion seems keenest. This is the capital city of a humble-bee, *Bombus muscorum*, commonly called the Carder, and one of the best known of its tribe. The nest is not yet complete, for the season is still early, and, as its tenants are unwarlike, we can examine it in safety. Their dwelling, oval in shape, is entirely composed of moss, which the bees ingeniously heckle or card with their feet, afterwards working it up into a compact mass, resisting changes of weather. When possible these architects like to choose a site at the foot of a wall or base of a bank, this position giving them a certain security. Lifting the roof of the nest we find a series of cells of various sizes, connected by masses of coarse brown wax, somewhat in shape like pigeons' eggs, but longer and thinner. These cells are not made of wax, but of a silky material like rice-paper, and are really the cocoons spun by the bee-grubs. At this time of year they will not be very numerous, but towards the end of summer we may count between two and three score. Round about these cocoons, at the sides and base of the nest,

we shall find several masses of wax, very much resembling the queen-cells of the Hive-Bee, containing young grubs and bee-bread, or kneaded lumps of pollen and honey. These are the work of the queen-mother, the foundress of the colony, in the early spring days. According as the grubs grow to maturity they spin up the egg-shaped cocoons we first noticed, wherein they undergo their changes, first into nymphs, afterwards into perfect bees. The empty cocoons are then strengthened by the workers with a rim of wax and used as store-pots for honey. The older writers on bees, such as Kirby, state that the latter is never stored by any of our wild bees in regular cells like those of the hive-bee; but I have found, as we shall probably here find, in the nests of the Lapidary or Red-tailed Humble-bee, several roughly-shaped hexagonal cells of brown wax, partly sealed, and filled with honey. The queens and workers of the latter bee are very common objects at this time; later in the season we shall meet with the males. Other humble-bees are in evidence, especially the White-tail, *Bombus terrestris;* an allied species, *B. hortorum;* and we may meet a specimen of the less common *B. sylvarum.*

There are other bees here too, in numbers on bramble flowers and white-thorn, or flying up and down the faces of the clay banks. These are various members of the large genus *Andrena,* which, like the bulk of our wild bees, are "solitary" in their habits, and consist of two kinds of individuals only, males and females; or as we may put it, drones and workers, the untiring industry of the female being a characteristic feature of all the stinging Hymenoptera. The lady *Andrena* constructs a tunnel or burrow in the face of a bank to a depth, varying with different species, of from eight to fourteen inches. These burrows are seldom straight, and often branch out into subsidiary tunnels. At the end of each the mother-bee places a ball of pollen and an egg. She then closes the burrow with a pellet of clay to prevent the invasion of ants and predacious beetles.

The members of this genus we shall most likely meet are *Andrena Trimmerana, A. albicans, A. helvola, A. Wilkella* (easily known even on the wing by its silvery pile), *A. Gwynana, A. minutula,* and perhaps, though I have not taken it in Glencullen, the handsome *A. cineraria.*

In company with the *Andrenæ* we observe crowds of the brightly coloured *Nomadæ* or wasp-bees, with gaudy stripes of black and yellow, belonging to the large group of inquiline or "cuckoo"-bees. They are so called because they do not make nests for themselves, but use the nests of other species, their young being reared upon the food stored up for the grubs of their hosts. Amongst them we notice the common *Nomada alternata*, *N. ruficornis*, and *N. succincta*; we may also meet *N. bifida* and *N. flavoguttata*. At the upper part of the glen I have taken an example of the rare *N. ferruginata*, a rather sober-coloured insect.

Here upon a Hawkweed is a bee of curious appearance, dark-coloured, with a sharply pointed tailpiece, ringed with narrow greyish bands. This is another inquiline, *Cœlioxys elongata*, and we shall not have far to go for its host. There are several species of the latter, but the commonest, *Megachile centuncularis*, is abundant in many places. It is about the size of a hive-bee, but stouter, and lines its burrow very neatly with cuttings of Rose and Sweetbriar leaves. Nor does it confine its attention to the rose family only, for I have seen it cutting the leaves of such shrubs as *Symphoricarpus*. An allied species, *M. ligniseca*, lines its nest with cuttings from the Elm and the Beech.

Another genus of wild bee, *Halictus*, cannot possibly escape our notice, from the great abundance of some of its species. One of the commonest of these is a very pretty insect, *Halictus rubicundus*, the females being easily known by their ashy-grey banding and golden-yellow pile. The male *Halicti* have rather a peculiar appearance from their elongated bodies and slender antennæ. The males of *H. rubicundus* and *H. cylindricus* often congregate in a common burrow where they pass the night, and spend the time when the day is wet or cloudy. We shall probably meet with some of these "bachelor's clubs" by exploring the clay banks as sunset approaches. Most of the *Halicti* are small black or brassy insects, and all are remarkable for their fussy activity.

Flying about the burrows of the *Halicti*, but of less active habits, we observe other little bees, prettily marked with black and scarlet. These belong to the genus *Sphecodes*, formerly, but wrongly, thought to be inquiline like the

Nomadæ. We can distinguish at least two species, *S. gibbus* and *S. dimidiatus*.[1]

All the bees we have dealt with up to this belong to the long-tongued group, in scientific parlance *Anthophila acutilingua*. But there are a couple of the obtusilingual or short-tongued division we shall pretty certainly notice near the Glendhu side of the valley. One of these, *Prosopis confusa*, is a small black insect, somewhat like *Halictus subfasciatus*, but distinguished on closer inspection by its light yellow face and the yellowish bands upon its legs. The female *Prosopis* constructs her tunnel in a bramble stem, lining it throughout with a whitish secretion ; the male seems to be a notably lazy insect, for he is usually found, even in the sunniest part of the day, coiled up asleep in the cup of some flower.

Our other short-tongued bees belong to the genus *Colletes*. Two species occur at Glencullen, *C. fodiens* and *C. Daviesana*. The latter is not uncommon, a small bee of compact shape, thinly clothed with light brown hair. Several of its colonies, with burrows crowded closely together, will be found in the cut banks near the mountain end of the glen. The *Colletidæ* construct a remarkably clean-cut tunnel, about five inches in depth, terminating in a cluster of cells. These are finished with peculiar care. In fact the more we examine their work the more we shall marvel at their method, and the amount of industry involved. Each cell is oval in shape, about the size of a linnet's egg, made of fine mortar, and lined with a waxy enamel. When finished they are provisioned, as usual, with pollen. To dig them out intact requires some care, but we may accomplish it before the daylight fails us.

We have now in our afternoon stroll taken a hasty glance at a few of the wild bees that may be met with any summer's day in Glencullen. There are certainly others we have not noticed, needing fuller observations to record. But using our

[1] I may mention, however, that Mr. Edward Saunders ("Hymenoptera-Aculeata of the British Isles," p. 194), is inclined to adopt the earlier opinion as to the inquiline nature of *Sphecodes*. The facts that it is always found in company with *Halictus*, the absence of any pollinigerous organs, and its listless habit of flight, would seem to support this view; but the question can hardly be considered settled.

The researches and observations of Smith, Shuckard, Bridgman, and Sichel, and the analogy of the structure of *Ceratina* and *Prosopis* supply the chief arguments against the quoted opinion of Mr. Saunders.

eyes as naturalists, and as naturalists seeking to gather the meaning of what we have seen, we have traversed Glencullen till we have reached the end of the valley, and with it the end of our ramble. The stars are beginning to twinkle overhead and a bluish mist to enwrap the tree-tops of the glen. Soon a turn of the path will hide from us the late scene of our inquiries; but will not, I trust, so easily efface the recollection of the hours therein spent, and the knowledge we shall have derived from them.

THE PLANTS OF WESTMEATH.

BY H. C. LEVINGE, D.L.

DURING the past summer and autumn, the following plants were gathered by me in the County Westmeath, additional to those recorded in the May and June numbers of the *Irish Naturalist* for 1894, thus bringing up the total number of species for the county to 572, and the total additions to the *Cybele Hibernica*, Dist. VII., to 77. The *Rubi* were submitted to the Revds. E. F. Linton and W. Moyle Rogers, who have kindly examined and named them :—

Ranunculus circinatus, Sibth (vii.)—Brittas Lake, Knock Drin.

Rubus rhamnifolius, Auct. Angl. (vii.)—Knock Drin woods.

R. incurvatus, Bab. (vii.)—Knock Drin. A striking and handsome Briar with fine panicles of bright pink flowers and dark-green foliage, not previously recorded from Ireland, but by no means uncommon in the woods at Knock Drin.

R. erythrinus, Genev. (vii.)—Roadside hedge, near the "Longford gate," Knock Drin.

R. mucronatus, Blox. (vii.)—Deer Park fence, Knock Drin.

R. corylifolius, Sm. (=**sublustris**, Lees.) (vii.)—Knock Drin woods.

R. Balfourianus, Blox.? (vii.)—Near "the Supply" Bridge near Mullingar. Mr. E. F. Linton remarks that this is certainly Corylifolian or Cæsian, and Mr. M. Rogers suggests it may be a form of *Balfourianus*, Blox., which is a very variable plant.

Lactuca muralis, Fresen. (vii.)—Ballynegall roadside wall, between Portnashangan Church and School-house, also in the Ballynegall Demesne; appears to be truly indigenous.

Tragopogon pratensis, L. (vii.)—Killua Demesne, near Clonmellon.

***Ornithogalum umbellatum,** L. (vii.)—Rockview, near Delvin, thoroughly established in ditch banks and meadows.

†**Bromus commutatus**, Schrad. (vii.) (fide Mr. A. Bennett).—Meadows at Knock Drin.

Chara denudata, Braun. (= *C. dissoluta*, Leonh.)—Brittas Lake Knock Drin. Not previously found in the British Islands—*vide* description by Messrs. H. and J. Groves, *Irish Naturalist*, January, 1895, p. 11.

IRISH MAMMALS.

BY G. E. H. BARRETT-HAMILTON, B.A.

If, as Mr. Lydekker truly remarks in the preface to his recent work,[1] "no monograph of the British Mammals as a whole has been published since the second edition of Bell's 'British Quadrupeds' in 1874" and "since that date considerable advances have been made with regard to our knowledge of the geographical distribution of our native mammals," it was surely all the more incumbent upon the Editor and Publishers of the volume to procure the services of an author, who was known to have paid some attention to the study of British mammals. Mr. Lydekker, on the contrary, starts with the humiliating confession that he "makes no claim to being an observer of the habits of British mammals," and he has, therefore, filled his pages with quotations drawn largely from the writings of Macgillivray, as published in the original series of the "Naturalists' Library." To these he has added notes contributed by Mr. A. Trevor Battye and Mr. W. E. de Winton—gentlemen whose names have been until quite recently unknown in connection with the study of our British Mammals—while he has almost completely ignored the older workers, with the exception of Mr. J. E. Harting. In his preface, the author does, indeed, tender his acknowledgments to Mr. A. G. More (whom he appears to think is still "of the Dublin Museum") "for much important information kindly communicated by letter on the subject of Irish mammals," but there is little trace of Mr. More's influence in the body of the work, and the general meagreness of the references to Ireland, and the quotations from Thompson's "Natural History of Ireland" with regard to the distribution of mammals whose whole status might well have been completely changed since the publication of that excellent work, leads us to the belief that the author has taken but little pains to make himself acquainted with the natural history of Ireland.

It would take more than Mr. Lydekker's pleasant style of writing and the pretty binding of the book to hide the haste

[1] Allen's Naturalists' Library, edited by R. Bowdler Sharp, LL.D., F.L.S., etc.—**A Handbook to the British Mammalia,** by R. Lydekker, B.A., F.R.S., V.P.G.S., etc., London: W. H. Allen & Co., Limited, 13, Waterloo-place, S.W., 1895. Price 6s.

which is evident on almost all pages of his volume, and which could hardly have been expected to have been absent from a work which appears to have been projected only about a year ago.

In the present notice we propose to confine ourselves for the most part to that part of the book which refers to mammals found in Ireland, and, even then, want of space will hardly permit us to notice all the omissions.

We cannot compliment the publishers on the thirty-two plates. In our opinion Mr. Lydekker's book would have been much improved had they been left out. These may have been good for the time when the first edition of the Naturalists' Library was published, but in these days readers expect something more for their money than plates like No. 2 (the Long-eared Bat), which even the author is compelled to describe as "not quite true to nature." But if the plates are bad, the figures of the skulls are worse; some of them indeed are hardly recognizable as skulls at all, were it not that we are told so in the letter-press. That of the skull of the Squirrel on page 168 is almost the worst of a bad lot.

The best parts of the book are the chapters on the ancient mammals of Britain, and the introduction, which are pleasantly written, but even these are by no means perfect.

In the introduction (pp. 1-13) Mr. Lydekker discusses the origin of the British mammalian fauna. The British Islands come under the category of Dr. A. R. Wallace's "Continental" Islands, that is to say they were lands which have evidently been united with the neighbouring Continent of Europe at no very remote epoch, to which fact the general similarity of the fauna and flora and of the geological formations, the shallowness of the intervening seas, and the absence of peculiar mammals testify. Among the proofs which exist that these islands formerly stood at a much higher elevation than at present is the case, not the least remarkable are the submerged forests which occur on several parts of the coast of Great Britain, in addition to which the author might have mentioned many which occur in Ireland, such as that on the coast of the Barony of Forth in the County of Wexford.

Mr. Lydekker credits Britain with forty-seven species of terrestrial mammals (including several doubtful species), which have been known to have inhabited the British Islands during

the historic period. Of these twenty-six are Irish, but the Wolf, the Brown Bear, and the Wild Boar are now extinct, while the Black and Brown Rats, the Rabbit, the Fallow Deer, and the Squirrel are introduced as doubtfully indigenous species, so that our present list of truly indigenous Irish mammals fairly includes only eighteen species, and in historic times Ireland appears never to have had more than twenty-one species. Great Britain, on the contrary, has been inhabited by about forty species, while the neighbouring parts of the Continent of Europe possess many more.

In discussing the cause for this difference in richness of the fauna of countries lying so close to each other, Mr. Lydekker brings forward three theories—(i.) That of Dr. Wallace, who attributes the disappearance of the ancient British Fauna to a submergence of comparatively late date; (ii.) that which attributes the disappearance of the greater part of the fauna to the ice-sheet of the Glacial Epoch, and (iii.) that of Mr. G. W. Bulman (expressed in a recent paper[1]) that the ice-sheet did not extend further south than the latitude of London, if as far south as that, whence the fauna again spread northwards with the return of more favourable conditions, although with the loss of such forms as were unable to withstand a considerable amount of cold. On this latter view it is considered that Britain never was connected with the Continent after the passing away of the Glacial Period. On the two former views we must attribute our new fauna to a short connection with the Continent subsequent to the destruction by the ice of the Glacial Period. Of these theories, Mr. Lydekker is more inclined to agree with the second—indeed, Mr. Bulman's ingenious suggestion does not seem to account for the poverty of the mammalian fauna of Ireland as compared with that of the rest of Britain.

At this point we should have expected some attempt at an explanation of the peculiarities of our Irish mammalian fauna, but not a word have we on the subject, in fact the difficulty has been ignored by Mr. Lydekker in a manner similar to that in which he has ignored many others in his book. Not even is there a reference (we believe, in the whole book) to the work of the late Professor A. Leith Adams, who wrote in

[1] *Natural Science*, Oct., 1893.

one of his papers[1] that "The probability is, that the migration came from Scotland, and that there was a land communication between the two countries at the close of the Glacial Period, by which the greater portion of the mammals that had found their way to Scotland crossed to Ireland." Professor Leith Adams was led to make this suggestion by the fact that all the living and extinct mammals of Ireland, with the exception of the Grizzly Bear, have been recorded also from Scotland, while a large number of extinct English mammals are absent from both Ireland and Scotland. This suggestion has been supported by the recent investigations of Scottish naturalists into the Fauna of the islands lying between Ireland and Scotland.

In an ingenious paper lately published, Dr. R. F. Scharff[2] has stated his opinion, based upon the distribution of the Fresh-water Fish and the Mollusca that "Ireland was in later Tertiary times connected with Wales in the South and Scotland in the North, whilst a freshwater lake occupied the present central area of the Irish Sea. The Southern connection broke down at the beginning of the Pleistocene Period, the Northern connection following soon after. There is no evidence of any subsequent land connection between Great Britain and Ireland." There is much to be said in favour of this view, but it seems to us that perhaps an adaptation of Mr. Bulman's views to Ireland might account for the peculiarities of the flora and fauna of the south and west, such as the presence of the Mediterranean Heath and the Natter-jack toad.

Passing on to the systematic part of the work—which commences with the Bats (pp. 13—53), of which seven species have been found in Ireland, we find the statement that "since Bats are, on the whole, less interesting than many other British mammals, our notices of the various species will be comparatively brief." Thus, Mr. Lydekker again avoids a difficulty, and, while giving us any quantity of quotations from writers on the habits of our more common and easily observed mammals, contents himself with most meagre notes on the rarer, or less easily observed, and therefore, we should have thought, more interesting species. The list of

[1] "Report on the History of Irish Fossil Mammals," *Proc. Roy. Irish Acad.* (2) Vol. iii., 1883.

[2] *Proc. R. Irish Acad.* (3) Vol. iii., 1894, No. 3

the localities where the rarer Irish Bats have been obtained is very meagre, and in very few cases has the author taken the trouble to give the references for his statements. The subject of the migration of Bats is barely touched upon (page 27), the words "the fact that Bats do migrate, either occasionally or periodically, being well ascertained on the testimony of several trustworthy observers," being a very inadequate reference to so interesting a subject, with regard to which we may note that, though we once tried to obtain information on this subject by a correspondence with the light-keepers at the light-stations on the Irish coast, we entirely failed to obtain any valuable information as to the occurrence of Bats at these stations.

On the distribution of the Hedgehog (in Ireland) (page 58), Mr. Lydekker has no more recent authority to quote than Thompson for the statement that it "is found everywhere in suitable localities." But, indeed, there is little work to be done with regard to the distribution of Irish mammals. With the exception of the Bats, the Cetaceans, the Squirrel, the Black Rat, and the Red deer, all our mammals are found from north to south of the island, and many of the cases in which their distribution is curtailed are due to the direct agency of man. Referring to the depredations of Hedgehogs among game-birds and their egg-stealing propensities, he presents us with the statements of two writers in the *Field* and *Land and Water*, without giving either their names or a reference to the pages where their remarks occur, and then goes on to announce triumphantly that "this evidence, although circumstantial, appears to be pretty conclusive." Although, no doubt, the Hedgehog is, on the whole, a nocturnal animal, that this is not always the case we can testify from personal experience, having found a Hedgehog moving about in broad daylight in the Co. Wexford. It is a pity that Mr. Lydekker has not given us any notes on the habits of the Hedgehog in captivity—an omission which we have also to regret in the case of many other species.

Passing over the Mole, the Water-Shrew and the Common Shrew, which are not found in Ireland, we find an exceedingly short account of the Lesser Shrew, an interesting and but little known mammal, which is the only representative of its genus in our country. It appears to be widely distributed

and frequent, at least in parts of Ireland. Sir Douglas Brooke has an albino example, obtained in Fermanagh. Mr. Lydekker's statement with regard to Shrews that "during the winter they retire beneath the roots of trees or bushes, to the deserted holes of other small mammals or other secure nooks, where they pass the cold months in a state of profound torpor" can hardly be regarded as a serious one in the face of the receipt by the writer of several specimens of the Lesser Shrew from the Co. Wexford during the recent severe frost. Mr. Oldfield Thomas also writes that he has received four Common and one Lesser Shrew from Norway, caught on three feet of snow, with the thermometer below zero! Among the synonyms of the Lesser Shrew we do not note that of *Sorex hibernicus* given to it by Jenyns. Quite recently a note has been published by Mr. Oldfield Thomas[1], in which he shows that the correct names for the two British species of Shrews are *Sorex araneus*, Linn., for the Common Shrew, and *S. minutus*, Linn., for the Lesser or Pygmy Shrew. Mr. Lydekker, however, retains the name of *S. vulgaris*, Linn., for the Common Shrew.

The first of the Carnivora, in Mr. Lydekker's book, which has been found in Ireland, is the Wolf, and we are glad to be able here to give a word of praise to Mr. Lydekker for having included in his book notices of the extinct members of our fauna, which are undoubtedly entitled to their place beside their more fortunate survivors. As is so often the case in this book, Mr. Lydekker has given no reference for his statements with regard to the Wolf, and our readers may be glad to refer for further details to Mr. Harting's article on the extinct British Wolf,[2] also to an interesting note by Mr. G. H. Kinahan[3]. It is a pity that Mr. Lydekker has omitted any reference to the Wolf-dogs, for which Ireland was famous, and for accounts of which the writings of Prof. Leith Adams, Sir William Wilde, Dr. V. Ball and others should be consulted, as well as Captain Graham's work on the Irish Wolfhound[4].

As in the case of the Wolf, so with regard to the Wild Boar in Ireland (pp. 255-257) Mr. Lydekker's statements are not quite satisfactory, and he has given no reference to prove the

[1] *Zoologist*, Feb., 1895, pp. 62–4. [2] *Popular Science Review*, 1878, pp. 396-406.
[3] *Land and Water*, November 3rd, 1894. [4] Dursley, 1885.

existence of this animal in historic times. Although the absence of pig-bones in the older Irish deposits has caused some doubt to be expressed as to whether this animal was truly indigenous to Ireland,[1] there is no doubt that herds of pigs, either truly wild or feral, infested the woods and forests of Ireland in historic times.

As to the Fox (pp. 98-104) Mr. Lydekker seems to have no more recent authority to quote than Thompson, and this is also the case with regard to the Badger and Otter, which animals all survive from north to south of Ireland, and in many parts of the country are plentiful. A reference to our packs of Foxhounds would not, we think, have been out of place, nor would a reference to the weight of this animal, an interesting note on which was published last year[2].

On the distribution of the Marten Mr. Lydekker has quoted the latest paper on the subject, but has again omitted to give the reference.[3] Since that article was written we have obtained records of the occurrence of the marten in Roscommon,[4] in Dublin in 1877,[5] and from several other counties from which it had been already recorded. Interesting notes on Martens robbing bee-hives of the honey will be found in the *Field*.[6]

That the Polecat ever existed in Ireland will be news to many Irish naturalists, and we should like to know on what authority Mr. Lydekker makes the statement (p. 114) that "although Thompson had doubts of its occurrence, there appears good evidence that the Polecat, in his time at least, was an inhabitant of the woods of Kerry, Down, and other parts of Ireland."

"The Stoat," says Mr. Lydekker (page 119), "does not, according to Thompson, undergo a personal colour-change" in Ireland. Occasionally, however, Stoats undergo a partial change in Ireland in the winter, and Mr. Kinahan[7] records examples from Dublin, Galway, Clare, and Mayo. Mr. More's experience is not in accordance with this, and after many years

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[1] V. Ball, in *Sci. Trans. Royal Dublin Soc.* (2), vol iii., No. x, p. 339.
[2] *Field*, March 10th, 1894. [3] *Zoologist*, April, 1894.
[4] *Field*, April, 4, 1874. [5] *British Assoc. Guide to Dublin*, part ii., p. 90.
[6] Feb. 10, 1877, May 17, 1873, and April 4, 1871.
[7] *Land and Water*, June 11, 1892.

of close attention to Irish Natural History, he informed us that he had never met with a white Stoat in winter; but such a specimen certainly exists, from Co. Wexford, in the Dublin Museum of Science and Art,[1] and Mr. R. M. Barrington has another from Meath.[2] In the County Cork there is a pack of hounds which are trained to hunt the Stoat in summer, when there is no Fox hunting, and they give excellent sport, but of course are followed on foot.

Although Mr. J. E. Harting[3] seems still to have a lingering hope that the Weasel may yet be found in Ireland, Mr. Lydekker (p. 122) rightly states that "it appears to be unknown" there, and indeed the question may now, we think, be fairly considered as settled that the Weasel does *not* occur in Ireland. Often as the Weasel has been reported, no specimen has ever been produced, and such specimens as have been produced and submitted to competent naturalists have invariably proved to be Stoats.

(TO BE CONCLUDED.)

PROCEEDINGS OF IRISH SOCIETIES.

Royal Zoological Society.

Recent donations comprise a porcupine from C. A. James, Esq; a Peacock and a pair of White Guinea-fowl from J. Daly, Esq.; and a cockatoo from Mrs. Paul. Three Great Eagle-Owls, an Axis Deer, two Peccaries, an Ocelot, three Paradoxures, a Viverrine Cat, a Prairie Marmot, two Armadillos, a hundred Java Sparrows, an Aoudad, and an Antelope have been acquired by purchase.

2,060 persons visited the Gardens in January.

Dublin Microscopical Club.

December 20th.—The Club met at Dr. M'Weeney's, who showed a series of serial sections of the human central nervous system prepared by Van Gehuchten's modification of Golgi's method. This consists in impregnating the ganglion cells and their processes with chromate of silver by immersion of the pieces of tissue in nitrate of silver solution after treatment of bichromate of potash and osmic acid. The finest ramifications of the non-medullated protoplasmic processes of the nerve-cells can thus be followed, and the method may be said to have revolutionized our ideas of the structure of the central nervous organs. A peculiarity is that the sections must be mounted without a cover-glass. Contrast sections by Weigert's method were also shown.

[1] Vide *Land and Water*, May 28, 1892.

[2] *Op. Cit.*, June 4, 1892.

[3] *Zoologist*, Dec., 1894.

Mr. F. W. MOORE exhibited *Verticillium latertium*, Bert. It was found growing on a piece of decaying stem of *Cattleya Dowiana*, which had been imported recently from Costa Rica, on which it formed bright red patches. Under the microscope the colour did not appear nearly so brilliant as in the growing condition.

Mr. G. H. CARPENTER showed preparation of the head of the sea-midge, *Clunio marinus*, Halid., drawing special attention to the large size and circular shape of the eye-facets, and to the vestigial condition of the jaws.

Dr. SCOTT showed sections of caries of teeth prepared by Dr. Baker, showing the micro-organisms filling the dentinal tubules—also photographs of the sections coloured to represent the original sections.

PROF. G. COLE showed a section of banded Gneiss from Cushendun Co. Antrim. It has been recognised that some gneisses result from parallel igneous intrusions. In this case a eurite has formed parallel veins in what appears to be an altered basalt, and granular crystals of quartz and felspar from the eurite appear scattered in the latter rock. Deformation of the mingled rocks, accompanied by re-arrangement and re-crystallisation of quartz and felspar, has gone on subsequently to the intrusion.

Mr. M'ARDLE exhibited specimens of *Lejeunea calyptrifolia*, Hook., in fruit, which he collected last year at Auniscaul, Co. Kerry. On account of the small size and scarcity of the plant it is rarely met with in this condition. The perianth is large for the size of the plant, somewhat campanulate in outline, with five projecting angles or teeth at the apex, which are decurrent to the base. Calyptra spherical, strongly reticulated, with a stalk or peduncle about twice its length, divided by transverse septa into a number of tubular-like cells.

Mr. W. N. ALLEN exhibited a drawing of *Scapania aspera*, Mull., which he made from plants collected by Mr. M'Ardle in the Co. Cavan. The plate shows a plant the natural size, portion of a branch, magnified leaves and leaf cells, bracts, perianth with spinose ciliated mouth highly magnified, a shoot with gemmæ at apex of leaves. Mr. Allen also exhibited a good figure of *Metzgeria conjugata* (Dill) Lindb., clearly showing the monœcious character of the plant. These excellent delineations with others are for Mr. M'Ardle's coming paper on plants collected by him in the Co. Cavan for the Flora and Fauna Committee of the Royal Irish Academy.

PROFESSOR A. C. HADDON exhibited sections of a small sea-anemone commensal with a calcareous polyzoon which he had collected in Torres Straits. The actinian has not yet been determined, but it is probably the same as that recorded by Prof. W. A. Haswell, in the *Proc. L. S., N. S. Wales*, vol. vii., p. 608.

JANUARY 17th.—The Club met at Dr. FRAZER'S.

Prof. G. COLE showed the glassy edge of an olivine-basalt dyke, S. of Annalong Port, Co. Down. This is a pleasing and transparent example of basalt passing into brown tachylyte, with very trifling development of magnetite, so that the glass resembles the modern examples from the Pacific islands far more than the well-known and darker types from the western isles of Scotland.

Mr. F. W. MOORE showed *Nectria sanguinea*, Fr. This pretty and interesting species was found growing on a decaying pseudo-bulb of an unnamed *Eriopsis* imported from Brazil. As seen growing, the colour was extremely bright, but under the microscope it was much duller. It belongs to Cook's fourth section "Denudatæ," and is characterised by having the perithecia ovate in shape, and blood red in colour, the sporidia being elliptical and colourless.

Mr. GREENWOOD PIM exhibited *Macrosporium cheiranthi* from damp wall-paper, showing its peculiar muricate spores.

Prof. T. JOHNSON exhibited *Giraudia sphacelarioides*, a brown alga found growing on the leaves of *Zostera* at Roundstone (Moynes) in Co. Galway. The plant is recorded from the south coast of England and is an addition to the Irish marine flora. The peculiar lateral wart-like sori of sporangia were shown, and Goebel's investigations on the mode of reproduction in the species were described.

On the same *Zostera* leaves were growing plants of *Castagnea zosteræ*, Thin., showing plurilocular zoosporangia. This brown alga was found growing on the leaves of the marine monocotyledon *Zostera* at Moynes near Roundstone, the only known Irish locality. Here it was discovered fifty years ago by McCalla, and is recorded in Harvey's *Phycologia Britannica* under the synonym *Mesogloia virescens* β *Zoostericola*. The species is also recorded from the south coast of England and the west of Ireland.

Mr. MCARDLE exhibited a proliferous form of *Lejeunea serpyllifolia*, which he collected last year in Mr. Hickson's wood at Lispoll, near Anniscaul, Co. Kerry. The adventitious shoots grew from all parts of the branch. Under a high magnifying power he showed a portion of the stem and attached leaf lobule, with young shoots arising from each. The leaves showed still more remarkable examples of adventitious shoots. The specimens showed the first stage, the outgrowth of a simple cell from the margin; the second stage in which several additional cells were formed; a perfect leaf with five adventitious shoots in various stages of development, on some the leaves were well marked; and a further stage, a shoot with three leaves and two perfectly formed stipules or folioles, and at the attachment of the stem to the old leaf, root hairs; the contents of the cells had disappeared, the walls near the attachment showing disintegration.

Mr. McArdle also exhibited a drawing of five figures demonstrating the different stages of development of the young plantlets of *Lejeunea*, and a proliferous form of *Metzgeria conjugata*, a specimen under the microscope showed secondary branching of an adventitious shoot from the thallus. This uncommon mode of re-production in *Lejeunea* will form the subject of an article on the vegetative propagation amongst Hepaticæ, with plate, which will shortly appear in the *Irish Naturalist*.

Mr. G. H. CARPENTER showed a slide (prepared by Mr. J. E. Duerden) of a hydroid, *Bougainvillia ramosa*, in which some of the cups were much enlarged and thickened, forming a kind of "gall" inhabited by the parasitic embryo of a Pycnogon. Clinging to the stem of the hydroid was a larval *Nymphon*, but it could not be definitely stated that the embryos in the cups belonged to the same species. Dohrn and others have described the embryos of *Phoxichilidium* as sometimes parasitic in the polyps of *Podocoryne*.

Dr. M'WEENEY showed pure cultures and a slide of the *Bacillus diphtheriæ* (Klebs-Löffler) obtained from a diphtheritic membrane sent to him for bacteriological examination by a Dublin physician. The micro-organisms were quite typical and were contained in pure cultivation from the membrane. The patient recovered.

Mr. J. N. HALBERT exhibited two very rare Irish beetles, *Micropeplus tesserula*, Curt. and *Pseudopsis sulcata*, Newm., from the collection of Mr. A. H. Haliday, the former taken in a marsh near Holywood (*Entomologist*, vol. I., 1840), the latter also from Holywood, and Avoca. He was induced to bring these forward as both were entirely overlooked as Irish in Canon Fowler's "British Coleoptera." Judging from the records, both are rare in England, where *Pseudopsis sulcata* seems not to have been taken north of Yorkshire.

Belfast Naturalists' Field Club.

January 15.—The President in the Chair.—Mr. Joseph Wright, F.G.S., stated that a few weeks ago he had visited Divis Mountain in company with Mr. S. A. Stewart to examine Boulder-clay, which Mr. Stewart had observed high up on the mountain exposed in sections by the side of a mountain stream. Two gatherings of this clay (about 10 lbs. weight) were made at the height of about 1,300 and 1,400 feet respectively above the sea. These on being microscopically examined were found to contain two fry of mollusca, one *Buccinum undatum*, the other doubtfully referable to *Littorina litoralis*, also a foraminifer, *Nonionina depressula*, and six ostracoda too young to name with certainty. Through the courtesy of Mr. Gray he had also received a few pounds weight of Boulder-clay from Wolthill, 800 feet above the sea. In this sample were found three specimens of *Nonionina depressula*. These discoveries are of interest on account of the great height at which the clay occurs and of the marine organisms found in it; foraminifera and ostracoda have not hitherto been recorded from local Boulder-clay at such high elevations. Some discussion ensued, in which Messrs. William Gray, M.R.I.A.; W. Swanston, F.G.S.; J. Templeton, and others took part.

The President then called upon Professor A. C. Haddon, of the Royal College of Science, Dublin, to deliver his lecture upon "Modern Relics of Olden Time," which dealt with primitive means of transport, implements, ornaments and ceremonies which still survive among the peasantry in Ireland. The lecture was fully illustrated by a representative series of slides of Irish and foreign subjects, the lantern being worked by Mr. R. Welch. Messrs W. H. Patterson, Wm. Gray, Richard Patterson, and R. Welch having spoken, the wish being expressed that Professor Haddon would deliver a course of lectures next season under the auspices of the Club, the President conveyed to the lecturer the best thanks of the Club. The following new members were then elected:—Miss M'Cutcheon, B.A., Messrs. J. M'Clelland Martin, W. J. Stewart, and Charles J. Lanyon.

Belfast Natural History and Philosophical Society.

February 5th.—The following papers were read—John MacCormac, M.D., "Education and Innervation." Illustrated by a special series of lantern photo-slides. Seaton F. Milligan, M.R.I.A.—"Antiquarian Collections in Ulster, with special reference to the forthcoming Exhibition in the Linen Hall."

Dublin Naturalists' Field Club.

January 8th.—The Annual Meeting of the Club was held at the Royal Irish Academy House, the President (G. H. Carpenter, B.Sc.) in the chair. The Secretary (R. Lloyd Praeger) read the annual report, of which the leading features were as follows:—The membership of the Club stands at 158, having risen by over 25 per cent. during the year. The summer excursions and winter evening meetings were all carried out as arranged, and the attendance of members and visitors at them was satisfactory. The winter session was opened by a conversazione, which was largely attended. A highly successful three-day excursion was made to Fermoy and Lismore, in conjunction with the Cork and Limerick Naturalists' Field Clubs. Very good natural history work was done on the excursions, the results including the male and female, respectively, of two animals of which the other sex alone had previously been known, and a number of plants and animals not hitherto known in Ireland, or very rare in that country. A successful course of lectures on Botany were given by Prof. Johnson during the spring. A committee has been appointed to investigate the flowerless plants of Dublin and Wicklow and the flowering plants of Wicklow. The Committee have taken part in the formation of an Irish Field Club Union, the objects of which are to bring about an increased intercourse between the Clubs, to furnish mutual

assistance, and to look after matters of general Field Club interest. The proceedings of the Club have been regularly reported, and selected papers printed in full, in the *Irish Naturalist*. The Committee return thanks to the Royal Irish Academy for the continued loan of their rooms. The Treasurer (Prof. T. Johnson) subsequently submitted the statement of accounts, which showed a larger expenditure than usual, which was explained by the Treasurer. The adoption of the report and accounts was moved by Prof. A. C. Haddon, M.A., and seconded by Mr. W. F. de V. Kane, M.A., and passed, after a discussion, in which Mr. J. J. Dowling, Prof. Cole, Miss Hensman, Mr. J. E. Palmer, the Treasurer, and the Secretary took part; the opinion was generally expressed that so much money should not be spent on the excursions and conversazione. The President next declared the officers for 1895, whose names had been submitted to the last meeting, duly elected, and referred to the regretted departure from Dublin of Mr. J. E. Duerden, a most useful member of Committee. A vote of thanks to the Royal Irish Academy for the use of their rooms for the purposes of the winter meetings was proposed by Miss Hensman, seconded by Mr. J. E. Palmer, and passed. A donation of £5 to the funds of the *Irish Naturalist* was proposed by Mr. J. J. Dowling and seconded by Mr. R. P. Vowell. The proposer and seconder spoke in complimentary terms of the good natural history work which is being done by this journal. Mr. Kane moved and Mr. M. J. Buckley seconded an amendment that, instead of £5, one-tenth of the gross receipts of the Club for the coming year should be devoted to the magazine; this arrangement would slightly increase the proposed grant. After a discussion, in which Prof. Johnson, Mr. Dowling, and Prof. Haddon took part, the amendment was, by permission, withdrawn. Mr. Carpenter, on behalf of the editors of the journal, thanked the Club for their continued support of this enterprise On the motion of Prof. Haddon, seconded by Prof. Cole, a vote of thanks was given to the Press for their courtesy in reporting the proceedings of the Club. The following were then elected members of the Club:—E. P. Farran, Mrs. Merewether, Miss J. Orr, H. J. Seymour.

Mr. R. Lloyd Praeger subsequently exhibited some curious varieties of the Mistletoe. In one of these the leaves and stem were variegated with yellow; in the other the stem divided at each node into four or six branches, instead of the normal two. Prof. Johnson gave his views on the origin of this abnormality. Mr. Praeger also showed some remarkably overgrown specimens of plants found this year in Ireland.

JANUARY 22nd.—The PRESIDENT in the Chair. Mr. JOSEPH WRIGHT, F.G.S., of the Belfast Nat. Field Club lectured on "Foraminifera, Recent and Extinct." The President, in introducing the lecturer, pointed out that was the first meeting held in Dublin under the Irish Field Club Union scheme, one object of which was to arrange for occasional interchanges of lecturers among the Irish Clubs, that they might know more of each other's work. Mr. Wright proceeded with his lecture, which dealt fully with the classification and structure of the various forms of Foraminifera, and with their distribution, recent and fossil. The lecture was illustrated with a large series of diagrams, and with many microscopic slides. A vote of thanks to Mr. Wright was passed on the motion of Mr. W. S. Green, M.A., H.M. Inspector of Fisheries, seconded by Prof. Haddon, M.A.

FEBRUARY, 12th.—Prof. COLE, Vice-President, in the Chair. Mr. H. K. GORE CUTHBERT read a paper on "The Wild Bees of Glencullen," which is published in our current issue. Prof. SOLLAS, F.R.S., and Mr. R. LLOYD PRAEGER contributed a paper on the Boulder-clay of Kill-o'-the Grange. This paper will shortly appear in our pages. In the discussion on each paper which ensued, Rev. T. B. Gibson, Mr. N. Colgan, Mr. Cuthbert, Mr. Praeger, Prof. J Johnson, and the Chairman took part. The following new members were elected:—Richard Burnett, Miss A. Jellett, Lieut.-Colonel Plunkett, J. R. Redding, Miss A. B. Stack, Miss Gertrude Webb.

LIMERICK NATURALISTS' FIELD CLUB.

JAN. 24th.—Dr. W. A. FOGERTY, Vice-President, in the chair. Mr. JOSEPH WRIGHT lectured on "Foraminifera, Recent and Fossil," examples being shown from varying strata--Chalk, Lias, estuarine, and Boulder clays from the North of Ireland, as well as recent specimens dredged in the Atlantic Ocean on some of the expeditions sent out by the Royal Irish Academy. Besides these, the lecture was illustrated by a number of diagrams, photographic lantern slides, &c., exhibiting the marvellous beauty and complexity of the shells formed by these very minute creatures. Mr. Wright's visit to Limerick marks a new departure in Field Club work in Ireland, he having come here by arrangement with the recently-formed Field Club Union as representing the Belfast Club, whereby an interchange of lectures is to take place occasionally in future amongst the various Irish Field Clubs. On the motion of Mr. Robert Gibson, a hearty vote of thanks was unanimously passed to Mr. Wright for his interesting lecture.

NOTES.

BOTANY.

CHARACEÆ.

Irish Characeæ.—A Correction.—In Messrs. Groves' paper, under *Nitella flexilis* (p. 40) "148. Antrim—Carnlough River. 1892. R. Ll. Praeger" should read "145, Armagh—Camlough River. 1892. R. Ll. Praeger." The mistake was mine, as I find that on the label of the specimen submitted to Messrs. Groves, "Antrim" was written by inadvertence for "Armagh." The fact that I had sent other specimens from Carnlough, explains the second alteration. *N. flexilis* is still a desideratum of the flora of North-east Ireland.

R. LLOYD PRAEGER.

PHANEROGAMS.

Second Flowering of Artemisia stelleriana.—Mr. Praeger, in the *Irish Naturalist* for November, refers to the interesting fact of this *Artemisia* coming twice into flower on the North Bull in the summer of 1894. It may be worth mentioning that it continued to flower into the second week of December. In the middle of October it was in profuse bloom, and to the best of my recollection I also saw it in flower in the autumn of 1893.

C. B. MOFFAT, Ballyhyland, Co. Wexford.

Eythræa pulchella on the North Bull.—I can corroborate Mr. Scully's statement as to this plant's still growing on the North Bull. I gathered it there last summer, about a mile north of the station given by Mr. Scully.

R. LLOYD PRAEGER.

ZOOLOGY.

INSECTS.

Erebia epiphron, var. cassiope, near Sligo.—I am glad to be able to record the rediscovery of this mountain butterfly in Ireland. For forty years, since the late Mr. Birchall took "a fine series in June, 1854 . . . about halfway up Croagh Patrick on the Westport side in a grassy hollow," no entomologist has seen the species in this country. The captor of the specimen now recorded is the Rev. R. A. M'Clean,

late of Sligo, the greater part of whose valuable collection of lepidoptera has been secured by the Dublin Museum. He informs me that he took the insect on the edge of a wood at Rockwood near Sligo, at the height of about a thousand feet, during the summer of last year (1894). A high wind was blowing at the time, and he believes that the butterfly had been blown down from higher ground. The specimen is a female somewhat rubbed, the wings expanding 1⅝ inches, and with the fulvous markings and black spots rather clearer than in most of the British specimens of var. *cassiope* in the Museum collection.

As this locality is about fifty miles from the previous station for the insect (Croagh Patrick, Co. Mayo), we may hope that the species has a fairly wide distribution among our western mountains, though it is doubtless excessively local. Like many other alpine insects, it ranges much further south in Ireland than in Great Britain, where it is known from the hills of Scotland and Cumbria, but not from those of Wales. On the continent it is found in the Alps, the Pyrenees, and the mountains of Hungary, while the type of *epiphron* occurs in the mountains of Germany and northern France.

GEO. H. CARPENTER.

Thecla betulae in Co. Wexford.—I owe Mr. Kane an apology for having quoted him at second hand. It was not in his Catalogue, but in the resumé of the first part of it given in the *Irish Naturalist* for March, that I saw the distribution of *Thecla betulae* set down (p. 59) as "Munster; Co. Galway." I ought to have stated this when writing my note, the only object of which was to make it clear that the butterfly is not confined to those limits.

C. B. MOFFAT, Ballyhyland, Co. Wexford.

[We regret that we omitted the Co. Wexford locality for this butterfly in our review of Mr. Kane's Catalogue.—EDS.]

Coleoptera from Co. Dublin,—Owing to many causes my collecting in Co. Dublin last season was not as successful as I should have wished, most of my rambles being spoiled as far as entomology was concerned, by bad weather, and everything considered, insects were in my experience, not nearly so plentiful as in 1893. Amongst others the following species were secured in addition to those given in the *Irish Naturalist* for September last. Very few of the *Geodephaga* were met with, the only novelty was *Patrobius assimilis*, Chaud., a local highland form of *P. excavatus* taken in a fir plantation, Tibradden, Dublin Mountains, being a very critical species, Dr. Sharp kindly verified the identification; *Dyschirius salinus* appears to be not uncommon on the shore near Sutton, whilst *Homalium riparium* was in great numbers under sea-weed in the same locality. *Dromius nigriventus*, Portmarnock sand-hills, and in a decayed tree-stump, Howth; *Taphria nivalis*, Bray river, near Bray. The old quarries near Raheny that yielded *Enochrus bicolor*, etc., also produced three beetles new to me, *Lathrobium terminatum* (with yellow spots at apex of elytra very obsolete, approaching var. *immaculatum*, Fowler.) *Quedius maurorufus* and *Rhamphus flavicornis*, the two former were taken in damp moss at edge of pools and are additions to the Dublin list. *Agabus Sturmii*, *Hydroporus erythrocephalus* with other common water-beetles were fished from the pools. The Portmarnock and Donabate districts were tried on more than one occasion. The sand hills lying between the latter locality and Malahide Point, are very productive; here an uncommon burying-beetle *Necrodes littoralis* with *Choleva grandicollis* and other things were shaken out of a dead rabbit. *Heliopathes gibbus* and *Otiorrhynchus ovatus* occur, and what seems to be a new record for Ireland in *Apion onopordi*, Kirby. At Portmarnock *Orchestes salicis* plentifully off dwarf Salix growing on the sand-hills, *Corticaria fuscula*, *Apion seniculum*, *A. humuli*, *A. æneum*, *A. radiolus*, *A. æthiops* and *Sitones puncticollis*; some of these are not as yet included in our Dublin list. *Acalles ptinoides* in moss from Bray Head. *Baryrhithes sulcifrons*, Howth. *Hypera plantaginis*, North Bull; also a very puzzling *Anisotoma* which Dr. Sharp considers to be a

very large specimen of *A. dubia*, previously recorded by Professor McNab from same locality. *Otiorrhynchus ligneus*, *Alophus triguttatus* and *Bradycellus harpalinus* were almost the only species taken during a day's collecting on the hill near Carrickmines. In an old pond overgrown with vegetation in the Santry Demense, *Bagous alismatis* and *Poophagus sisymbrii* occurred in numbers. The following species, though unrepresented in the Dublin and Wicklow list of 1878, are apparently common in suitable places, i.e.—*Ocypus ater* (sea-shore), *Quedius semiæneus* (coast sand-hills), *Cercyon flavipes*, *C. pygmæus*, *Conosoma lividum*, *Philonthus puellus* (Dublin Mountains, etc.), *Stenus ossium*, *S. nitidiusculus*, *S. pallitarsus*, *S. pubescens*, *Scydmænus collaris*, *Enicmus transversus*, *Corticaria fuscula*, *C. elongata* (Drumcondra), *Ceuthorrynchus marginatus*, *C. punctiger*.

Mr. G. Low collected some Coleoptera at Dundrum including three uncommon species, i.e.—*Omosita discoidea*, *Trophiphorus mercuralis* and *Scaphisoma boleti*. In the autumn of 1893 I was fortunate in retaking two local insects, *Liosoma ovatulum*, var. *collaris*, and *Lamprosoma concolor* at Woodlands near Lucan, where the first Irish examples were collected some years ago by Dr. Power. I have also a specimen of *Choleva agilis*, taken in a damp place at Tibradden in the September of the previous year. There are probably more noteworthy species in my collection still awaiting identification, and a few, although named, I should prefer to get verified before recording.

J. N. HALBERT, Dublin.

Coleoptera from the North of Ireland.—That successful observer, Mr. R. Welch of Belfast, was kind enough to send some Coleoptera collected by him in various localities in the north of Ireland during the past season. The best thing amongst these was *Cercyon aquaticus*, Muls., taken in damp moss on Cave Hill near Belfast. It has not, I think, been previously noted from Ireland. He also took on Cave Hill the following species:—*Hypera trilineatus*, *Barypeithes sulcifrons*, and *Niptus hololeucus*. At PORTSALON, Co. Donegal, *Anchomenus marginatus*, *Otiorrhynchus atroapterus*, *Cneorrhinus geminatus*, *Gastrophysa polygoni* and *Serrica brunnea*. At WOODBURN GLEN, Co. Antrim, one specimen of the rather local *Choleva agilis* and *Phædon tumidulus*. Near BELFAST, *Alophus triguttatus*, *Barynotus mœrens*, *Bruchus atomarius*, *Exomias areneiformis*; and in the People's Park near Belfast, *Cœlambus impressopunctatus*, *Philhydrus maritimus*, *Deronectes xii-pustulatus*, and *D. depressus*.

J. N. HALBERT, Dublin.

The Stridulation of Corixa.—The stridulation of *Corixa* having been seldom remarked, I think it may be interesting to relate that nearly fifty years ago the late Dr. Robert Ball brought under the notice of the Zoological Section of the British Association at the Cambridge Meeting, 1845, the fact that *Corixa striata* produced loud sounds while immersed in water. Dr. Ball stated that the sounds, which had been heard by Miss M. Ball a few years previously, had since been heard both by Miss M. Ball and himself. A very interesting and more detailed account of the observations is given in a note from the original observer and communicated by Dr. Ball to the *Annals and Magazine of Natural History*, 1846. Miss M. Ball noticed two distinct sounds, which agrees with Mrs. Thompson's account of the stridulation of a *Corixa* (*Irish Naturalist*, 1894, p. 114). One of the sounds is probably due to the movement of the teeth on the feet as shown by Mr. G. H. Carpenter (*Irish Naturalist*, December, 1894), but further observations seem necessary to arrive at a satisfactory explanation of the other sound, which Miss M. Ball states to be accompanied by a movement of the body from side to side.

A. R. NICHOLS, Dublin.

[I am very grateful to my friend Mr. Nichols for having discovered this early Irish observation on the stridulation of *Corixa*. Like Mrs. Thompson, and Dr. Schmidt-Schwedt, as quoted in my paper, Miss

Ball observed the motion of the front feet across the face to accompany the chirping; she suggests that possibly the transverse ridges on the face have a part in producing the note. The edge of the face seems, however, more probably the part concerned, as it would be more easily reached by the feet than would the front.—G.H.C.]

MOLLUSCS.

Testacella haliotidea, F. Big., in Co. Dublin.—Mr. Burbidge recently discovered this species in one of the greenhouses of Trinity College Botanic Gardens. The difference in the shell between *T. haliotidea* and *T. scutulum* is so slight that an anatomical examination is necessary for a diagnosis of the species. As I was able to convince myself, this specimen is undoubtedly *T. haliotidea*, so that we have in it an addition to the fauna of Co. Dublin. Hitherto this species had been known only from Youghal, Cork, and Bandon.

R. F. Scharff, Dublin.

MAMMALS.

Irish Rat (Mus hibernicus Thomps.) at Lough Brickland, Co. Down.—Having been told that black rats lived in some fields on the north margin of Lough Brickland, which is close to my glebe house, I offered a reward for one, but none turned up in the course of several years. However, to-day, 5th February, 1895, when some members of my family were returning from skating on the above lough a black rat, a male, was found on the road near their reputed haunt. It was just dead and bore no marks of how it had lost its life. Having been brought to me, I now enclose it.

H. W. Lett,
Aghaderg, Loughbrickland.

GEOLOGY.

On Saturday evening, 12th January, Prof. G. A. J. Cole commenced his second course of geological lectures delivered under the auspices of the Belfast Naturalists' Field Club. In spite of exceptionally inclement weather there was a large attendance. We hear that the number of applications for the practical class which is held after each lecture has been in excess of the available accommodation.

Kitchen Middens of Donegal.—I think Mr. Kinahan and Mr. Welch have not observed my first and second reports to the Royal Irish Academy on "Pre-historic Remains from the Sandhills of the Coast of Ireland," read 14th January, 1889, and 12th January, 1891. In these I report pottery from pre-historic sites at Buncrana, Dunfanaghy, Bunbeg, and Bundoran. I have since found pottery at Ballyness and Portsalon.

W. J. Knowles, Ballymena.

Kitchen Middens of Antrim.—Among the various remains from the pre historic sites of Co. Antrim I reported to the Royal Irish Academy in January, 1891, the finding of bones of the Great Auk. I have since found some more bones of that bird, which leads me to believe that it was a native of the north of Ireland when the people of the stone age lived there. I have not seen any notice of this find in the *Irish Naturalist*.

W. J. Knowles, Ballymena.

Glacial Deposits of Dublin and Bray.—In the *Proc. Liverpool Geol. Soc.* (Vol. vii., pp. 183-206), Mr. T. Mellard Reade has an interesting paper on observations on the glacial deposits around Dublin, made during a visit in the summer of 1893. The conclusions which Mr. Reade has come to regarding the origin of these beds have been already set forth in a paper which he contributed to the *Irish Naturalist* (1894, pp. 117-121, 150-153). The paper is illustrated by some excellent sketches and diagrams.


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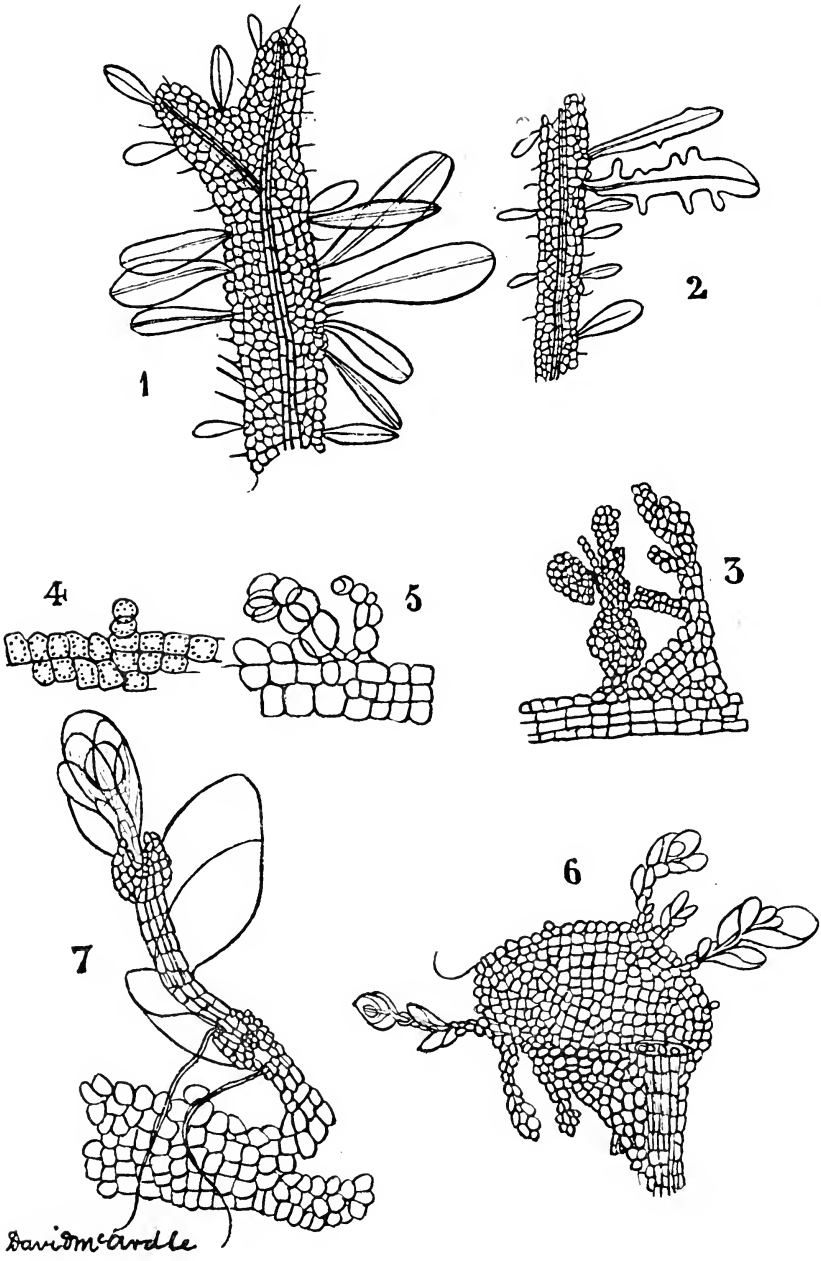

ADVENTITIOUS SHOOTS ON LIVERWORTS.

1, 2. *Metzgeria conjugata.* 3—7. *Lejeunea serpyllifolia.*

The Irish Naturalist.

Vol. IV. APRIL, 1895. No. 4.

ADVENTITIOUS BRANCHING IN LIVERWORTS.

BY DAVID M'ARDLE.

(Read before the Dublin Naturalists' Field Club, March 12th, 1895).

VEGETATIVE propagation amongst Hepatics is well demonstrated by some of the species which are of frequent occurrence in Ireland, and good examples are to be seen in plants of both frondose and foliose groups. *Marchantia* and *Lunularia* have special receptacles on the upper side of the frond or thallus called gemmæ-cups, from the floor of which cellular papillæ arise, which grow into flat or spherical stalked bodies, the gemmæ. In *Lunularia* the rim of the cup is partial or crescentic. In *Marchantia*, on the contrary, it is complete. The escape of the gemmæ is facilitated by club-shaped hairs which grow between them. The cell-walls of these hairs are mucilaginous, swell up and force the gemmæ out of the receptacle, when, under favourable circumstances, each one is capable of producing a perfect plant.

In the genus *Blasia* these receptacles are flask-shaped; the gemmæ, floating in a transparent mucilaginous substance, are often found at this early stage furnished with a single root-hair before emerging from their mucous receptacle.

The smallest portion of the frond of *Marchantia* or *Lunularia* broken off and placed in a favourable position, will grow. I have divided a number of plants of the rare *Codonia Ralfsii*, Gott (frequently cultivated at Glasnevin) by passing the sharp blade of a knife through them as they grew; after a few days I gently moved these parts a little distance and added soil between them, watered and covered the pot in which they were growing with a bell-glass, and in no instance did they show any bad effects from this treatment, but grew on rapidly and bore fruit.

In the genus *Metzgeria* adventitious shoots frequently grow from the margin and other parts of the frond, notably in

Metzgeria conjugata of which a small portion is shown magnified in Plate 3, fig. 1, bearing copious adventitious shoots. In fig. 2, secondary branching of an adventitious shoot is shown. The normal branches of the plant proceed from the pseudo-nerve.

Through the genera *Blasia* and *Pellia* we have the transition to the foliose group, which is well shown in *Pellia calycina* and the variable *Riccardia multifida*. These plants are found growing in large patches in damp places, increasing year after year by innovations, or young growths. Often a patch is found crisped and apparently dead in dry weather, but on close examination a few green shoots will be observed nourished by the detritus of the mother-plant; these shoots are sufficient to reproduce the species.

Amongst the foliose group, in the genera *Kantia* and *Cephalozia* we have examples of the gemmæ borne on the apex of attenuated branches. In *Cephalozia Francisci* and *C. denudata*, they are copious and remarkable, of a bright yellow colour when mature; in *Kantia* they form bright pellucid clusters of a brilliant green or yellow colour at the apex of the branches, leaves, &c. Dr. Spruce very aptly calls these bodies "propagula." Of leaf-gemmæ we have familiar instances in *Jungermania incisa* and *J. ventricosa* and species in the genus *Scapania*. In *Radula complanata* and *Madotheca platyphylla* we have examples of simple cells becoming detached as gemmæ from the margin of the leaves. Dr. Spruce records[1] an instance of shoots or branchlets growing from the leaves of *Jungermania juniperina*, which he collected at Cromaglown, Killarney, when on a visit to Dr. Taylor. This interesting notice is illustrated by a woodcut showing two leaves with a branchlet on each.

In his exhaustive work on the Hepaticæ of the Amazon and Andes, Dr. Spruce notices the disintegration of the marginal cells in the genus *Plagiochila*; the loosened cells hang awhile in little masses, then fall away, and are dispersed, some to renew their growth as distinct individuals. Sir William Hooker in his grand work on the British *Jungermaniæ* mentions a few species, now in the genus *Lejeunea*, on which he found gemmæ, and these appeared to be produced on their stems.

[1] *Phytologist*, vol. ii., 1845, p. 85.

Last year I collected *Lejeunea serpyllifolia* in Mr. Hickson's wood at Lispoll near Auniscaul, Co. Kerry, and when examining the plant on the table of a dissecting microscope, I was struck with the unusual and abnormal branching of one of the specimens, and I proceeded to ascertain the cause of it. From copious material, I found that these shoots or branchlets came from all sides of the stem and elsewhere. Figure 3 represents a portion of the stem and attached leaf-lobule, with young shoots arising from each. The leaves of the plant exhibited still more remarkable examples of adventitious shoots. Figure 4 shows the first stage of growth. It is from a portion of a leaf-margin highly magnified, and shows these shoots to be outgrowths of a simple cell. I noticed that the cells in these proliferous plants were more than usually chlorophylliferous. Figure 5 shows a further stage of development. Figure 6 shows a leaf of *Lejeunea serpyllifolia* with six adventitious shoots, in some of which the leaves are well marked. Figure 7 shows further development of a leaf-shoot with three leaves and two perfectly formed stipules, and, at the base of the stem a couple of root-hairs. The contents of the cells in the old leaf have disappeared, the walls near the attachment of the plantlet are beginning to disintegrate, and very shortly it would become independent from the mother-plant.

The delegation of rooting apparatus called the flagellæ to leafy branchlets, which occurs in some liverworts, is remarkable. These flagellæ enable the plants to fix themselves firmly where they grow, and assist them to resist drought or to start off on a separate existence and continue the life of the parent plant. That the reproduction of the species of *Lejeunea* by adventitious shoots is an unusual occurrence amongst those which grow in Ireland, there can be no doubt. I have examined many specimens from all parts of the country during a number of years, and have not previously found the vegetative budding in *Lejeunea* as now described.

This mode of reproduction is important in a marked degree, as occurring in a genus of which we have tropical and subtropical species growing in Ireland, and is favourable to the views held by my late excellent friend, Dr. Spruce, in his treatise on an Irish *Lejeunea*[1]:—"No existing agency is

[1] "On Lejeunea Holtii from Killarney." *Journal of Bot.*, vol. xxv., 1887, p. 72.

capable of transporting the germs of our hepatics of tropical type, from the torrid zone to Britain, and I venture to suppose that their existence at Killarney dates from the remote period when the vegetation of the whole northern hemisphere partook of a tropical character."

My own recent discovery of *Radula voluta* by the shores of Lough Cultra in the County Cavan, remote enough from Killarney, its only other Irish habitat, further strengthens the opinion held by this gifted observer. My specimens received a searching examination at the hands of Mr. M. B. Slater, F.L.S. The late Professor Lindberg considers that the Killarney plant is identical with specimens of *Radula Xalapensis*, a native of Mexico (New Granada), also found at Tullulah Falls, Georgia, United States. The late Dr. D. Moore in his excellent work on the Irish Hepaticæ[1] agrees with Lindberg and calls the plant *Radula Xalapensis*.

EXPLANATION OF PLATE 3.

Fig. 1. *Metzgeria conjugata*, with adventitious shoots, × 150.

Fig. 2. *Metzgeria conjugata*, showing adventitious shoots with secondary branching, × 150.

Fig. 3. *Lejeunea serpyllifolia*, portion of stem and attached leaf-lobule with young shoots, × 250.

Fig. 4. *Lejeunea serpyllifolia*, portion of leaf-margin showing first stage in growth of shoot, × 700.

Fig. 5. *Lejeunea serpyllifolia*, further stage of growth, × 750.

Fig. 6. *Lejeunea serpyllifolia*, leaf with six adventitious shoots, × 250.

Fig. 7. *Lejeunea serpyllifolia*, leaf shoot with leaves, stipules, and root hairs, × 400.

[1] *Royal Irish Academy Proc.* (2) Vol. ii., 1876.

IRISH MAMMALS.

BY G. E. H. BARRETT-HAMILTON, B.A.

(*Concluded from page* 72).

To the synonyms of the Otter Mr. Lydekker[1] might have added *Lutra Roensis*, a name given by Ogilby to the Irish Otter[2], chiefly on account of its beautiful dark fur. Some other Irish mammals have, at one time or other, been described as distinct species, e.g., the Lesser Shrew, as *Sorex hibernicus*, by Jenyns,[3] the Hare and the Rat, but the two latter are mentioned by Mr. Lydekker. These names are of at least sufficient interest to Irish naturalists to deserve a passing notice. Another point not touched upon by Mr. Lydekker in regard to the Otter is its weight. In stating also that the female gives birth to her young "in the month of April or March" he appears to have overlooked a paper, written by Mr. T. Southwell,[4] wherein the writer endeavours to show that in England the Otter almost invariably breeds in winter, but this does not seem to apply so well to Ireland, where young Otters have been met with in most of the summer months[5]. As far as we are aware there is at present only one recognised pack of Otter Hounds in Ireland, that of Mr. W. C. Yates, who hunts parts of the Counties of Wexford and Wicklow, where Otters are very plentiful.

The last of the terrestrial carnivora treated of by Mr. Lydekker is the Bear, *Ursus arctos*, which, though said to have been exterminated in Great Britain in the historical period, does not appear to have survived so long in Ireland.[6]

Of the marine carnivora (pp. 142-164) the undoubtedly Irish species are the Great Grey Seal (*Halichœrus grypus*) and the Common Seal (*Phoca vitulina*). No other species can as yet with certainty be admitted to our list of mammals, although it

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[1] Allen's Naturalists' Library, edited by R. Bowdler Sharp, LL.D., F.L.S., etc.; **A Handbook to the British Mammalia,** by R. LYDEKKER, B.A., F.R.S., V.P.G.S., etc., London; W. H. Allen & Co., Limited, 13, Waterloo-place, S.W., 1895. Price 6s.

[2] *P.Z.S.*, 1834, iii.

[3] *Annals of Nat. History*, 1838.

[4] *Zoologist*, 1888, p. 248.

[5] *Irish Sportsman*, July 9th and 30th, 1892.

[6] V. Ball, *Sci. Trans. Royal Dublin Society* (2), vol. iii., pp. 334-5.

is possible that the Harp Seal (*P. grœnlandica*) and the Hooded Seal (*Cystophora cristata*) have occurred (pages 158 and 160).

Pages 164 to 232 of Mr. Lydekker's work are devoted to the important order of the Rodentia, first among which we come to the Squirrel (*Sciurus vulgaris*), and here we miss an allusion to Mr. R. M. Barrington's paper on the distribution of the Squirrel in Ireland,[1] an important paper, which should not have been passed over, though, since it was written, Squirrels, which have been introduced in many parts of the country, have considerably increased their range. On the changes of the colour of the Squirrel at different times of the year, Mr. Lydekker quotes Macgillivray and Bell. A series of skins all collected at the same place and for each month of the year shows us, however, that we cannot, like the former naturalist, lay down any fixed rule as to the exact time of year when the changes will occur. Probably the Squirrel moults twice in the year—roughly speaking, in spring and autumn, and before each moult the old coat becomes thin and faded, but we can lay down no special time for such change to take place—indeed some specimens received during the late frost were already losing their winter coat. It follows from the amount of individual variation shown that the light cream-coloured tail may be observed at almost all times of the year, and this we have actually found to be the case. The statements of Bell[2] notwithstanding, we have notes of having seen Squirrels with cream-coloured tails in March, May, June, July, August, and December. The assertion that "the female produces three or four young ones about mid-summer" appears to have been adopted from Bell,[3] and we must refer our readers to notes[4] of newly-born Squirrels found in the second week of February, and in March. We ourselves have seen quite young and blind Squirrels taken from the nest on August 14th, 1891, in Ireland—a fact which, perhaps, indicates the birth of two lots of young in the year.

Passing over the Beaver, the Dor-mouse, and the Harvest-mouse, which species do not appear to have ever occurred in

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[1] *Proc. R.I.A.*, n.s. vol. ii., 1880.

[2] "Hist. of British Quadrupeds," (Ed. ii.), p. 279.

[3] *Op. cit.* p. 278. [4] *Field*, March 6th, 1886. *Zoologist*, March, 1891.

Ireland, we come to the Long-tailed Field-mouse (*Mus sylvaticus*), which Mr. Lydekker not inappropriately calls the Wood-mouse, to distinguish it from the Voles, which are usually known as "Field-mice." Among the characters of this species which distinguish it from the House-mouse are the mammæ, which number six, as opposed to ten in *Mus musculus*. The tail of this species is often quite as long as, or longer than, the head and body, and the skull is distinguishable from that of the House-mouse.

Mr. Lydekker includes in his work a supposed species of Mouse, recently added to the British list by Mr. W. E. De Winton,[1] viz., the Yellow-necked Mouse (*Mus flavicollis* of Melchior). Although we do not wish to judge too hastily of Mr. De Winton's discovery, we are inclined to think that this supposed species is merely a very fine and handsome variety of *M. sylvaticus*, and we question Mr. Lydekker's wisdom in hastening to include it in the British list. Mr. De Winton's characters laid down for this Mouse seem to us to be very insufficient, considering that it occurs everywhere with *Mus sylvaticus;* although the case might, we admit, be different were the geographical area inhabited by *Mus flavicollis* clearly defined. We are indebted to Mr. De Winton for kindly permitting us to examine his fine series, and we have carefully compared them with those of specimens in our own collection, and we confess that we cannot see where *Mus sylvaticus* ends and *M. flavicollis* begins.

The Black Rat (*Mus rattus*), says Mr. Lydekker, quoting from Mr. J. E. Harting, "must now be regarded as very rare" in Ireland. In fact it may be said to be confined entirely to the seaport towns, the Black Rats which are recorded from inland localities having invariably in our experience proved to be examples of Thompson's *Mus hibernicus*. We have seen specimens of the true Black Rat taken in recent years at Waterford and Belfast, but its presence at these towns is by no means constant, and appears to be entirely due to its having been brought there, sometimes in numbers, by foreign ships. The variety known as *Mus Alexandrinus* has been taken in a corn ship at Belfast, and a specimen is in the Museum of that city.[2] As regards the introduction of the Black Rat into

[1] *Zoologist*, Dec., 1894, p. 441.

[2] *Irish Sportsman*, Dec. 19th, 1891.

Britain from the Continent, which, we are told, "appears to be evident from the circumstance that it is not mentioned as occurring here previous to the fifteenth century, coupled with the fact that its remains are unknown in English cavern deposits," we very much doubt the application of this statement to Ireland, since Rats are certainly mentioned in Irish literature of much older date than the fifteenth century. Those who are curious on this subject would do well to consult Mr. David Comyn's "Irish Illustrations to Shakespeare" (p. 21), recently published at the *Freeman's* Office, in Dublin, where will be found much interesting information on this matter, as well as on the ancient Irish custom of rhyming Rats to death.[1] The whole subject takes up more space than is at our disposal if gone into thoroughly, and we must content ourselves with merely mentioning that Rats are alluded to by Giraldus Cambrensis[2] as having existed in Ireland in the 6th century.[3] Other allusions in Irish literature seem to show the existence of the common House-mouse in Ireland in very early times, and the date of its introduction, if it *was* introduced, is certainly shrouded in mystery.

The Rat described by William Thompson in 1837 as *Mus hibernicus* is rightly placed by Mr. Lydekker under *Mus decumanus* as a variety of that species. Since the paper[4], in which that conclusion was finally come to, was written, we have been able to amass a great deal of additional information, all of which strengthens the position there taken up. Specimens have been examined which were intermediate in coloration between *Mus hibernicus* and *Mus decumanus*, and an interesting family of rats which was brought to our notice through the kindness of Mr. D. R. Pack Beresford, of Bagnalstown, Co. Carlow, consisted of an old female *Mus decumanus* and ten young ones, eight of which were *Mus decumanus* and two *Mus hibernicus* (one of the latter having the typical white breast-spot). In addition to the specimens alluded to in the above paper, we have now examined specimens from the following additional Irish counties, viz.:

[1] Vide, "As you Like it." Act iii., Sc. 2.

[2] Top. D. Z., c. 6, and in other places.

[3] Vide also "The Proceedings of the Great Institute," published in 1860 by the Ossianic Society.

[4] *Zoologist*, 1891, p. 1.

—Monaghan, Wicklow, and Tipperary. Its occurrence in England has also been proved in Lundy Island[1]; in Surrey[2], at Norwich[3]; almost certainly at Little Whelnetham, in Suffolk[4], and quite recently at Cambridge. In Scotland it has occurred in North Uist[5].

Passing over the Voles (pp. 201–219), which do not occur in Ireland, we come to the Rabbits and Hares, and here Mr. Lydekker must be commended for his support of a change in nomenclature, which, though certain to prove inconvenient at first to those who have used the older names, is undoubtedly a right one, viz.:—*Lepus europæus*, Pallas, for the Common Hare of England, instead of *Lepus timidus* of many authors, and *Lepus timidus*, Linnæus (formerly applied wrongly to the preceding species) instead of *Lepus variabilis*, Pallas, for the Mountain Hare (the common Hare of Ireland) the reasons for which are given on page 222. As Mr. Lydekker has given an introduced species such as the Fallow-deer a place among our Irish mammals, he might have alluded to the fact that English Hares have more than once been introduced into Ireland, though we are not aware that any of the introductions have as yet proved a success. The introduced species is said to keep apart from the Irish Hare and to make no attempt to interbreed with it; and in most of the instances which have come under our notice it has died out unless protected. Some instances of the introduction of English Hares into Ireland will be found collected[6], where will also be found other notes on the Irish Hare, but the list is by no means perfect, and we possess notes of several other instances. Irish Hares have several times been introduced into Great Britain and have done well, notably at Vaynol, in North Wales[7], and in Islay, off Argyleshire[8], where they are stated to have been distinguishable from the Scotch Hare.

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[1] *Irish Naturalist*, September, 1892.
[2] *Zoologist*, February, 1893, p. 103.
[3] Described as hybrids in *Zoologist*, Sept., 1889.
[4] *Field*, Jan. 24, 1891.
[5] *Annals of Scottish Natural History*, April, 1891, p. 134.
[6] *Irish Sportsman*, September 19, 1891.
[7] *Field*, August 1, 1891.
[8] Thompson's "Natural History of Ireland".

The Mountain Hare (*Lepus timidus*, Linn.) comes in for a very moderately liberal treatment at Mr. Lydekker's hands, and we could add considerably to his account of this species did space permit us. We must, however, be content to point out a few things which seem to have escaped Mr. Lydekker's attention. Thus, there is no allusion to the weight of this animal, which, according to Mr. J. E. Harting,[1] in Scotland averages "probably between 5 lbs. and 6 lbs.; the heaviest I have noticed weighed $7\frac{1}{4}$ lbs." In the South of Ireland we have found the average weight of the hares to agree very much with the above, but we have weighed hares in January (does) which turned the scale at 9 lbs. and $9\frac{1}{4}$ lbs. Doubtless the fact that they were lowland hares had something to do with it. Although we have weighed hares which were heavier than these, we cannot at this moment find the note we made of it. It is certainly wrong to say of this Hare, as far as concerns Ireland at least, that "instead of making a 'regular form' it skulks among stones or in the clefts of rocks, or hides among the heather or fern." In the lowlands at least of Ireland this Hare makes a regular form, and in this and some other respects seems to have almost entirely adopted the habits of the English Hare.

The date of the supposed introduction of the Rabbit into Ireland seems to be completely a matter of conjecture, but the animal would appear to have been well established during all the historical period. In 1741 Rabbit's fur was one of the exports of the city of Cork.[2] As regards the weight of wild Rabbits (a point not touched upon by Mr. Lydekker), we may refer to a note by Mr. Harting.[3] In Irish Rabbits there does not seem to be any difference in weight from that of those killed in England.

That the Red-deer, now confined as a wild animal to Kerry, was once widely distributed over Ireland, is proved by the numerous discoveries of its bones over the island, and by the historical allusions. An interesting paper on this species appeared in 1882, written by Mr. R. J. Ussher.[4] This is the

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[1] *Field*, September 5, 1891.
[2] *Journal Cork Arch. Soc.*, 1893, p. 392.
[3] *Field*, Dec. 3, 1892.
[4] *Zoologist*, March, 1882.

only species of Deer now found in a wild state in Ireland, the Reindeer being long extinct, and the Fallow-deer an introduced species.

Of the Cetaceans, or Whales, Dolphins, and their allies (pp. 257 to 298) Mr. Lydekker has not very much to say, and he has evaded the trouble of looking up accounts of the habits and life-history of these interesting mammals by the use of sentences such as the following (applied in this case to the Sperm Whale (p. 276), but similar sentences will be found on pages 259, 261, 265);—"In the case of such a casual visitor to our shores it will be unnecessary to say anything about habits"! Time will not permit us to go through the whole list of Irish Cetaceans in detail, and we must be content with regretting that we found no allusions in Mr. Lydekker's book to several recent records of the occurrences of Cetaceans on the Irish coast, such as of the Hump-backed Whale (*Megaptera boops*) in Sligo[1]; of Sibbald's Rorqual (*Balænoptera Sibbaldi*) in Wexford[2], these two examples being the first and only one of their species which have been recorded from Ireland; of the Lesser Rorqual (*B. rostrata*) in Kerry[3]; of the Sperm Whale (*Physeter macrocephalus*) in Mayo[4]; of the Bottle-nose (*Hyperoodon rostratus*) in Wexford[5]; and of the White-sided Dolphin at Portrush[6], and Co. Wexford[7].

Far the best part of this book is the account of the ancient Mammals of Britain (pp. 298 to 328), but this, as we learn from a foot-note, is not new, having originally appeared in *Knowledge*. In connection with the Gigantic Irish Deer, Mr. Lydekker might have alluded to the evidence in favour of the view that this animal was contemporaneous with man as afforded by the discovery by Mr. R. J. Ussher of its long bones, split as though for the extraction of marrow, in connection with stone implements in Ballynamintra Cave, Co. Waterford.[8]

In conclusion, we regret that we cannot recommend Mr. Lydekker's book as one which may take the place of Bell's

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[1] *Zoologist*, May, 1883, p. 188.
[2] *Zoologist*, 1891, pp. 215 and 306.
[3] *Irish Sportsman*, Dec. 19, 1891.
[4] *Zoologist*, 1890, p. 72.
[5] *Zoologist* (loc. cit.)
[6] *Zoologist*, 1876, p. 5007.
[7] *Zoologist*, 1890, p. 384.
[8] *Sci. Trans. R.D.S.* (2), vol. iii., pp. 337-8.

"British Quadrupeds," a worthy successor of which has yet to be written. One thing we can commend him for is his refusal to introduce into his work the *Scomber scomber* principle, whereby, according to Dr. Bowdler Sharpe (*vide* Preface) "the correct title of the Badger should be *Meles meles* (L.); of the Otter, *Lutra lutra* (L.); of the Roe-deer, *Capreolus capreolus* (L.); of the common Porpoise *Phocæna phocæna* (L.), and of the Killer, *Orca orca* (L.)"!

NOTES ON THE IRISH CAVES.

BY R. J. USSHER, J.P.

REFERRING to Dr. Scharff's paper on Irish Caves in the *Irish Naturalist* for March (p. 57), I am delighted that he has called attention to this subject, for there is no reason why this country, so rich in limestone, should not contain hoards of remains of extinct animals in its cavern-deposits like other countries, and like the two caves in this district (Dungarvan and Blackwater) at Shandon and Ballynamintra, whose animal remains have been reported on.[1] Dr. Scharff's object in commencing a list of caves is evidently with a view to future searches in them for similar finds. It is well therefore to bear in mind that limestone caves alone have the property of preserving animal relics, and that it is vain to search caves in other rocks for them. Nor are all limestone caves by any means suitable places. Those that are large and open, such as are most likely to be known and visited, are as a rule unpromising, as well as those which contain a quantity of soft, wet cave-earth, for there the drip is too copious and rapid to form stalagmite.

Nor again, can we hope for results from caves which, like those near Mitchelstown, have been until recently inaccessible from without, however intricate and extensive they may be.

[1] *Trans. Rl. Irish Academy*, vol. xxvi., part v., pp. 187-230.

The lucky cave is one which having in past ages been open, and having become the resort of animals or primeval men, has received their remains as its deposits were being formed, and having entombed them beneath a stalagmite floor which formed over them, has remained undisturbed until the present time.

Such a cave may now be wholly or partially choked. Thus when I discovered the Ballynamintra Cave and commenced to open it with Professor Leith Adams it was filled to within six inches of its roof with the strata which represented the several chapters in its history. It was then difficult to realize that we had found an orifice of any importance. I have recently had the pleasure of rearranging, with the permission of Dr. Ball, the collections from this cave in their new case in the annexe of the Science and Art Museum, Dublin. But it contains only a fragment of our pre-historic records. Bone-caves should be brought to light north, south, east, and west in Ireland. Not only caves but pitfalls (pits, and vertical fissures in limestone) may contain stores of bones of extinct animals. A series of such caves were explored by Professor Leith Adams in Malta and yielded exuviæ of very specialized animals, e.g., the Pigmy Elephant.

In many cases the roofs of our caves and rock-shelters have been quarried away, and the fossiliferous strata have probably been left undisturbed beneath the quarry rubbish. I have heard of quarry men saying "When we came to the dirt we stopped," such dirt as would repay the most careful and laborious examination.

It does not follow from what I have said that the presence of stalagmite is essential to the preservation of bones. The remains of Irish Elk in the refuse-heap of the early hunters at Ballynamintra were not covered with stalagmite, but were in limestone soil dry enough to prevent the bones from decomposing. Still, a floor of stalagmite is the greatest safeguard to fossil bones beneath it, not only preserving them beautifully, but affording a guarantee that the newest object beneath it is more ancient than the oldest object above it.

In proceeding to dig out such deposits, the most careful records must be kept of the exact position of each object, for unless the sequence of events is recorded, the history of the cave is broken up like the mixed letters in a spelling game,

while the whole value of the fossils in most cases depends on the connection in which they are found and the objects with which they are associated. Accordingly, when a cave rich in suitable deposits is found, competent aid should be obtained in the removal of its contents.

In the Report on the remains referred to above[1] the following caves, not referred to by Dr. Scharff, are mentioned:—

Co. WATERFORD.

1. (1, Ordnance Sheet 31). An additional cave at Shandon, which proves to be very extensive, and by no means quarried away, as believed when the above paper was written.

2. (10, Sheet 30) Coolanav Cave, named Ooanagoloor, a vast cavern.

3. (12, Sheet 30), Kilgreany Cave, at Mrs. Williams's farm.

4. (16, Sheet 30), Bridgequarter, a cave north of Condon's house.

5. (20, Sheet 30) Bridgequarter, cave in Whitechurch House Demesne.

6-9. (23-26, Sheet 29), Bewley, four caves near the Dun of Bewley.

Particulars, with a map showing the position of these caves, is given in the above paper, and the numbers in brackets denote the several caves on that map. Several others are mentioned but need not be quoted in connection with an enquiry into the number and position of caves likely to yield a subterranean terrestrial fauna or the remains of extinct animals.

10. (Sheet 30) Ballynamintra Middle. In the rock called Carrigmurrish I discovered an extensive system of cave-galleries since the above report was written. The letter "B" on the map would correspond with the position of this spot.

Cave at Ballymote, Co. Sligo.—With reference to my note on the Irish Caves in last month's *Irish Naturalist*, Dr. V. Ball mentioned to me that Mr. Somerset Ward had found a portion of a Bear's skull in a cave near Ballymote, County Sligo, in 1887.

R. F. SCHARFF, Dublin.

Additional Irish Caves.—Having read Dr. Scharff's paper in the *Irish Naturalist* for March, I send the names of one or two not mentioned in his list:—

Co. CORK. Anna-Clogh, Mallow, *Archæologia*, 1806. Carrigacrump, near Cloyne, stated in Windele's "Cork" to be of great interest. Pooleen Caves, four miles west of Berehaven, also mentioned in Windele's "Cork."

Co. KERRY. Ballybunion.—W. Ainsworth, Dublin, 1834.

JAMES COLEMAN, Southampton.

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[1] Explorations in the Bone Cave of Ballynamintra, near Cappagh, Co. Waterford, by Leith Adams, G. H. Kinahan, and R. J. Ussher. *Trans. Royal Dublin Society* (2), vol. i. 1881, pp. 177-226.

REPORT ON INSECTS COLLECTED AT COOLMORE, CO. DONEGAL,

FOR THE ROYAL IRISH ACADEMY FLORA AND FAUNA COMMITTEE, JULY, 1894.

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

As I described Coolmore and the surrounding district in my last report,[1] I need not repeat the description. This year I made expeditions to some neighbouring localities, those visited being Bruckless, Coxtown, Mervagh, and Templenew. Bruckless is on the opposite side of the bay to Coolmore and about four miles from Killybegs. The shore there is very different from that at Coolmore, the sand being replaced by coarse gravel and large boulders. It did not prove a very productive locality, though I obtained some nice specimens there. Coxtown is near the town of Donegal. I spent two afternoons there, and the grounds produced some interesting specimens, chiefly by beating Oak trees. Mervagh is near Ballintra on the lower course of the river that flows through that town. I was particularly anxious to visit it, as I had, last year, taken *Siagara minutissima* there, and wished to obtain more. My kind friend, the Rev. John Hamilton, of Coolmore, drove Mrs. Johnson and myself over to the spot. The afternoon turned out wet; however being equipped with waterproofs we faced the weather, and were rewarded by capturing a large number of *Siagara* as well as some other insects. The *Siagara* were confined to one spot at the edge of the river, and seemed to rest on the mud at the bottom. Templenew is about two miles from Beleek on the River Erne. On a former occasion I had tried the river and found it barren of insects, so I turned my attention to other parts, and in a pond took *Donacia crassipes* and *D. versicolorea*.

On the day after my arrival at Coolmore the beach was strewn with numbers of insects. Where these came from I cannot tell, though it seemed most probable that they came from the opposite side of the bay, having been blown across by the strong north-west wind which prevailed at the time.

I sugared diligently, but it was not a success, and melanic forms were entirely absent. Last year matters were quite the reverse, sugar was most productive, and dark forms abounded.

[1] *Irish Nat.*, vol. iii., 1894, p. 83.

In spite, however, of these drawbacks, I obtained a goodly number of Lepidoptera, among them some "micros," most of which I picked up on a patch of meadow on the verge of the cliff.

The total number of insects collected amounted to 353 species, exclusive of some unidentified Diptera, &c. They comprise—

Coleoptera,	220	species;	new to district,	126	species.
Hemiptera,	22	,,	,,	14	,,
Hymenoptera,	4	,,	,,	2	,,
Lepidoptera,	87	,,	,,	60	,,
Neuroptera,	18	,,	,,	13	,,
Orthoptera,	2	,,			

I am indebted to Dr. D. Sharp, Mr. C. G. Barrett, Mr. E. Saunders, and Mr. J. Edwards for kind assistance in identifying insects with which I was not acquainted.

I subjoin a detailed list, with notes, of those insects which are now recorded from the district for the first time. It will be seen that several are new to Ireland.

COLEOPTERA.

Carabidæ.

Nebria brevicollis, F.—Coolmore.
Pelophila borealis, Payk.—Coolmore, washed up on the beach.
Loricera pilicornis, F.—Coolmore.
Clivina fossor, L.—Bruckless.
Dyschirius impunctipennis, Daws.—Coolmore, on the sandy beach in company with *D. politus*. It does not appear to have been previously recorded from Ireland, and is local in England and Scotland.
Bradycellus verbasci, Duft.—Coolmore.
Harpalus æneus, F.—Coolmore, not at all as plentiful as on the east coast.
H. latus, L.—Coolmore.
Pterostichus versicolor, Sturm.—Coolmore, numbers washed up on beach.
Pt. vernalis, Gyll.—Coolmore, Bruckless.
Amara plebeia, Gyll.—Coolmore.
Bembidium lampros, Herbst.—Bruckless, Coxtown.
B. æneum, Germ.—Coolmore.

Haliplidæ.

Haliplus obliquus, F.
H. fulvus, F.
H. fluviatilis, Aube.
H. lineatocollis, Marsh.
} In the river at Mervagh.

Dytiscidæ.

Coelambus inæqualis, F.—Coolmore. I was unable to find either *C. ix-lineatus* or *C. impressopunctatus* in the locality in which they abounded last year, probably owing to the difference of the two seasons.
Agabus paludosus, F.—Coolmore, Templenew.
A. unguicularis, Thoms.
Ilybius fuliginosus, F.
Rhantus bistriatus, Berg.
Dytiscus punctulatus, F.
} Coolmore.

Hydrophilidæ.

Laccobius alutaceus, Thoms.—Templenew.
L. bipunctatus, F.—Coolmore.
Limnebius truncatellus, Thoms.—Templenew.
Cercyon depressus, Steph.—Coolmore.
C. hæmorrhoidalis, Herbst.—Templenew.
C. unipunctatus, L.—Coolmore.

Staphylinidæ.

Aleochara nitida, Grav., v. **bilineata,** Gyll. } Coolmore.

Microglossa nidicola, Fairm.—Coolmore, in nests of Sand-martin. The only other Irish record is Killiney (M'Nab).

Homalota currax, Kr.—Coolmore. The only other Irish record is Powerscourt, Co. Wicklow, in shingle (G. C. Champion).
H. elongatula, Grav. } Coolmore.
H. sordida, Marsh }

Gnypeta labilis, Er.—Coolmore. An addition to the Irish list.
Tachyporus nitidicollis, Steph.—Coolmore, Bruckless.
T. solutus, Er.—Coolmore, Bruckless.
T. brunneus, F.—Coolmore.

Mycetoporus longulus, Mann.—Coolmore.

Leistotrophus murinus, L.—Bruckless, a single specimen.
Ocypus cupreus, Rossi.—Bruckless.
Philonthus varius, Gyll.—Coolmore.
Ph. albipes, Grav.—Bruckless. Is not previously recorded from eland.
Ph. sordidus, Grav.—Coolmore.
Ph. quisquiliarius, Gyll. } Coolmore.
Xantholinus ochraceus, Gyll. }
X. punctulatus, Payk.—Coolmore, Bruckless.

Othius læviusculus, Steph. }
Lathrobium multipunctatum, Grav. } Coolmore.
Stilicus affinis, Er. }

Stenus fornicatus, Steph.—Coolmore, new to the Irish list, appears to be a southern species in England.

Bledius erraticus, Er.—Coolmore, a very large colony occurred among the sandhills. This is an addition to the Irish list. Rare in England.

Oxytelus laqueatus, Marsh—Coolmore.

Omalium Allardi, Fairm.—Coolmore, also recorded from Waterford (Dr. Power) and Armagh.

Megarthrus depressus, Lac.—Coolmore.

Histeridæ.

Hister neglectus, Germ. }
Saprinus nitidulus, Payk. } Coolmore, in carrion.
S. æneus, F. }

Coccinellidæ.

Coccinella vii-punctata, L. } Coolmore.
C. xxii-punctata, L. }

Hyperaspis reppensis, Herbst.—Coolmore, a few specimens washed up on the beach. It has not been previously recorded from Ireland.

Nitidulidæ.

Brachypterus pubescens, Er.—Bruckless.
B. urticæ, F.—Coolmore.

Lathridiidæ.

Cononimus nodifer, Westw. } Coolmore.
Enicmus transversus, Ol. }

Cryptophagidæ.

Cryptophagus scanicus, L., v. **patruelis,** Sturm. } Coolmore.
Micrambe vini, Panz. }

Byrrhidæ.

Byrrhus fasciatus, F. } Coolmore, on the beach.
Cytilus varius, F. }

Scarabæidæ.

Aphodius fossor, L.—Bruckless.
A. rufescens, F.—Coolmore.
A. fœtidus, F.—Coolmore. The only other record is Bellurgan, Co. Louth.
A. nitidulus, F.—Coolmore. I have also taken it at Greenore.
A. punctato-sulcatus, Stm.—Coolmore, Bruckless.
Serica brunnea, L. } Coolmore.
Melolontha vulgaris, F. }
Phyllopertha horticola, L.—Coolmore, a number on the beach.

Elateridæ.

Lacon murinus, L.—Coolmore, a large number washed up on the beach; and I also took it on *Ammophila* on the sandhills.
Cryptohypnus quadriguttatus, Lap.—Bruckless. I took a good many under stones on the shore. I have also taken it at Ardara, and it is recorded from Dublin and Killiney.
Athous hæmorrhoidalis, F.—Coolmore.
Adrastus limbatus, F.—Coolmore, Coxtown.
Agriotes lineatus, L. }
Dolopius marginatus, L. } Coolmore.
Corymbites cupreus, F. }
C. tessulatus, F.—Coolmore, washed up on the beach in some numbers. The only other Irish record is in M'Nab's list. "Dublin, taken by Mr. Tardy."
C. quercus, Gyll. } Coolmore.
v. **ochropterus,** Steph. }

Dascillidæ.

Dascillus cervinus, Latr.—Coolmore, numbers washed upon beach.
Helodes minuta, L.—Coolmore, Coxtown.
H. marginata, F. } Coolmore.
Cyphon coarctatus, Payk. }

Malacodermidæ.

Telephorus bicolor, F.—Coolmore, Bruckless, Templenew.
T. flavilabris, Fall.—Bruckless.

Chrysomelidæ.

Donacia crassipes, F.—Coolmore.
D. versicolorea, Brahm.—Templenew.
D. sericea, L.—Coolmore, Templenew.
Lema lichenis, Voet.—Coxtown.
Chrysomela polita, L.—Coolmore.
C. fastuosa, Scop.—Coolmore, a single specimen on the beach, previously recorded from Courtown, Co. Wexford.
Gastroidea viridula, De G. }
Phædon tumidulus, Germ. }
P. armoraciæ, L. } Coolmore.
Lochmea capreæ, L. }
Galerucella calmariensis, L. }

Haltica ericeti, All.—Coolmore, a single specimen washed up on the beach.

Phyllotreta nemorum, L.
Crepidodera helxines, L. } Coolmore.

Psylliodes picina, Marsh.—Templenew.

Cassida flaveola, Thunb.—Coolmore.

Mordellidæ.

Anaspis ruficollis, F.—Coxtown.

Anthicidæ.

Anthicus floralis, L.—Bruckless.

Curculionidæ.

Apion apricans, Herbst.
A. carduorum, Kirby. } Coolmore.

A. ervi, Kirby.—Coolmore, Coxtown.

Polydrusus pterygomalis, Boh.
Phyllobius argentatus, L. } Coolmore, Coxtown.

Philopedon geminatus, F.—Coolmore.

Sitones lineatus, L.
Hypera nigrirostris, F. } Coolmore.
Hylobius abietis, L.

Orchestes quercus, L.—Coxtown, a single specimen by beating Oaks; also recorded from Cultra, Co. Down, and Dublin.

O. fagi, L.—Coxtown.

Ceuthorrhynchidius troglodytes, F.
Phytobius canaliculatus, Fahr. } Coolmore.

HEMIPTERA.

Zicrona cœrulea, L.—Coolmore, a single specimen washed up on the beach. I can find no previous record from Ireland. It seems to be of southern distribution in England.

Gerris thoracica, Schum., H. S.—Coolmore.

G. lacustris, L.—Templenew.

Nabis flavomarginatus, Scholtz,—Coxtown,

Salda littoralis, L.
Anthocoris sylvestris, L. } Coolmore,

A. nemoralis, F.—Mervagh.

Monalocoris filicis, L.—Bruckless,

Lygus pratensis, F.—Coolmore.

Phylus melanocephalus, L.—Coxtown, beating Oaks.

Psallus lepidus, Fieb.—Coxtown on Ash.

P. varians, H. S.—Coxtown on Oaks.

Macropsis lanio, L.—Coxtown. I have also taken it at Loughgilly, Co. Armagh.

Bythoscopus alni, Schr.—Mervagh.

HYMENOPTERA ACULEATA.

Crabro dimidiatus, F.—Bruckless. They had their nests in holes in a large boulder on the shore.

Bombus hortuorum.—Coolmore.

(*To be concluded.*)

ON THE FENESTELLIDÆ, WITH REFERENCE TO IRISH CARBONIFEROUS STRATA.

BY GRENVILLE A. J. COLE, M.R.I.A., F.G.S.
Professor of Geology in the Royal College of Science for Ireland.

In the present preliminary paper, I can do little more than call attention to the beauty and variety of a family of fossil polyzoa, the remains of which are widely distributed across Ireland. The Fenestellids are among the commonest fossils wherever the great Carboniferous Limestone retains traces of organic remains; members of the family are figured in almost every text-book of geology; and the reticulated character of their funnel-shaped or spreading zoaria renders their detection easy, even on rough surfaces of the rock.

The family, which was a favoured one in the days of Sir Richard Griffith and Frederick M'Coy, has suffered in recent years from the criticism of Mr. G. W. Shrubsole[1], who has been able largely to reduce the number of species of the type-genus *Fenestella*. His papers, we should note, do not deal with the "Fenestellidæ," as ordinarily understood, but with *Fenestellæ* only; and they show how species have been founded, not only upon imperfect specimens, but upon the characters of different portions of the same zoarium.

However, Mr. Shrubsole's method of dealing with the superficial markings and accessory parts of the Fenestellid zoarium was, to say the least, drastic and indiscriminate, and formed a marked contrast to the careful observation expended upon these details on the other side of the Atlantic. It may fairly be said that Mr. H. A. Prout, Professor James Hall, and Mr. E. O. Ulrich have taught us much of the beauty of our own fossil polyzoa; and the abundance of material in our Carboniferous strata is surely sufficient to rouse us now to emulation.

The delicate outer structures of polyzoan colonies are best preserved in shales; but a great deal can be learned from the

[1] "A Review of the British Carboniferous Fenestellidæ," *Quart. Journ. Geol. Soc. London*, vol. xxxv. (1879), p. 275; "A Review and Description of the various species of British Upper-Silurian Fenestellidæ," *ibid.*, vol. xxxvi., p. 241; "Further Notes on the Carboniferous Fenestellidæ," *ibid.*, vol. xxxvii., p. 178.

weathered surfaces of fossiliferous limestones, and from the free use of sections.

The general character of the *Fenestellidæ* is as follows:—

The zoarium forms a delicate calcareous mesh-work, on one surface of which the cellules or zoœcia occur. These are grouped along the main bars or *columns*[1] of the mesh. The columns bifurcate as the zoarium grows broader from its base, and the adjacent ones either approach and join one another at intervals, then separating again, or are united by little cross-bars called *dissepiments*. In the former case, elliptical apertures, called *fenestrules*, are left between the sinuous bars; in the latter case the fenestrules, elliptical or rectangular, are bounded on each side by the main columns, and above and below by the dissepiments. The fenestrules are far larger than the zoœcial apertures.

Ulrich[2] admits the genus *Thamniscus* into the family, and is thereby forced to extend his definition to forms that possess no fenestrules; but this seems an unnecessary complication. The genera included by different authors vary somewhat, but amount to about fourteen, and the greatest development of the family as a whole is in the Carboniferous period. For our purposes, the following genera are of immediate interest, and will be briefly discussed in order:—

1. **Phyllopora,** King (*Retepora* auct.) The columns are rounded, and are sinuous in the plane of the zoarium, uniting with one another laterally and leaving practically circular fenestrules. The zoarium is funnel-shaped when perfect, as in so many of the Fenestellids, and the zoœcia open on its outer surface, forming two or more rows on each column. *Ordovician* to *Permian.*

2. **Polypora,** M'Coy[3]. The columns are round, and connected by dissepiments. The zoœcia are in 2 to 8 rows (Ulrich) on each column; M'Coy observed 3 to 5 rows. There is no keel between the rows, but sometimes (Ulrich) a line of strong tubercles occurs along the column. *Silurian* to *Permian.*

3. **Fenestralia,** Prout. Like *Polypora,* but with a ridgeor *keel* a long each column, on each side of which there are two rows of zoœcia. Only one species is known, from the *Lower Carboniferous* of the United States.

[1] These were unfortunately styled "interstices" by M'Coy, Young, and others, a name more suggestive in the intervening apertures in the mesh.

[2] "Palæozoic Bryozoa," Geological Survey of Illinois, vol. viii. (1890), p. 395.

[3] Synopsis of the Characters of the Carboniferous Limestone Fossils of Ireland (Dublin, 1844), p. 206.

4. **Fenestella,** Lonsdale. The columns are round, and are united by dissepiments, slighter than themselves, as in *Polypora*. There is a keel, as in *Fenestralia ;* but there is only one row of zoœcia on each side of it. *Silurian* to *Permian ;* most abundant in *Carboniferous*.

4a. **Archimedes,** Lesueur. Like *Fenestella*, but wound spirally about a central axis, with the zoœcia on the internal or upper face. *Carboniferous*.

4b. **Ptilopora (Ptylopora),** M'Coy[1] (Scouler MS.). Like *Fenestella*, but columns diverging pinnately on each side of a central and thicker axis. *Carboniferous*.

5. **Semicoscinium**, Prout. (= *Carinopora*, Nicholson). Two rows of zoœcia, as in *Fenestella*, but the dissepiments are thicker and shorter, and the keel on each column is greatly developed. This striking feature is often thickened near its crest or in its central portion, and its form can be well studied in sections.[2] *Silurian* to *Devonian*.

6. **Unitrypa**, Hall. Like *semicoscinium*, but the crests of the prominent keels send out cross-bars which connect them. Sometimes there are two bars to each fenestrule, and sometimes there is one to each zoœcium. Uppermost *Silurian* to *Devonian*.

7. **Isotrypa,** Hall. Like *Semicoscinium*, but the keels are thin at first and then expand, the long plate-like summits that are thus produced being connected by bars at regular intervals ; these bars correspond to the dissepiments beneath them, and form a sort of outer meshwork. *Silurian* to *Devonian*.

8. **Hemitrypa**, Phillips.[3] In this genus the correspondence of structure between the outer mesh and the inner fenestrated zoarium is carried farther than in *Isotrypa*, and a delicate network, which may be styled the *tegmen*,[4] covers the face of the zoarium, and is supported by pillars rising from keels like those of an ordinary *Fenestella*. Each row of pillars, in fact, bears a rod running parallel to the column of the zoarium which lies beneath it, and these rods give off bars, producing a network between each pair of rods. The circular apertures of this network correspond to the zoœcia underlying them. *Silurian* to *Carboniferous*.

In the above synopsis the genera are arranged with an eye to their culmination in the exquisite details of *Hemitrypa*, which was at one time nearly consigned to oblivion by European palæontologists, its tegmen being somewhat negligently regarded as a parasite.[5] The range of this genus makes

[1] *Op. cit.* p. 200.

[2] See, for instance, Nicholson and Lydekker, "Manual of Palæontology," vol. i., p. 625, fig. 469 G.

[3] "Palæozoic Fossils of Cornwall, Devon, and West Somerset." (Ordnance Geological Survey, 1841), p. 27.

[4] G. A. J. Cole, "On Hemitrypa hibernica," *Proc. Royal Dublin Soc.*, vol. viii. (1893), p. 137.

[5] *Ibid*, pp. 133-5.

one hope that further research may show that some of its relatives also reached the Carboniferous period; and the number of Fenestellids recorded by Sir R. Griffith[1] from the base of the Irish Carboniferous strata points to the shaly beds of the south as a possible field of observation. But *Hemitrypa* seems the natural survivor of the series that leads on up to it from *Semicoscinium*, and this genus is fortunately already well known in Ireland. The great variety, however, of Fenestellid species now established in the United States makes a more thorough examination of our Carboniferous forms desirable. Specimens showing outer coats, even if these resemble parasitic crusts, are of especial value, and may possibly furnish new examples of the beautiful *Hemitrypa* series. Even in museums, a large number of Fenestellid specimens are merely casts of various parts of the zoarium; and at any time some choice example may be discovered, which may largely improve our knowledge of a genus. The observation of the "eight radial denticles," pointing inwards from the mouth of the zoœcia, in *Actinostoma*,[2] was a striking step forward in this direction, and similar structures may have existed in many *Fenestellæ* or *Polyporæ*. The controversy, again, as to the nature of *Palæocoryne*[3] shows how even important appendages of these complex polyzoa may be lost from all but the most exceptional specimens. Too often, moreover, workers have been glad to set aside such discoveries as "abnormalities" and "parasitic growths," without going to the length of supporting their assertions by a section. A great deal can be learned of the structure of a Fenestellid zoarium by merely grinding down two surfaces perpendicular to one another and to the face of the zoarium (vertical and horizontal sections), and examining these, when moistened, with a dissecting microscope or even with a hand-lens.

The Fenestellidæ have hardly yet revealed all their secrets to us. Their zoœcia, as is now known, depart widely from the simple cyclostomatous type, and Ulrich,[4] with great reason,

[1] "The Localities of the Irish Carboniferous Fossils," *Journ. Geol. Soc. Dublin*, vol. ix. (1860-62), p. 53.

[2] Prof. J. Young and J. Young, "New Carboniferous Polyzoa," *Quart. Journ. Geol. Soc. London*, vol. xxx (1874), p. 681.

[3] *Ibid*, p. 684. Nicholson and Lydekker, *op. cit.*, p. 624.

[4] *Op. cit.*, p. 344.

has adopted and extended Vine's suborder *Cryptostomata* for their reception. The cryptostomatous zoœcium is typically ovoid, as in the *Cheilostomata*, with an aperture towards one end; but, as growth proceeds, the rim of this aperture is prolonged out into a calcareous tubular *vestibule*, the axis of which is oblique to that of the zoœcium. I cannot help thinking that, in the highly keeled Fenestellids, the polypides permanently protruded themselves even beyond their vestibules, and ultimately became surrounded by a membranous tube which extended as far as the tegmen. Enough has been said, however, to indicate the lines on which observation may profitably proceed; and I need scarcely add that I should be grateful for the loan of any well preserved specimens from Irish Carboniferous strata. The surface cannot be too greatly "encrusted" by what may seem an outer sheath; the zoœcia and fenestrules may be entirely disguised by the meshwork of a rude or a more delicate tegmen. The forms, moreover, with well marked keels, or merely with lines of tubercles, all have an important bearing on the evolution of the more elaborate genera.

NOTES.

ZOOLOGY.

ARACHNIDS.

New Irish Spiders from Londonderry.—During the latter half of 1894, I sent Mr. G. H. Carpenter some spiders from Magilligan, Walworth, and Rathmullan. Among them he found specimens of eight species new to Ireland:—*Zora spinimana*, *Cryphœca sylvicola*, *Hahnia elegans*, *Leptyphantes alacris*, *Tmeticus abnormis*, *Microneta viaria*, *Xysticus erraticus*, and *Heliophanus flavipes*.

JAS. N. MILNE, Londonderry.

INSECTS.

Co. Dublin Hymenoptera, Captures in 1894.—Last summer at Monkstown I found *Psen pallipes* abundantly in burrows of *Anobium* and other wood-boring beetles. *Crabro peltarius* I took in great quantity at Portmarnock, also *C. cephalotes* and *C. varius*. *C. dimidiatus*, a new local record, also occurred at Monkstown. *C. peltarius* I met with in numbers at Laytown, as likewise *Oxybelus uniglumis*, on the occasion of the joint excursion of the Belfast and Dublin Field Clubs in June.

H. G. CUTHBERT, Blackrock, Dublin.

Orthezia cataphracta, Shaw, in Co. Dublin.—When collecting at Howth on the 9th of last March, I found several beautifully fresh examples of the female of the curious Coccid *Orthezia cataphracta*, Shaw, in moss, near the top of the cliffs, at the back of Lord Howth's demesne. This forms the first note of the insect from Co. Dublin. I have also taken specimens on Bray Head and near Dingle. As it has now been

recorded from several localities ranging over the north, east, and south-west, we may assume that it is common in suitable places throughout the country. No examples of the very rare winged male have as yet been observed. The peculiarly northern distribution of this insect is interesting, as it has been found in Greenland, Lapland, Scotland, and the north of England.

J. N HALBERT, Dublin.

AMPHIBIANS.

Wanted live Newts.—Some doubts have been expressed whether one or more species of newt inhabit Ireland. Readers of the *Irish Naturalist* who are interested in the question are herewith requested to kindly forward to me any newts which they may be able to secure. Three species of newts live in England, but only one species has hitherto been definitely authenticated in Ireland. It is chiefly from the south of Ireland and the County Galway that newts are wanted, as it is from there that others than the common form have been reported to occur. Specimens should be packed in moss and enclosed in a tin box.

R. F. SCHARFF, Museum, Dublin.

BIRDS.

Osprey in Co. Kerry.—Mr. T. W. M'Cormick writes us that a week or two ago an adult specimen of *Pandion haliætus* was shot near the Railway Hotel, Killorglin, Co. Kerry.—*Land and Water*, March 2.

Smew in Co. Cork.—On the 1st of March, 1895, a Smew (*Mergus albellus*), was shot on the Bandon river, a few miles west of Bandon. The Smew is a rare bird in the south of Ireland, and this appears to be the first record of it occurring in the Co. Cork.

C. LONGFIELD, Enniskeane, Co. Cork.

Little Bustard in Co. Longford.—Mr. L. Powell records in the *Irish Times* of March 2nd, that a Little Bustard (*Otis tetrax*) was shot in Co. Longford during February.

Carnivorous habit of Rooks in Frost.—Mr. W. J. Thomas records in the *Field* of February 16th that, during the severe frost that prevailed in the early part of this year, Rooks were observed to attack and devour Starlings in the neighbourhood of Mullingar.

GEOLOGY.

The Naturalist in the Mourne Mountains.—An unusually practical wall-sheet, which is shortly to be issued in pamphlet form, has been recently published by the Belfast and County Down Railway Company. It is headed "Mountain-climbing in the Mournes," and gives details of six typical routes, by following which the finest scenery of this grand district may be explored. The tourist should be in possession of the hill-shaded 1-inch ordnance map, to which a reference might well have been given; but it would probably be worth while for the same competent climber who has prepared these concise notes to induce the Railway Company also to put on sale a lithographed map, say on the scale of two inches to one mile, on which the details acquired by his obviously wide local knowledge might be noted down. The typical visitor to sunny Rostrevor has very little knowledge of the Mournes. It is from the north, and west, from Newcastle, Bryansford, and Hilltown that their wilder features have been studied; and we may now hope that some active walker will do for Slieve Gullion and the ridges around Carlingford Lough what the County Down Railway has done for its especial district.

G. A. J. COLE, Dublin.

PROCEEDINGS OF IRISH SOCIETIES.

Royal Zoological Society.

The Sixty-third Annual Report of this Society, which is just issued, is one of considerable interest. From the Report of the Council we learn that the total number of visitors to the gardens during the past year (1894), was 115,031, being nearly 10,000 greater than the total of 1893. The number of visitors (and, as a consequence, the receipts at gate) have been steadily increasing for the last six years. There is also a slight increase in Entrance Fees and Subscriptions. During the year nine Lion cubs have been born, five of these being males in one litter, an unusual occurrence. They have been exchanged for a fine pair of Ostriches, a monster Baboon, and other animals. Among the other items we note that three Pumas were born in the gardens, and that a pair of the curious South African Hunting Dogs were acquired by purchase. The Chimpanzee "Bella" unfortunately died on 15th November, but the purchase of an Orang-utan has secured to the gardens another representative of the Anthropoid apes. The Bovine animals include a Brahmin Bull, Pigmy Indian Cattle, Brahmin Dexter Crossbred Heifer, Gayal Cow, Chillingham Heifer, and Yak Cattle. The Aquarium has been greatly improved, and is now very attractive. The Report concludes with a catalogue of the animals now in the gardens, and the usual list of members, etc. We congratulate the Society on their flourishing condition.

Recent donations comprise a Fallow-deer Fawn, from A. E. Goodbody, Esq.; a Mongoose from C. A. James, Esq., and a pair of Foxes from S. Barkley, Esq. A young male Lion, sent by the governor of Harar to the Queen, has been graciously presented by Her Majesty to the Society. The animal has safely arrived at the Dublin gardens, and has received the name of "Victor." A Barbary Sheep has been born in the gardens, and a pair of Mandarin Ducks purchased.

4,350 persons visited the gardens in February.

Dublin Microscopical Club.

February 14th.—The Club met at Mr. A. Andrews'.

Prof. G. Cole showed a section of Perlitic Obsidian, from Sandy Brae, north of Tardree Mountain, Co. Antrim. This rock is probably the most beautiful example of an unaltered perlitic glass in the British Isles. Mr. W. W. Watts has recently (*Quart. Journ. Geol. Soc.*, vol. L., p. 367), given a detailed description of its microscopic characters. It forms the glassy part of a rhyolite, which probably flowed from the great neck of Tardree Mountain.

Mr. M'Ardle exhibited the perianth and capsule, with spores and elaters of *Radula voluta*, Tayl., from specimens which he collected on the shores of Lough Cultra, Co. Cavan, in 1893. This is a new locality for the species. The Irish plant is held by good authorities to be the same as *R. Xalapensis*, N.M., from New Granada collected by Linding, and on Tullulah Falls, Georgia, U. States.

Mr. H. J. Seymour showed sections of Silicified Oolite found as a pebble in the Glacial gravels of Glencullen, Co. Dublin. Foraminifera form the centres of the Oolitic grains, which are purple-brown in the mass, cemented by white chalcedony. In section the grains appear pale brown. It would be interesting to trace the origin of this rock. Probably it is from some Oolitic zone in the Carboniferous system; but it is just possible that it is from a Jurassic stratum, which has been entirely removed from Co. Dublin.

Belfast Naturalists' Field Club.

February 19.—The President (F. W. Lockwood) in the chair. Rev. Denis Murphy, S.J., lectured on Irish Art as shown on Ancient Crosses.

March 9.—A party of twenty-five, mostly members of the geological class, visited the various deposits to be found at Larne. The party left Belfast at 12.30, arriving in Larne Harbour at 1.40, where they were met by Professor Cole, who straightway led them down to the exposure of the New Red Sandstone: making this his text, he gave a very clear outline of the conditions of this country in these times. No find was made except a few pieces of gypsum. A little way further on was seen a large section of the Rhætic Beds, towards the top layers of which Mr. William Swanston was lucky enough to hit on *Pecten valoniensis*, the type fossil of the stratum in which it occurs.

Professor Tate has recorded no fossils from this part. A so-called oolitic structure was next discussed, but no decision was arrived at: Professor Cole, however, secured several of the knots and grains, of which we may hope to hear more. The Lias beds were now arrived at, and the zones of *Psiloceras planorbis*, *Ægoceras Johnstoni* and *pentacrinus* were successfully crossed, each forming a halting-place for the collectors to whom the Professor explained the various features. Specimens of the above were obtained, and also of *Lima gigantea*, *Gryphæa incurva*, various *Cardinias* and others. Perhaps the best find was a *Nautilus* in which the septa were replaced by sulphate of iron, and of which about one third of the outer whorl was practically removed, showing the chambers, divided off by the gold-coloured layers of the sulphate. Another shift was then made to the Greensand, of which there is a large but sand-covered exposure, a great part of it being the reddened deposit, in which there were a vast number of fragments of *Inoceramus*, so much so that Professor Cole believes this bed represents the English Turonian, which is usually thought to be missing in our Irish strata. Close to this is the base of the Chalk, with *Ananchytes ovatus*, and *Belemnitella mucronata*, of which specimens were secured, as also some impressions of spongy or polyzoan forms. Professor Cole believes our Chalk to correspond to the very topmost layer of the English Chalk, and this belief was strengthened by Mr Swanston drawing attention to the great development of marine gasteropods in the Limavady district. On the road back to Larne, another outcrop of Greensand was examined, yielding only a *Rhynchonella robusta*, and the party then headed for the Post-Pliocene gravel beds of the Curran, which have already been very fully described in the Proceedings of the Club. One or two members of the party were fortunate in discovering marine shells and worked flints side by side in the middle of the section *Littorina litorea*, *L. litoralis*, and *Patella vulgaris* were found. The estuarine clay was noticed only in passing, as time was short, and the party travelled back to Belfast by the 5.45 train. Tea in the Museum was followed by Professor Cole's lecture on the Eocene, Oligocene, and Miocene periods, in which by far the most important point raised was the discovery of worked flints in undoubted Miocene deposits in India. Fuller particulars are being anxiously watched for, but there seems no reason to doubt the authenticity of the find. If true, it will be a final blow to the theory that man sprang into existence in the last geological formation, and with all his modern powers of intellect.

March 19.—The President in the Chair. The following papers were read: Lt.-Colonel Partridge—"Additional Lepidoptera from Enniskillen." J. R. P. Manfield.—"Wild Bird Protection and Nesting Boxes." Subsequently the annual meeting of the Microscopical Section was held, and there was a display of microscopical apparatus and objects.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

MARCH 5.—The President (R. LLOYD PATTERSON) in the chair. MR. REDFERN KELLY lectured on "The Great Mystery of Stellar and Planetary Evolution."

DUBLIN NATURALISTS' FIELD CLUB.

MARCH 12.—The President (G. H. CARPENTER, B.Sc.) in the chair. Prof. J. P. O'REILLY, C.E., read a paper entitled "The Possible Palæontological Reading of an Eastern Tradition." The reader drew attention to a statement taken from Bailly's "Lettres sur l'Atlantic de Platon et sur l'ancienne Histoire de l'Asie" (Paris, 1779), in which the statement was made that Huschenk, grandson of Caiumarath, first King of the Persians, conducted his expeditions on a horse having twelve feet, which, the reader endeavoured to show, might possibly have been one of the three-toed ancestors of the horse. Another tradition told how Tahamuruth, third King of Persia, had for a steed a great bird called Simorg-auka, which the reader suggested may possibly have actually been a bird allied to the Ostrich. Prof. Cole, criticizing the paper, pointed out that the suggestions made by Prof. O'Reilly could not be met on the grounds of impossibility, as man was known to have been contemporaneous, for instance, with *Hipparion*, but he considered that the twelve-toed horse of the legend was more probably a retrogressive sport. Rev. Maxwell Close and the President also spoke. A letter was read from Dr. E. J. M'Weeney regretting his inability to attend and read a paper which stood in his name.

Mr. D. MCARDLE read a paper on "Adventitious Branching in Liverworts," which appears in our present issue.

Mr. R. LL. PRAEGER exhibited some rare British plants from the Boswell Herbarium. The species shown included *Ranunculus reptans*, *Elatine Hydropiper* (from Belfast), *Peucedanum officinale*, *Erythræa latifolia*, *Orobanche Picridis*, *O. caryophyllacea*, *Primula scotica*, *Statice Caspia*, *Atriplex pedunculata*, *Carex frigida*, *Lastrea uliginosa*. Professor JOHNSON exhibited a sea-weed, *Epicladia Flustræ*, Rke., new to Ireland, found on *Flustra* collected at Rush by Mr. J. E. Duerden.

Messrs. J. L. Huddleston, and G. E. T. Greene, J.P., F.L.S, were elected members of the Club.

CORK NATURALISTS' FIELD CLUB.

NOVEMBER 21.—An Inaugural Address was delivered by the President (Prof. M. M. HARTOG, D.Sc.). Mr. J. N. HALBERT'S paper, "Insects collected on the joint Clubs' Excursion of Fermoy and Lismore," as read by him at the Dublin N.F.C., was read by the Secretary, after which an hour was pleasantly spent looking through the specimens and microscopes brought by members.

JANUARY 23.—The first lecture was given in connection with the Irish Field Club Union by JOSEPH WRIGHT, Esq., F.G.S., of Belfast, on "Foraminifera recent and fossil, with special reference to those found in Ireland." The lecture was beautifully illustrated with photographic lantern slides and diagrams.

Miss H. A. MARTIN, V.P., having kindly consented to give four lectures on structural botany, a special class was formed, and two lectures up to the present have been given on the Morphology and Physiology of the Root and of the Stem.

ALEXANDER GOODMAN MORE,

F.R.S.E., F.L.S., M.R.I.A.

The Irish Naturalist.

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ALEXANDER GOODMAN MORE,

F.R.S.E., F.L.S., M.R.I.A.

IRISH Natural History has sustained the severest blow it could well receive in the death of Alexander Goodman More, for it may be truly said that no naturalist ever had the same reliable grasp of the flora as well as the fauna of this country as he possessed.

A. G. More was born in London on September 5, 1830. He was the son of Alexander More of Malvern, and grandson of Alexander More, Collector of Customs, Aberdeen, great-grandson of Gilbert More of Readen, Aberdeen, and on the grandmother's side of Alexander Innes of Breda and Cowie.

From 1836 to 1841 he resided at Renens near Lausanne with his parents and also with M. Germond, who was his tutor at Yvonnand and Echallens. At Renens he became acquainted with the Shawe-Taylors of Castle Taylor, Co. Galway. This intimacy, which was continued through life, was probably the primary cause of his coming to live in Ireland.

While in Switzerland his taste for Natural History early showed itself in the collection of butterflies. In 1841 he went to Mr. Bailey's school at Clifton, and there prepared for Rugby, to which he went in 1844, his parents residing in the Isle of Wight. Five years were spent at Rugby. More became head of his house (Rev. Charles Mayor's) and first Grecian Scholar.

In 1846 he tells us in a brief private diary—which will, hereafter, be frequently quoted—"Taste for birds first began from being anxious to know all about a Nuthatch I had shot, which I compared with, and found out in Bewick." In 1848 Eyton's supplement to "Bewick," Selby's "British Ornithology," and St. John's "Highland Sports," were purchased, and More "began to study birds more carefully."

He was now eighteen, and Westwood's "Butterflies," Jenyns' "British Vertebrates," Temminck's "Manual," and Turton's "British Land Shells" formed the nucleus of a well-read library which was rapidly enlarged by presents from friends who admired his ability and genius.

In 1850 he says "Walter (Mr. Walter Shawe-Taylor) carried me off to Ireland where I spent the summer and botanized for the first time." In the same year More entered Trinity College, Cambridge. The following summer, 1851, was spent at Castle Taylor, and *Viola stagnina* discovered in Ireland. He was introduced to Prof. Babington at Cambridge and elected Associate of the Ray Club. In 1852 he "began really to study botany," and purchased a number of valuable books dealing with the English and Continental floras.

At Cambridge he took a certificate in geology, but ill-health prevented his completing his college course and trying for the Natural Science Tripos—a circumstance always spoken of with keen regret in after life. Fond of shooting and fishing, he also steered the head boat at Cambridge in May, 1853. At this time he joined the Botanical Society of Edinburgh, and progress in botany consisted chiefly "in the more careful comparison of plants with their descriptions," a study in which his critical eye subsequently excelled and in which he had few equals. Portions of 1854 and 1855 were spent in the West of Ireland, and his first botanical essay appeared, *i.e.* "Notes on the Flora of Castle Taylor." The following year he was elected F.L.S. In 1857, he was introduced to Mr. H. C. Watson, author of the "Cybele Britannica," and visited him subsequently at Thames Ditton.

In 1858, in conjunction with Mr. T. Boyd, a paper "On the Geographical Distribution of Butterflies in Great Britain" was published, on the plan of Watson's "Cybele Britannica." At the same time he made an analysis of De Candolle's "Naturalized Plants," and catalogued Dr. Bromfield's herbarium.

In 1859 some suggestive remarks on the migration of birds appeared in the *Zoologist*, and More, with the natural pride of a young botanist, says, "Gained the confidence of C.C.B." (Prof. Babington). This was his first year of critical work at botany.

In 1860 the appendix to Venable's "Isle of Wight Guide" appeared, and the following summer he visited Waterton: his stay at Walton Hall with all its curiosities was always remembered with pleasure.

Watson's plan of the "Cybele Britannica", already applied to the butterflies by More, was now made use of for illustrating the distribution of birds in Great Britain during the nesting season, and materials were diligently collected. So highly was his paper on the subject thought of that Prof. Newton alludes to it thus in his article on Ornithology in the "Encyc. Brit.," 9th Ed., "Though contravening our plan we must for its great merits notice here Mr. More's series of papers in the *Ibis* for 1865."

Not content with the Butterflies and Birds of Great Britain, More in 1864 again visited Ireland, and to quote the diary, "proposed an Irish Flora to D. M." (Dr. David Moore of Glasnevin). Watson's "Cybele Britannica" did not include Ireland, and we have here the first germ of the "Cybele Hibernica," a work which will always form a conspicuous landmark in Irish Botany. Dr. Moore had much of the material already collected; the application of Watson's system to its arrangement was assisted by More, who, in order to be near his friend, came to reside at Glasnevin. The authors worked with diligence for two years, mutual esteem and harmony prevailed, and the "Cybele Hibernica" was completed in August, 1866.

In 1867 he was appointed Assistant in the Dublin Natural History Museum, and for twenty years from that date his room there was the rendezvous of all naturalists who came to Dublin. Here introductions were made, jealousies dispelled, and friendships initiated and cemented. Every nerve was strained to encourage, stimulate, and assist the younger naturalists. More was their counsellor and guide, and the Natural History of Ireland had in him a most earnest advocate.

In 1877, he was made an Honorary Member of the Zoological and Botanical Society of Vienna.

By a gentle and gracious manner, unfailing courtesy, and wonderful tact, rare specimens were, over and over again, coaxed from the owners for the Museum, and difficulties overcome in their transfer by a sort of insidious persuasion which few could withstand.

In the old days, before the present National Library was built, most of the works on Natural History were collected in a lofty square well-lighted room, and here More often spent hours working at some moot point for the benefit of a friend down in the country. The trouble he took was amazing. For a quarter of a century, scarcely a pamphlet, paper, or book was published on the flora or fauna of Ireland in which the author did not acknowledge his assistance or advice. It always gave him greater pleasure to help others to write than to undertake the task himself. There was no lack of mental energy, but ill-health frustrated many a plan which would have been carried out had he been more vigorous.

In 1881, on the death of Dr. Carte, he was appointed Curator of the Museum, and occupied this post till a protracted illness caused him to retire on pension in 1887. His residence at Rathmines now became the frequented resort of botanists and zoologists, with whom he kept up a constant correspondence, making systematic entries of their notes in the "Cybele Hibernica", and in other books and papers which he had interleaved and annotated.

He was not a scientist of the modern type; the correct identification of a species, its habits, and geographical distribution were studied by him rather than its morphology and histology. He revelled in minute distinctions between well-marked varieties, and his critical opinion was respected in England and abroad. Familiar with every pamphlet and book on his favourite studies, he held a unique position as a referee in the bibliography of Irish and English Natural History, for he knew both zoological and botanical literature.

The short notes and papers which he has written are numerous, but, unlike many, he wrote less than he knew, rather than err by making unfounded statements. His "Outlines of the Natural History of the Isle of Wight," the valuable papers in the *Ibis* for 1865, the Supplement to the "Flora Vectensis", the "Cybele Hibernica" and its Supplement, and last but not least his "List of Irish Birds" are the best known of his writings. From the Royal Irish Academy he received, from time to time, several grants for scientific purposes.

The errors which he corrected and saved others from making are scarcely less numerous than those many additions to

the Irish Flora and Fauna which are solely due to his activity. After the scientific exploration of any district, More was the traveller's first confidant, and the delight with which he hailed a discovery gave a zest and enjoyment to field work which will be sadly missed in Ireland. What areas deserved attention—who had been there previously, and what had been done and left undone—were at his fingers' ends. He suggested many expeditions, checked others, and was consulted in the arrangement of all. Nobody can hope to fill his place ; no one is equally familiar with birds, mammals, fishes, reptiles, flowering plants and ferns, a versatility which was happily combined with a sound judgment, great tact, and a suavity and gentleness of manner peculiarly attractive. His ability was perhaps best testified by the regard which was entertained for him by every one. He has left a blank which can never be filled, and which will be more vividly realized every day by those who had the privilege of his friendship.

RICHARD M. BARRINGTON.

LIST OF THE SCIENTIFIC WRITINGS OF THE LATE A. G. MORE.

BOTANY.

1855. On some uncommon Plants observed at or near Tunbridge Wells in Kent. *Phytologist*, (n.s.) vol. i., pp. 292–5, 345–8.

1855. On the Flora of the neighbourhood of Castle Taylor, Co. Galway. *Proc. Edin. Bot. Soc.*, pp. 26–30.

1857. *Anemone pulsatilla*. *Phyt.* (n.s.) vol. ii., pp. 215–216.

1858. Analysis of De Candolle's "Naturalized Plants." *t.c.*, pp. 449–462. [Not signed by A. G. M., but mentioned in his diary.]

1860. Remarks on the *Violæ* of the coast sand-hills. *Phyt.* (n.s.), vol. iv. pp. 301–3.

1860. Additional localities for some rare Hampshire plants. *t.c.*, pp. 80–82.

1860. Remarks on Annual Addresses. *t.c.* pp. 103–4. [Not signed.]

1860. What is *Ranunculus heterophyllus ?* *t.c.*, pp. 138–142. [Not signed.]

1860. Remarks on Harrow Plants. *t.c.*, pp. 170–2. [Signed, "A."]

1860. Chickweeds. *t.c.*, pp. 172–4. [Not signed.]

1860. *Sonchus palustris*. *t.c.*, pp. 310 312. [Signed, "A."]

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THE BREEDING BIRDS OF LOUGHS CONN, CARRA, AND MASK.

BY ROBERT WARREN.

(A Report laid before the Royal Irish Academy, 28th May, 1894).

THE results of some former visits to Lough Conn have enabled me to ascertain that Wild Ducks and Teal breed on some of the islands and shores of the lake; and the adult Shoveller has been seen, and a flapper shot in Errew bay on the west side of the lough; and in the summer of 1892, my friend, Mr. H. Scroope, jun., had a nest and twelve eggs sent him from the same part. A colony of Blackheaded Gulls breed on the low gravelly island off Errew Bay, and also some Common Terns: and this summer, Mr. H. Scroope obtained a nest and eggs of the Common Gull off the same island—the first nest that I have known of this gull to have been found on Lough Conn, the nearest breeding station being on Lough-na-Crumpane, a little bog-lake some eight or ten miles away.

The Common Tern also breeds on the stony shores of some islands near Cloghans, a favourite breeding haunt of Redshanks. Some Dunlins frequent the boggy shore of the southern end of the lake near the Pontoon road; while Ringed Plovers are seen in many of the sandy bays.

The Common Sandpiper is to be met on every island, as well as on the shores of the lake, and some pairs of Hooded Crows have nests in the low trees on some of the islands.

Formerly the Lesser Blackbacked Gull bred in large numbers on islands in the lake, but of late years, although some birds are seen during the summer time, no nests have been discovered. Redbreasted Mergansers also breed on the islands.

Of the Warblers, only the common species are met—Whitethroats and Willow Wrens, on the islands, while the Chiff-chaff frequents the woods of Cloghans and others along the shore of the lake.

Having been informed by Mr. W. H. Good, of Westport, that the Lesser Blackbacked Gull, Common Gull, Common and Arctic Terns bred on Lough Mask, and the Yellow Wagtail on Lough Carra, I was anxious to verify the statement, and on the 12th of June, 1893, I left Ballina for Ballinrobe, being

joined at Claremorris station by my friend, Mr. W. Williams. After arriving at Ballinrobe in the evening, we walked on to Lough Carra (about two miles from the town), to make some preliminary observations, and see about engaging a boat and men to go up the lake next morning. On reaching the bridge near the foot of the lake, Mr. Williams hearing the call of a Yellow Wagtail, and looking round, saw a female bird with something in her bill sitting on the fence of an oat-field, and shortly after we saw the cock bird standing on a thistle in the oats. They evidently had a nest and young somewhere near, but although we searched carefully all round, were unsuccessful in finding it.

We soon after saw another cock bird whose hen must have been hatching, for she did not appear in sight; the three birds haunted the oat-field, and a bit of pasture land that extended from the lake to the road. Next morning when walking to our boat, we saw the three birds at the same place, and again in the evening when returning. We rowed up the lake, visiting several islands, on which we saw Redshanks and Sandpipers; and on a wooded island, having a dense undergrowth of brushwood and weeds, situated under Lakeview, we found two Wild Ducks' nests containing six, and nine eggs, and three nests of the Redbreasted Merganser having twelve, eight, and two eggs, those with the larger number being densely lined with down. The Merganser's nest with the twelve eggs was situated in a dense thicket of Meadowsweet four feet high, and so thick and close, that when the female left the nest we caught her before she could escape to the water. The nests were easily discovered by the beaten path through the grass and weeds leading from the water.

We next landed on a long low island under Brown Hall, about 150 yards long, with a few bushes on it, and on either end was a colony of Blackheaded Gulls, having eggs and young, while on a patch of short grassy turf near the centre were a lot of Terns having eggs and some young in their nests. We sat down for some time watching them, and observing a pair hovering over us, screaming in a shriller tone than the others; one was shot, and it proved to be an *Arctic* Tern. We found a Wild Duck's nest, and a Water-Hen's, on the end of the island, the former with eight and the latter with ten eggs. Visiting some others we only saw Redshanks

and Common Sandpipers; and then on coming to that upon which Castle Carra stands, we were disappointed at finding that the Great Cormorants were not breeding on the ruins this season in consequence of a great part of the Ivy covering the walls having been torn down by the winter's storms. We however saw some birds resting on the highest part of the castle.

Continuing our course up the lake we came to a large island at the head of the lough, under Moore Hall. It was covered with old timber of a great size, Ash, Oak, Elm, and Scotch Fir, and in open glades formed by storms cutting lanes through the wood, were large brakes and thickets of Briars overgrowing the fallen trees, and in other parts of the island were dense copses of Black- and White-thorn mixed with Hazel, which appeared to us to be a perfect paradise for Warblers, but to our great disappointment we only saw the commoner ones, Willow Wrens, and Chiff-Chaffs, no trace of Wood Wren, Blackcap, or Garden Warbler. I may here remark that although one of the chief objects of our visit was to ascertain if any of the last-named Warblers visited the district, yet, although we carefully searched the woods of Creagh, the magnificent demesne of Colonel Knox, situated on the shores of Lough Mask; Cranmore, that of his brother, near Ballinrobe; and the lovely demesne of Lord Ardilaun at Cong on the shores of Lough Corrib, and the various wooded islands on Carra and Mask; we were unsuccessful in either hearing or seeing these birds, or *obtaining* any information about them.

Next morning when going to Lough Carra we saw the Yellow Wagtails in their old haunt, and after going to the island and securing the Merganser's nest and eggs, we took our boat under the bridge, and down the canal-like drain that leads for half a mile to Lough Mask, and entered it through a wilderness of rocks and stones. We then rowed across to the Partry side of the lake where the island upon which the Lesser Black-backed Gulls bred was situated, just opposite to the monastery; but on our way we landed on a flat stony island towards the middle of the lake; we saw some Redshanks and Sandpipers, but found only one nest with eggs of the Common Gull.

The island frequented by the Lesser Black-backed Gulls is very rocky, and with long grass between the rocks; there

are also a few bushes. On landing, we found that the nests had been lately robbed, upwards of twenty being empty, and a few in which the Gulls had begun to lay again. The nests were large and substantially constructed of the dried grass left by the floods on the shore of the island, and were generally placed between the rocks and large stones or near bushes, and when we were leaving a Merganser rose from her nest, under a bush, containing ten eggs; and standing on the extreme end of the stony point, we were surprised at seeing a Turnstone in the dark-coloured immature plumage of winter, a strange sight at that time of year, so far from the coast, on an inland lake.

A heavy thunderstorm with torrents of rain and high wind coming on drove us from the island, and it was with great difficulty that we gained the Ballinrobe side of the lake under Creagh, taking shelter within the walls of Grace O'Malley's castle on the island. After the storm passed off the wind continued so high as to raise such a sea on the lough, that it put an end to any further explorations that day, and we had to content ourselves with searching the woods of Creagh for Warblers, but as usual only the common ones appeared.

Next day we returned to the lake, and although still blowing hard we ventured on a visit to the Terns' island, taking advantage of the shelter of Cushlough Island until opposite that of the Terns, to which we had a hard pull against a head wind and sea. On landing we found a large colony of Terns hovering overhead, for like the gulls, their nests had been nearly all robbed previous to our visit; we saw a large number of empty nests, but in a few they had begun to lay again, several having one and two eggs, and but very few having the full number of three, and only three or four nests with newly hatched young birds. We remained for a long time on the island watching the birds on the wing, and trying to distinguish between the Arctic and Common Tern, but failing to do so a few were shot and found to belong to both species. I took the eggs from two nests, which from their being similar in size and colour to some brought from the Sovereign Islands off Cork Harbour, and being a size smaller than those of undoubted eggs of the Common Tern taken off the Inch at Killaloe, and from an island in Lough Conn, I have no doubt of their being the eggs of the Arctic Tern.

We took the newly-hatched young from one nest, which are certainly *Arctic* Terns, for on comparing them with young Common Terns of about the same age, we found their tarsi so much shorter, as to leave no doubt of them being the Arctic species. I found a nest containing an egg of the Lesser Black-backed Gull, placed under a thick bush, and several empty ones on other parts of the island, while as usual the Common Sandpipers were on the islands; indeed on every island visited these birds were seen. The wind still blowing too hard for any further exploration of the lake, we returned and again spent some hours in Creagh demesne on our way to Ballinrobe.

Next morning being our last day, and finding it still too stormy for the lake, we drove to Cong to visit Lord Ardilaun's beautiful demesne on the shores of Lough Corrib, and searched the woods and plantations for the Wood Wren, Garden Warbler, and Blackcap, but after walking for hours, saw nothing of these birds, and returned thoroughly disappointed to Ballinrobe, where after dinner we set out for a walk to Lough Carra, to have a last look at the Yellow Wagtails, and have another search for their nests. We met them in their old haunt near the bridge, but although we remained about the place until dusk, failed, as before, in our search.

Returning to Ballinrobe, about half a mile from the lough, we came to a fir-wood that extended from Creagh demesne to a bog on the side of the road, and just when passing the wood, Mr. Williams hearing the churring of the Nightjar, we stopped to listen to its curious notes; here we remained for a time, but a noisy cart passing along the road scared the bird, which went deeper into the wood where we could scarcely hear him.

It was unfortunate the weather turning out so stormy on our last three days, for it prevented a thorough exploration of Lough Mask, especially the Galway side and the lower end, where there are a number of islands. However I was glad to have ascertained that the range of the Yellow Wagtail and Nightjar extended so far west, and that neither the Wood Wren, Garden Warbler, nor Blackcap frequented the woods of the lake district, at least so far as our observations went, though of course it is not improbable that all these birds, or perhaps some of them, may yet be discovered in some part of that district.

THE FRESH-WATER SPONGES OF IRELAND,

WITH REMARKS ON THE GENERAL DISTRIBUTION OF THE GROUP.

BY R. HANITSCH, PH. D.

[PLATE 4.]

THE following short account of Irish Fresh-water Sponges is based chiefly upon a small collection which I received last autumn from Dr. R. F. Scharff, Science and Art Museum, Dublin. The examination of the material gave such unexpected results, that I gladly accepted Dr. Scharff's invitation to publish the same in the *Irish Naturalist*.

According to Weltner (13 & 14), the Fauna of Europe comprises seven species of Spongillidæ, viz :—

Euspongilla lacustris, Autt.
Spongilla fragilis, Leidy.
Trochospongilla horrida, Weltner.
Ephydatia Mülleri, Lieberkühn.
Ephydatia fluviatilis, Autt.
Ephydatia bohemica, Petr.
Carterius Stepanowi, Dybowsky.

To these we have to add *Heteromeyenia repens*, Potts, of which Wierzejski (15, p. 143) discovered some free floating gemmules in a pond in Galizia. The same species is enumerated by Petr (6, p. 18) in his recent paper on European Spongillidæ. The article, however, being written in Bohemian, I am unable to say whether he gives additional data regarding the occurrence of that species. Out of Weltner's list the first five —and no others—occur in Germany (Weltner, 18, pp. 210-220) and France (Topsent, 8, p. 176). But *Ephydatia bohemica* has been found in Bohemia only, and *Carterius Stepanowi*, near Charkow in Russia, in Bohemia, Hungary, and Galizia (Wierzejski, 15, p. 143). Russia possesses six species (viz., Weltner's seven species with the exception of *E. bohemica*), although Traxler (10), in quite a recent paper, enumerates only four species from Northern Russia :—

Euspongilla lacustris.
Spongilla fragilis.
Meyenia (=*Ephydatia*) *Mülleri.*
Trochospongilla horrida.

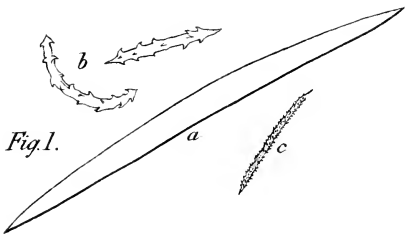


Fig. 1.

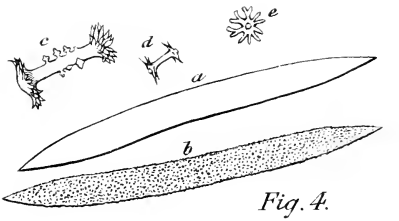


Fig. 4.

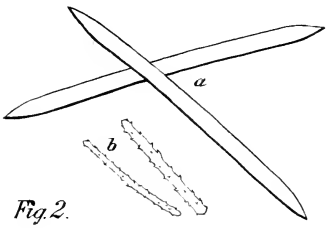
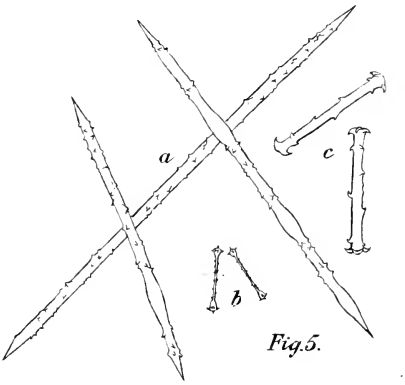


Fig. 2.



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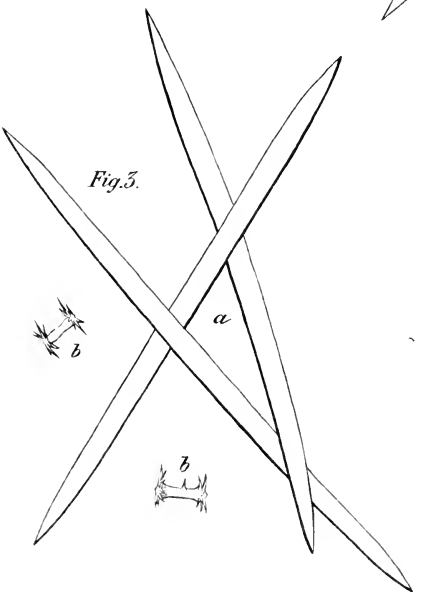

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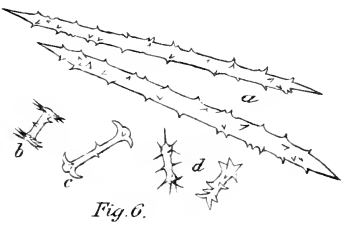

Fig. 6.

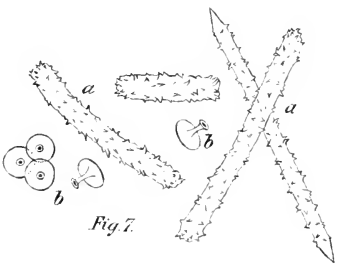

Fig. 7.

A few months ago, Dr. Adriano Garbini, of Verona, published a paper on Italian Spongillidæ. He has found, so far, only two species, namely *Euspongilla lacustris* and *Ephydatia fluviatilis*, and he gives a table showing the distribution of those two species in Europe (4, p. 20). They occur according to Garbini in all European countries, except the Iberian and Balkan peninsulas, and he explains this by saying that the long mountain-range of the Pyrenees, Alps and the Balkans hindered the dispersal of those Sponges from Northern Europe (where according to Merejkowsky, (5), at least *Euspongilla lacustris* has its home) into Southern Europe. Those two species, found in Italy, were conveyed and dispersed by migratory birds along their lines of flight from the White Sea and the Baltic, to the lakes of the Alps and Northern Italy. But before we accept this explanation, we must ask whether it is settled beyond dispute that only two species of Spongillidæ exist in Italy. In regard to their supposed non-occurrence in the Iberian and Balkan peninsulas, I may state that quite recently, amongst a collection of marine Sponges, sent to me by Dr. Paulino d'Oliveira in Coimbra, Portugal, I discovered an *Euspongilla lacustris*, coming from a small river near Caldas de Nixella, North Portugal. Whether this is really the first instance that the occurrence of a fresh-water Sponge in Portugal has been stated, I cannot say.

Coming now to Great Britain, we find that Bowerbank (1) mentions four species, which, according to his nomenclature, are :—

Spongilla fluviatilis, Johnst.
Spongilla lacustris, Johnst.
Spongilla Parfitti, Carter.
Spongilla sceptrifera, B.

One of these, *Spongilla Parfitti*, is synonymous with *Ephydatia Mülleri*, Liebk. (See Topsent, 9, p. 12). *Spongilla sceptrifera*, B., is, according to Carter (2, p. 93), probably nothing but *Spongilla (Ephydatia) fluviatilis*; "for *S. fluviatilis* grows abundantly in the same locality [reservoir, Exeter], and the characteristic spicule represented by Dr. Bowerbank (*l. c.* fig. 17) is nothing more than a detached frustule of the diatom *Asterionella*, like *A. formosa*." Bowerbank's type specimen

was without gemmules, so that a final decision is impossible. Adding to the three species which are thus left, *Spongilla fragilis*, mentioned by Carter (3, p. 18), as occurring in the River Wye, near Hereford, we find the British Fauna of fresh-water Sponges to consist of

Euspongilla lacustris, Autt.
Spongilla fragilis, Leidy.
Ephydatia Mulleri, Lieb.
Ephydatia fluviatilis, Autt.

We scarcely need to believe that this is all. It is very likely that the fifth species which is common to France and Germany, viz., *Trochospongilla horrida*, will some day be found in Great Britain, and perhaps others in addition.

We now come to Irish Spongillidæ. I will state right at the beginning that Dr. Scharff's material comprises, besides *Euspongilla lacustris* and *Ephydatia fluviatilis*, two species which are of undoubted American origin, viz., *Heteromeyenia Ryderi*, Potts, and *Tubella pennsylvanica*, Potts. Only the former of the two species contained gemmules, but the skeleton spicules of *Tubella pennsylvanica* are so characteristic, that I consider any mistake impossible. The case was more difficult with a fifth species, also without gemmules, from Park Lough, Hungry Hill. It has no resemblance to any known European species, and of American species I can identify it only with *Ephydatia crateriformis*, Potts. With this form it agrees both in the general character of its skeleton-spicules, and especially in certain small spicules scattered through the tissues, which may be immature amphidiscs (for details see p. 128). A quite satisfactory identification will be possible only when material with gemmules is found. But as I hear from Dr. Scharff that no scientific person lives within 50 miles of Park Lough, some time may elapse, before such can be obtained. A sixth and last species, *Ephydatia Mülleri*, I received through the kindness of my friend, Mr. S. R. Christophers, who collected it last summer during a walking tour in Ireland at McHugo Island, Lough Rea, Galway. The specimens are again without gemmules, but the skeleton-spicules of this species are so characteristic, that an error in identification is not likely.

The following therefore are the Fresh-water Sponges so far found in Ireland :—

1. **Euspongilla acustris,** Autt. Camlough River, Co. Armagh; Dry drain, Killakeen. Probably common throughout the country.
2. **Ephydatia fluviatilis,** Autt. River Barrow; Raheny ponds, Co. Dublin. Probably common throughout the country.
3. **Ephydatia Müllerí,** Lieberkühn. McHugo Island, Lough Rea, Galway. 150 feet above sea level.
4. ? **Ephydatia crateriformis,** Potts. Park Lough, Hungry Hill. 300 feet above sea level.
5. **Heteromeyenia Ryderi,** Potts. Lough Doon, near Dingle. 1,000 feet above sea level.
6. **Tubella pennsylvanica,** Potts. Columbkille Lough, Ballyshannon. 100 feet above sea level.

In this list we notice the important fact that the eastern part of Ireland possesses only common European forms (Nos. 1 and 2), but that the American species (Nos. 4, 5 and 6) are found only along the west coast, and there, so far, only one European species (No. 3) has been obtained.

How can we account for the occurrence of those American Spongillidæ in Ireland? Wallace (12, pp. 364 and 365) mentions several flowering plants, viz.:—*Spiranthes Romanzoviana*, *Sisyrinchium angustifolium* and *Eriocaulon septangulare*, which are American, and yet have been found in the west of Ireland, and he thinks that these American plants, together with a few arctic and alpine plants, may be the remnants of a vegetation once spread over the whole north temperate zone. Similarly, we might explain the occurrence of American Spongillidæ in Ireland. But, at least in the case of the Spongillidæ, it seems to me quite as likely that such forms migrated from North America to Ireland. The formation of gemmules gives to the Spongillidæ such chances of dispersal, as only few animals enjoy, comparable in fact to the dispersal of plants by means of seeds. In the February number of this journal Mr. G. H. Carpenter recorded from the Mitchelstown Caves, Co. Tipperary, a collembolan, *Sinella cavernicola*, almost, and a spider, *Porrhomma myops*, quite indistinguishable from species inhabiting the Kentucky and other North American caves. But insects too are very easily dispersed. Only in case of the discovery in Ireland of American animals whose presence could not be explained by dispersal in recent times, should

we be obliged to accept Wallace's theory as to a more or less uniform fauna and flora once spreading over the whole north temperate zone. In any case, it is significant that of American forms, with the exception of a few plants, only such animals have been found in Ireland as might easily have migrated there. Three agents may have served in carrying sponge-gemmules from North America across to Ireland—winds, ocean currents, and birds. Strong winds might carry dried gemmules almost any distance, like plant-seeds, and the position of Ireland, together with its western winds favours such a possibility. The Gulf Stream might have carried gemmules or even entire Sponges containing gemmules, loose or attached to floating timber, from North American rivers to Ireland. When once arrived on the Irish shore their further dispersal to higher levels must have been a comparatively simple matter. Similar cases must have happened often enough. Fresh-water Sponges, if they had, as we suppose, their ancestors in marine forms, must in any case have travelled inland and to higher levels. However, I do not know for how long a period gemmules can stand entire, or partial immersion in sea-water. Finally, we may look to birds as agents in the dispersal of gemmules from N. America to Ireland. Wallace (**11**, vol. I., p. 16) says that 'small and weak birds are often carried accidentally across great widths of ocean by violent gales.'—'No less than sixty-nine species of American birds have occurred in Europe, most of them in Britain and Heligoland.' Such birds would naturally first alight at the west coast of Ireland, and would be more liable to leave any gemmules there than at subsequent resting-places. Again, a number of migratory birds, common to Europe and America, regularly visit Greenland (Wallace, **11**, vol. II., p. 138). It is possible that, even by such roundabout methods, gemmules could be carried from America to Greenland and thence to Ireland. A similar communication *via* Iceland seems less probable, as, although there are no less than forty species of annual visitants from Europe to Iceland, there seems to be no regular inter-communication between N. America and Iceland (Wallace, **11**, vol. I., p. 198). The explanation of the fact that these Sponges, once arrived in the west of Ireland, did not spread out further east, is perhaps that competition was too severe.

I now propose to give a short description of the Spongillidæ so far found in Ireland, with the addition of *Spongilla fragilis*. By doing so the following list will at the same time include all British Spongillidæ and thus be useful to British collectors too. Besides, *S. fragilis* is sure to be found some day in Ireland, being, next to *Euspongilla lacustris*, the most common fresh-water Sponge of Europe and N. America.

Euspongilla, Vejdovsky.

Skeleton-spicules oxeote, generally smooth, accompanied by short, either straight or curved, smooth or rough flesh-spicules. Gemmules always single, and covered with oxeote and almost always spined spicules.

Euspongilla lacustris, Autt. [Pl. 4, fig. 1.] Forming finger-like branches arising from an encrusting base. Colour grass-green, yellowish, brown. Skeleton-spicules, smooth oxea, straight or slightly curved, gradually pointed. Flesh-spicules slightly curved, minutely spined. Gemmules globular, the covering spicules strongly spined, and more or less curved, tangentially or radially arranged.

Habitat: Camlough River, Co. Armagh (R. Ll. Praeger); dry drain, Killakeen, Co. Cavan (R.I.A. Flora and Fauna Committee); probably in numerous other localities in Ireland. Common throughout Great Britain, Europe generally, Siberia, and, according to Potts (**7**, p. 200), the most widely distributed fresh-water sponge of the United States.

[**Spongilla,** Wierzejski.

With the characters of *Euspongilla*, but gemmules in groups of two to thirty enclosed by a common covering. (Often considered as subgenus of *Euspongilla*).

Spongilla fragilis, Leidy. (Plate 4, fig. 2). Encrusting, never branching, surface smooth. Colour from light grey to brown, rarely green. Skeleton-spicules straight or very slightly bent, rather abruptly pointed, smooth. With little spongin, therefore easily broken. Covering spicules of gemmules generally larger than those of *Euspongilla lacustris*, straight or curved, with numerous minute spines. No flesh-spicules.

Habitat: Not yet found in Ireland. Occurs in England (River Wye, near Hereford), France, Germany, Bohemia, Galicia, Russia, and next to *Euspongilla lacustris*, the most widely distributed fresh-water sponge of North America. (Potts, **7**, p. 200).]

Ephydatia, Lamouroux.

With either smooth or rough skeleton-spicules, or with both. The gemmules surrounded by radially-arranged amphidiscs of a single type only. The rotules with star-shaped margins.

Ephydatia fluviatilis, Autt. (Plate 4, fig. 3). Encrusting, massive. Emerald green to light yellow-brown. Skeleton-spicules smooth, fusiform, slightly bent, gradually pointed. The shafts of the amphidiscs smooth or spined, twice as long as the diameter of the rotules; rays of the rotules deeply cut.

Habitat: River Barrow (Mr. T. Greene); Raheny ponds, Co. Dublin (Dr. R. F. Scharff); probably common throughout the country—Great Britain, France, Germany, Bohemia, Galicia, Russia, Italy, and throughout the Eastern and Middle United States generally.

Ephydatia Müllerl, Lieberkühn. (Plate 4, fig. 4). Encrusting, with smooth surface, sometimes with short branches. Green, yellow, yellowish brown, white. Skeleton-spicules straight or slightly bent, suddenly pointed, smooth or rough, or smooth and rough spicules mixed. Shaft of the amphidiscs short, rays of the rotules smooth or indented.

Habitat: McHugo Island, Lough Rea, Loughrea, Galway (Mr. S. R. Christophers), about 150 feet above sea level.—England (River Exe, Devonshire), France, Germany, Bohemia, Russia. Probably also in the United States, but Potts gives no locality, as he fuses this species with *E. fluviatilis*.

Our Irish material consists of a few small circular patches, each about 10 mm. in diameter and 1 or 2 mm. in thickness, of yellowish grey colour, when alive. Its skeleton-spicules appear short and stout, suddenly pointed, both the smooth and rough variety of spicules are present, measuring about 0·25 by 0·02 mm.

Ephydatia crateriformis, Potts. (Plate 4, fig. 5). Thin, encrusting. Colour of gemmules white or yellowish. Skeleton-spicules slender, gradually pointed, slightly spined. Tubule of the gemmule standing at the centre of a crater-like depression.

Habitat: (doubtful): Park Lough, Hungry Hill, 300 feet above sea-level (R. I. A. Flora and Fauna Committee).—Occurs in various localities in North America (for details see Potts, **7**, p. 229).

We have only two specimens from the Irish locality. They are small, uneven, somewhat lobular masses, about 10 mm. in diameter and 4 mm. in height. The skeleton-spicules are slender, 0·21 to 0·33 mm. by 0·007 mm., straight or only very little bent, slightly spined, often irregularly inflated, and such inflated portions of the spicules are always free from spines. The corresponding spicules as described and figured by Potts measure 0·27 by 0·01 mm., and show no such inflations. The Irish specimens contained no gemmules, but scattered throughout the tissue of the sponge there are exceedingly slender spicules with swollen ends, with most minute spines which may be immature amphidiscs, measuring 0·036 to 0·045 mm. by 0·0025 mm. Potts (**7**, p. 229) describes similar spicules in his American material, measuring about 0·062 by 0·003 mm.

Heteromeyenia, Potts.

Skeleton-spicules as in *Ephydatia*. The gemmules surrounded by intermingled amphidiscs of two types, whose shafts are of unequal length. The proximal rotules of all rest upon the chitinous coat; the outer extremities of the less numerous rotules project beyond the others.

Heteromeyenia Ryderi, Potts. Light green, massive. Skeleton spicules fusiform, gradually pointed, entirely spined, except at their ends. Rotules of long amphidiscs with three to six short recurved hooks. Rotules of short amphidiscs with straight rays.

Habitat: Lough Doon, near Dingle, 1,000 feet above sea-level (R. I. A Flora and Fauna Committee).—United States: from Florida to Nova Scotia, and from the Atlantic coast to Iowa. (Potts, **7**, p. 243).

The Irish specimens are in shape of small thin patches, 1 or 2 mm. in thickness, one of them with a conical elevation 4 mm. in height, bearing an osculum on its side. In giving the dimensions of the spicules we add Potts's measurements in brackets: skeleton-spicules 0·22 by 0·008 to 0·012 mm. (Potts 0·317 by 0·015 mm.); long amphidiscs 0·052 by 0·005 mm. (Potts 0·0507 by 0·006 mm.); short amphidiscs 0·024 mm. (Potts 0·03 mm.).

Tubella, Carter.

Skeleton-spicules smooth or spined, pointed or rounded off at the extremities. Gemmules with unequal trumpet-shaped amphidiscs of which the larger rotule rests upon the chitinous coat. The margins of these larger rotules generally entire.

Tubella pennsylvanica, Potts. Gray or green. Minute, encrusting. Skeleton-spicules extremely variable as to length and curvature; rounded or pointed at the ends; entirely spined. Margin of the large rotule of the amphidiscs entire, that of the small rotule occasionally notched.

Habitat: Columbkille Lough, Ballyshannon, 100 feet above sea level (Dr. R. H. Creighton[1]). United States; Lehigh River and tributaries; also generally throughout the Eastern United States (Potts, **7**, p. 251).

The largest of the Irish specimens is an encrusting mass, 25 by 20 mm. and 7 mm. in height, with a corrugated but smooth surface, bearing 8 or 9 oscula with a diameter of 1 mm. or less. Three varieties of skeleton-spicules can be distinguished: (1) strongly spined, curved spicules, with blunt ends, which are as a rule the thicker, the shorter, from 0·07 by 0·018 mm. to 0·116 by 0·013 mm. (2) Slightly spined, curved or straight spicules with pointed ends, of pretty uniform dimensions, 0·16 by 0·005 mm. to 0·19 by 0·008 mm. (3) Slightly spined, shylote spicules, few in number, 0·15 by 0·005 mm. Potts gives the average of the skeleton spicules as 0·165 by 0·0075 mm.

The specimens upon which this account is based, are not the outcome of systematic investigation. What results such an investigation would bring is difficult to foresee. But I am sure that even the highest expectations would not be disappointed, and I would not be surprised if the majority of American Spongillidæ were discovered some day in the West of Ireland. A fresh-water station after the model of those in Germany and Bohemia would be the best means towards the study of the remarkable Fauna and Flora of Western Ireland.

I will not conclude this paper without expressing my great indebtedness to the following gentlemen:—Dr. Scharff, for

[1] Erroneously recorded as *Euspongilla lacustris*, *Irish Nat.*, vol. ii., p. 322.

most of the material and valuable information regarding the Irish Flora and Fauna; Dr. Weltner, Berlin, for having kindly identified *Heteromeyenia Ryderi;* Dr. Günther, F.R.S., and Mr. Kirkpatrick for having sent me fragments of type-specimens from the British Museum; and finally, Mr. S. R. Christophers for specimens of *Ephydatia Mülleri.*

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EXPLANATION OF PLATE 4.

All figures are magnified 200 diameters.

Fig. 1. *Euspongilla lacustris*, Autt. From Killakeen, Co. Cavan.—*a.* skeleton-spicule; *b.* gemmule-spicule; *c.* flesh-spicule.

Fig. 2. *Spongilla fragilis*, Leidy. From Bohemia. (From type specimen in British Museum, sent to Dr. H. J. Carter by Prof. Vejdovsky).—*a.* skeleton-spicules; *b.* gemmule-spicules.

Fig. 3. *Ephydatia fluviatilis*, Autt. From Raheny ponds, Co. Dublin.—*a.* skeleton-spicules; *b.* amphidiscs (gemmule-spicules).

Fig. 4. *Ephydatia Mulleri*, Lieberkühn. From McHugoIsland, Lough Rea, Galway.—*a.* smooth skeleton-spicule; *b.* spined skeleton-spicule; *c.*,*d.* amphidiscs; *e.* rotule of amphidiscs. (Figs. *c.*, *d.*, *e.*, copied from Bowerbank, **I.** vol. III., pl. LXXXVI., figs. 14, 11, 12).

Fig. 5. *? Ephydatia crateriformis*, Potts. From Park Lough, Hungry Hills.—*a.* skeleton-spicules; *b.* immature (?) amphidiscs; *c.* mature amphidiscs. (Fig. *c.*, copied from Potts **7**, pl. v, fig. 5*b*.)

Fig. 6. *Heteromeyenia Ryderi*, Potts. From Lough Doon, near Dingle.—*a.* skeleton-spicules; *b.* short amphidiscs; *c.* long amphidiscs; *d.* immature (?) forms.

Fig. 7. *Tubella pennsylvanica*, Potts. From Columbkille Lough, Ballyshannon.—*a.* skeleton-spicules, one of them with pointed, the others with rounded ends; *b.* amphidiscs. (Fig. b, copied from Potts, **7**, pl. XII., fig. 1*b*).

THE ORIGIN OF MEGACEROS-MARL.

BY CLEMENT REID, F.L.S., F.G.S.

THROUGH the kindness of Mr. W. Williams of Dublin I have lately had an opportunity of examining a sample of the marl from which he has obtained skeletons of *Cervus giganteus* (*megaceros*.) The exact locality is not mentioned, but Mr. Williams informs me that he "does not think that there is anything exceptional in the place which the clay came from, as the bogs are spread over a good many miles of country, and are all of the same character on the central limestone plain of Ireland, about 120 miles from Dublin." As a minute examination of this marl has suggested a new explanation of the mode by which the deer were trapped in such quantities, I think that it may be interesting to give the results, not committing ourselves, however, to any opinion as to the partial or general application of this explanation. Until an examination of a larger series of specimens can be undertaken it will be impossible to say whether the peculiar conditions may not be confined to a single locality, and that elsewhere the deer were merely bogged in the way suggested by Mr. Williams in his paper published in 1881[1].

[1] W. Williams.—"On the Occurrence of *Megaceros Hibernicus*, Owen, in the Ancient Lacustrine Deposits of Ireland; with Remarks on the Probable Age of these Beds." *Geol. Mag.* (new ser.), Dec. II., Vol. VIII., pp. 354–363.

The deposit is evidently a *Chara*-marl, for though the calcareous stems are so much decayed as to be scarcely recognisable, yet decalcified nucules of *Chara* are abundant. The only other determinable remains consist of seeds of a few aquatic and marsh plants, Pondweeds being especially common. All of the species are of wide range, and throw no light on the climatic conditions that held during the *Megaceros* period. The plants found are as follows:—

Ranunculus aquatilis.
Myriophyllum spicatum.
Littorella lacustris
Potamogeton crispus.
P. prælongus.
Eleocharis palustris.
Carex ?
Scirpus ?
Chara (several species).

This examination of the matrix suggests a curious, and I believe till now unrecognised, explanation of the occurrence of whole skeletons, or of complete heads, of *Cervus megaceros* in such deposits. Those familiar with pools containing *Chara* will be well aware of the appearance of shallowness, and of a solid floor, which is so deceptive. The *Chara* and *Potamogeton* may grow from a depth of several feet, but they often appear to form a carpet of bright green turf a few inches under the surface of the clear water. Any animal treading on this turf would immediately plunge head-foremost into the water, and the wide-branching antlers of *Cervus megaceros* would become entangled amid the *Chara* stems, and still tougher Pondweeds, so that the animal would have scarcely a chance of escape.

If this be the method by which the deer were caught, one would expect to find the remains of stags far more abundant than those of hinds, and old animals more abundant than young, though the reverse was probably the case among the living deer. This disproportionate number of skeletons of stags has already been recorded by Mr. Williams and other writers. It would also account for the abundance of heads without other parts of the skeleton at certain localities; for the animal being caught by the antlers, the body might drift away within the reach of carnivorous animals, while the entangled head and heavy antlers would sink at the spot where the deer died.

PROCEEDINGS OF IRISH SOCIETIES.

Royal Zoological Society.

Recent donations comprise a Hawk from Rev. E. Denny, and a number of fish from F. Godden, Esq. Twelve Monkeys have been acquired by purchase, and a Pigmy Calf has been born in the Gardens.

7,660 persons visited the Gardens in March.

Dublin Microscopical Club.

March, 28th.—The Club met at Prof. G. Cole's, who exhibited a section of the basalt of Carnmoney, near Belfast, containing the translucent yellow-brown substance that has been called "hullite." He urged that this substance was really the altered basic glass between the crystals of the basalt, and exhibited sections from Eskdale in Dumfries and from Forfarshire in support of this contention, the former containing unaltered and the latter palagonitic glass.

Mr. F. W. Moore showed *Nectria sinopica*, Fries, growing on a decaying orchid pseudo-bulb, part of a plant which had been imported from South America. This *Nectria* is rare in Britain, and is reported as only growing on the Ivy, both in Britain and on the Continent. It is, therefore, interesting to find it now growing on an Orchid.

Mr. McArdle exhibited *Lejeunea patens* var. *cochleata* in fruiting condition, which he collected last year at Anniscaul, Co. Kerry. This form is remarkable amongst liverworts in having the margin and apex of the leaves recurved over the lobule, not unlike the orifice of a broad-lipped shell of a *Helix*. The plant was first collected at Killarney by the late Dr. D. Moore, who identified it with specimens gathered by Dr. Spruce on Mount Tunguragua in Ecuador, and named by him *L. cochleata*, but now Dr. Spruce writes that having compared it rigorously with *L. patens*, he thinks it must stand as a variety. It is an additional link between Tunguragua and Killarney.

Dr. McWeeney showed a specimen of *Eurotium repens* with the two forms of fructification, the imperfect or conidial, and the perfect or ascigerous, growing from the same mycelium. This common mould of which the conidial form under the generic name *Aspergillus* is so familiar, produces its small yellow peritheria comparatively seldom, and only under circumstances which are for the most part imperfectly known, but of which imperfect air-supply is one of the most important. In this instance however the peritheria were abundantly produced on a surface of nutrient gelatine, freely exposed to the air. The most mature conceptacles were in the centre of the patch which was an accidental contamination of a gelatine plate-culture made for another purpose. Every stage of their development from the corkscrew-shaped mycelia branch with its enveloping hyphæ could be distinctly traced. The peculiar shape of the ascopores (biconvex with a depressed margin) was then demonstrated.

Mr. G. H. Carpenter showed a chernetid or "false scorpion" *Chthonius Rayi*, from Howth, and remarked that only four of the twenty British species of this interesting order of arachnids had yet been found in Ireland.

Mr. J. N. Halbert exhibited *Microvelia pygmæa*, Duf., a minute hemipteron of aquatic habit, which he had taken in a marsh near Ventry, Co. Kerry. The specimen shown was immature, and the consequent non-development of the elytræ allowed the upper side to be seen; the silvery patches of pulusana with which it was covered, gave the insect a very brilliant appearance. The developed form is very rare. Haliday was the first to record this insect as British, from specimens taken near Belfast, but it has since been found in many widely distributed localities throughout Britain.

Mr. H. J. SEYMOUR showed Foraminifera from the raised beach at Portmarnock. These were got from a shelly sand which occurs in the field adjoining the Portmarnock brickworks, and close to the railway line. The sand lies beneath a deposit of alluvium and appears to overlie Glacial gravels. Only a small amount of the sand was examined, and from it specimens of *Polystomella*, *Planorbulina*, *Discorbina*, *Lagena*, and *Bulimina* were obtained. Of these *Lagena* was the most common after *Polystomella*, and one specimen of *Nodosaria* was found.

IRISH FIELD CLUB UNION.

GALWAY CONFERENCE AND EXCURSION.—The first conference of the Field Clubs of Ireland, under the auspices of the lately-formed Irish Field Club Union, will be held at Galway, on July 11 to 17. The proceedings will include a conference on Field Club work, and a number of excursions to the most interesting localities in that famous and beautiful region, such as the Arran Islands and the mountains and lakes of Connemara—districts of surpassing interest to the naturalist and antiquarian, and of great picturesqueness.

Arrangements have been made for special trains and steamers for the conveyance of the party, which it is expected will be a very large one. In addition to the members of the four Irish Field Clubs, representatives of several English scientific societies have signified their intention of being present, and there can be no doubt that this gathering will mark an important epoch in natural history work in Ireland. Tickets will be issued to members of Irish Field Clubs at surprisingly low rates, and early application for tickets is recommended, as the accommodation available places a limit on the number of the party. Applications will be received by the Secretaries of the various Clubs from this date forward.

BELFAST NATURALISTS' FIELD CLUB.

MARCH 28.—In connection with the Celtic Class, an entertainment of Irish music and readings was held. The report of the Celtic Section was read by the Secretary (J. St. Clair Boyd, M.D.). Readings in Irish were subsequently given by Messrs. George Gibson and P. J. O'Shea. Miss Cathleen Milligan, Mrs. Wheeler, and Mr. Savile Hardy contributed Irish songs, Miss Stelfox, Irish airs on the violin, and Mr. Owen Lloyd, Irish airs on the harp. There was a large attendance.

In our report of the meeting on March 19, mention was omitted of a paper by Prof. G.A.J.Cole, F. G. S., on the so-called "Hullite" from Carnmoney, in which the author expressed the view that Hullite is not a distinct mineral form but only altered basic glass. The paper will be published shortly in the *Geological Magazine*.

DUBLIN NATURALISTS' FIELD CLUB.

APRIL 9.—The President (Mr. G. H. CARPENTER, B. Sc.) in the chair. Prof. E. J. MCWEENEY, M.D., gave a communication on a fungoid disease of Mangel-Wurzel which has lately appeared in Ireland. The fungus attacks the leaves and especially the succulent root of the plant, producing dark brown discoloration. It was first found by Dr. Franks of the Agricultural College, Berlin, in Germany in the autumn of 1892, and named by him *Phoma betæ*. Prof. T. Johnson, D.Sc., and Mr. D. M'Ardle took part in the discussion that followed. Dr. McWeeney then exhibited in the lantern micro-photographs of yeast, by Mr. Allan Swan of Bushmills, showing the spores of this plant.

The Secretary subsequently read a paper on "Wild Bird Protection and Nesting Boxes," by Mr. J. R. P. MASEFIELD, M.A., of the North Staffordshire Naturalists' Field Club. The writer describes various forms of nesting boxes and other devices, by means of which he had induced upwards of thirty species of wild birds to breed in the vicinity of his house. He made a strong appeal for the protection of the rarer species of British

birds Mrs. LAWRENSON exhibited some very beautiful new hybrid daffodils, and Mr. R. WELCH (Belfast), photographs showing the effects of the great December gale in the North of Ireland

NOTES.

Portraits of Irish Men of Science and of others who have worked for the Advancement of Science in Ireland.—For some time I have had it in contemplation to exhibit in a suitable part of the Museum a collection of portraits of persons identified with the progress of science in Ireland.

Quite recently a number of portraits having become available for this purpose, and others, as the result of special correspondence, having been presented or promised, the time is now close at hand when the collection can be placed on view.

I therefore desire to make known through the pages of the *Irish Naturalist*, that contributions and loans to this collection of portraits of eminent and acknowledged men of science belonging to the above denomination will be gratefully accepted.

Circumstances have rendered it desirable that no restriction whatever should be put upon the style or nature of the portraits so contributed, no funds being available for securing uniformity. Hence we have decided to accept oil paintings, lithographs, etchings, or photographs, and to exhibit them as received, save that suitable frames will be supplied when needed.

Portraits of Mathematicians, Astronomers, Physicists, Meteorologists, Geologists, Botanists, Zoologists, Antiquarians, and Numismatists will be arranged in separate groups. In the cases of those who are deceased, short biographical notices will be attached to the portraits.

V. BALL, Science and Art Museum, Dublin.

BOTANY.

PHANEROGAMS.

The Lesser Burnet (Poterium Sanguisorba, Linn.), in the North of Ireland.—In Vol. I of the *Irish Naturalist*, 1892 (p. 81), is recorded for the first time, the occurrence of the Lesser Burnet in the North of Ireland. In a large field at Glenmore, near Lisburn, County Antrim, some patches of the plant growing close together were then found, with every appearance of being native there. It has continued to flourish in this spot, and this year, early as the season is (March), it has unexpectedly been found in another part of the same large field. In this latter spot, which is distant about three hundred yards from that mentioned in my former note, there are numerous plants, covering nearly a square yard. This, I should think, tends to confirm the view that the species is indigenous in the north. It may be added that the meadow has been known to me for close on forty years, and that at no time during that period has it been under cultivation.

JOHN H. DAVIES, Lisburn.

ZOOLOGY.

AMPHIBIANS.

Irish Newts.—All the newts I have hitherto received from various parts of Ireland, belong to the one species (*Molge vulgaris*, L.). Further search for the other species is therefore necessary, chiefly in the Co. Galway, where the late distinguished naturalist, Mr. M'Calla discovered a larger kind readily distinguishable, as he remarked, from both male and female of the Common Newt During the forthcoming visit of the Irish Field Clubs to Galway, t is to be hoped that the question will be

determined whether the large species of newt has since become extinct, or whether the faculty of taking interest in Natural History matters has become lost among the inhabitants of the county.

Mr. Thompson records the Common Newt from Belfast and Sligo, and mentions that Mr. M'Calla had found it at Tuam, and Dr. R. Ball at Youghal. It has been known from the Co. Dublin for a great many years. We have received specimens at the Museum of this species from the following localities:—Cashel, Co. Tipperary (Miss Kelsall); Cappagh, Co. Waterford (R. J. Ussher); Armagh (Rev. W. F. Johnson); Bushy Park, Co. Roscommon (A. R. Nichols); Waterford (A. Neale); Lake Mentrim, Co. Meath; Mullingar, Co. Westmeath; Giant's Causeway, Co. Antrim; Raheny and Howth, Co. Dublin (R. F. Scharff); Lucan, Co. Dublin (J. N. Halbert); Borris, Co. Carlow (R. I. Acad. Fauna and Flora Committee); and Cork (R. A. Phillips).

R. F. SCHARFF, Dublin.

MAMMALS.

Hedgehogs in Captivity.—In Mr. Barrett-Hamilton's paper on "Irish Mammals" in the *Irish Naturalist* for this month (March) the following sentence appears:—

"It is a pity that Mr. Lydekker has not given us any notes on the habits of the Hedgehog in captivity."

Having kept Hedgehogs at different times perhaps a few remarks about them may be interesting.

When first caught they are very shy, but after a time they learn to know who feeds them. Hedgehogs will eat almost anything, but as they belong to the carnivora they must have meat frequently when in captivity to keep them healthy, besides bread and milk, boiled potatoes, etc.

We had one Hedgehog that would lay his bristles down smooth and allow himself to be stroked without rolling up. He got so accustomed to be handled and fed by children that he would draw a little cart made out of a paste-board box. He was attached to this by a tape passed over his head with two traces, after the style of the American trotting harness. He was usually kept in a box with wire on the front of it, but sometimes made his escape. The garden he dwelt in was large and walled in, and after two or three days' absence he was generally found rolled up in a nest of grass and leaves under a bush. We had him about a year when during one of his outings he was found as usual, but alas! poor Peter was no more. What was the cause of his demise we cannot say.

Hedgehogs are not cleanly in their habits, and are generally infested with fleas. Knowing this, we once spread a white cloth on the ground, placed a Hedgehog on it and sprinkled it plentifully with Keating's Insect Powder, when the fleas left it in great numbers, the white cloth enabling us to see them. In some houses Hedgehogs are kept for killing black beetles, and it is said answer the purpose well.

M. JOSE SIMPSON, Ballymena.

The Irish Stoat.—Naturalists will be startled to read in the *Ann. Mag. Nat. Hist.* and more fully in the *Zoologist*, for April, that in the opinion of Messrs. Oldfield Thomas, and G. E. H. Barrett-Hamilton, our Irish Stoat must be regarded as a new species, intermediate between the Stoat of Great Britain and the Weasel. These gentlemen describe the animal under the name of *Putorius hibernicus*, and point out that it differs from the British Stoat and approaches the Weasel in its small size, and the less extent of whitish colour beneath the body. As a colloquial name they suggest "Assogue," an anglicised transliteration of the Irish name of the animal—Easog There will be, no doubt, much comparison of Irish with English *Putorii* by naturalists, and, if the distinctions indicated, be found constant, one of the most important additions to the Irish fauna within recent years will gladly be welcomed.

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SOME CAUSES OF THE DISINTEGRATION OF SHELLS.

BY MISS R. HENSMAN.

(Read before the Dublin Naturalists' Field Club, 11th December, 1894.)

THE disintegration of shells was, until quite recently, looked upon as due to the friction of the sea, which carries uninhabited shells backwards and forwards, bringing them into intimate relations with the land and dashing them against each other and against the rocks on the coast, and also to the gradual solvent action of the carbonic acid dissolved in the water. The aim of my paper is to draw attention to another and remarkable cause of this disintegration. The presence of tube-like structures in shells, corals, fossil fish-scales, and other calcareous bodies has been known for some years, but it was not known until quite recently to what cause these tubes were to be attributed. In 1888 was published a short paper by Bornet and Flahault in the *Journal de Botanique* describing two of these tube-like structures as perforating algæ. A year later a fuller paper entitled "Sur quelques Plantes vivant dans le Test calcaire des Mollusques" was published by the same authors, in which ten species were described and illustrated.

We have six species recorded in Ireland. The first to be found was *Gomontia* on the shores of Galway Bay, in the spring of 1891, by Prof. T. Johnson. Owing to the difficulty of freely examining these plants and the little general attention that has been paid to them, we may feel sure that more will be noticed on the Irish coasts, and even fresh forms discovered when greater research has been made. So far none are recorded from the North of Ireland. The brown seaweeds, which are as yet unrepresented, we may expect to be recorded.

Probably we shall find that there are more fresh-water species. It is due to Bornet and Flahault, that we have had pointed out the great use of these plants in the economy of nature—namely, that of shell-destruction. Since Bornet's work, papers have been published, giving illustrated accounts of two additional species, one by Batters[1], and one by Bommer[2].

The presence of these organisms can be detected in the shells of various molluscs, such as razor-shells, limpets, cockles, periwinkles, by the green, bluish green, or pink stains which they make. They have been classified according to their colour, into four groups :—

1. Rhodophyceæ (red) ; 2. Chlorophyceæ (pure green) ; 3. Cyanophyceæ or Phycochromaceæ (blue-green) ; 4. Fungi (plants colourless, appearing to belong to the fungi).

Care is needed in examining a specimen to make sure that the plant we are looking at really penetrates into the shell, as various algæ, especially in the young state when the spores are germinating, form patches of various colours on the surface of shells, but never penetrate into their substance. This mistake fortunately is easily avoided ; by using one or other of the following simple tests we can determine whether the coating is superficial or not. If we scrape the shell with a sharp instrument (or, if this is not at hand, one's nail being so, answers the purpose admirably) the young germinating non-perforating seaweeds will be rubbed off, leaving the shell its original colour. If the shell is penetrated by a shell-borer this will not be the case, the colouration still being apparent. Another and perhaps better plan is to break the shell in two ; if the stain continues to any depth we may feel sure that we have a perforating alga. A good deal of information can also be obtained by powdering the shell with pestle and mortar, and observing the powder under the 1-inch objective, or by taking a thin layer of the shell, and looking at it under the same objective.

For fuller information as to these plants it is necessary to first remove the calcareous matter and thus set free the plants themselves for examination. The reagent used is Perenyi's Fluid, which not only dissolves the carbonate of lime, but fixes the protoplasm, without destroying the colour. The

[1] *Conchocelis rosea*. E. Batters. *Phycological Memoirs*, II., 1893.

[2] "Note sur *Verrucaria consequens*," 1892, C. Bommer.

action of any acid upon carbonate of lime is well known. Perforating seaweeds perform the same office as acid, though in a less rapid manner, upon the shells which they penetrate. Bornet was the first to point out that they must therefore be most powerful factors in the work of disintegration.

All these algæ attack the shell in the same manner. First they form a horizontal layer on the outside of the shell, from this branches develop, and enter into the substance of the shell until it may be quite honeycombed by them. The calcareous matter is thus by their agency returned to the water, where it may again enter into the composition of marine plants or animals.

One of the commonest species is *Gomontia polyrhiza*, frequently found, especially in razor-shells. It is readily distinguished by the naked eye, owing to its patches of green, marking the shell, sometimes on one side, sometimes on both, the depth depending on the age of the plant. At certain times we notice dark green specks scattered over the surface of the shell; these are the reproductive organs or sporangia.

Under the microscope *Gomontia* is recognised by its long branched green septate filaments, and by the sporangia, which take definite forms when young. As they reach maturity their walls become thick and stratified, root-like filaments are developed, and the sporangia being detached, look like independent plants. They were at one time described as such under the name of *Codiolum polyrhizum*. The filaments of *Gomontia* vary greatly in size; so much so, that one is extremely liable to mistake the different preparations for distinct and separate species.

With *Gomontia* we often find *Mastigocoleus* and *Hyella*, both of which stain blue-green or grey. The former can be distinguished microscopically from the latter by the presence of heterocysts, and by its tortuous filament, which is of equal thickness throughout. Looked at with the naked eye, *Hyella* shows more numerous patches, the filaments of which are closer together than *Mastigocoleus*. On microscopic examination *Hyella* usually shows two kinds of filaments, some long and branched, others composed of a number of cells.

Plectonema terebrans, an extremely delicate form, can only be observed after decalcification and subsequent examination, as it gives no external indication of its presence. Threads of it are frequently found in preparations of other algæ, from which it is at once distinguished by its long slender segmented filaments, much interwoven with each other.

The red alga, *Conchocelis rosea*, first observed by Batters in 1892, stains pink, so its presence can be at once determined: tests being employed to make sure we are looking at a shell-borer. The filaments swell out into irregularly-shaped inflations, more or less constricted at the joints. In the centre of each cell of the inflations there is a star-shaped chromatophore.

The shell-destroyers, which are looked upon by Bornet as belonging to the colourless group of Fungi, are *Ostracoblabe* and *Lithopythium*. The latter has not yet been recorded from this country.

A marine lichen named *Verrucaria consequens* was, in 1894, obtained in shells collected at Bundoran by Professor Johnson. It will perhaps not be out of place here to explain what we understand by the term *lichen*. Lichens are compound bodies consisting of two organisms—a fungus and an alga, variously associated. The fungus absorbs the required water and mineral substances; the algal portion of the lichen, possessing chlorophyll, absorbs carbonic dioxide, evolves oxygen, and forms starch, &c., thus supplying the organic food necessary for the nourishment of the whole plant. We have in this way a case of division of labour among organically distinct plants, to form a symbiotic organism, with marked peculiarities of its own. The fruit of a lichen, which is always formed entirely of the fungal element, may be open and cup-like (apothecium), or enclosed in a cellular covering (perithecium). *Verrucaria consequens* has long been known from the west of Ireland, but M. C. Bommer was the first to show, in 1892, its perforating powers in Belgian specimens. It was first noticed in limpet-shells; later on it was observed in *Purpura* and acorn barnacles.

On looking at any shells attacked by this lichen, we notice dark spots as indentations scattered over the surface, the perithecial fruits of the lichen, formed from the fungal

constituent (*Ostracoblabe*). On removing one of these fruits we see that the fungoidal filaments are really attached to it. A young fruit in course of development shows this still more clearly. The algal element of *Verrucaria* shows filaments having a great resemblance to *Hyella cæspitosa*, though their form is somewhat altered owing to its living in conjunction with a fungus and not as an independent organism.

The law of sympathetic selection of colour in nature is well known. Animals, plants, and insects all display this quality in a marked degree. Molluscs are apparently not devoid of this power of selection.

Batters has noticed this fact with regard to the yellow periwinkle, which lives among *Fuci*. We may expect shortly an interesting paper showing the protective colouring adopted by these molluscs.

I conclude my remarks on the perforating seaweeds with a list of the Irish species. This is the first time a complete list of the Irish species has been published. For it and for help and every facility for examination of the group, I am indebted to Professor Johnson.

Hyella cæspitosa, Bornet et Flahault—Clontarf, 1892, Prof. Johnson. E. and W. coasts of Ireland.

Plectonema terebrans, Thuret—Clontarf, 1892, Prof. Johnson and R. Hensman. E. and W. coasts of Ireland

Mastigocoleus testarum, Lagerheim—Roundstone, 1893, Prof. Johnson and R. Hensman. E. and W. coasts of Ireland.

Gomontia polyrhiza, Bornet et Flahault—Shores of Galway Bay, 1891, Prof. Johnson. E. and W. coasts of Ireland.

Conchocelis rosea, Batters—Clontarf, 1893, Prof. Johnson and R. Hensman.

Verrucaria consequens, Nyl.—Bundoran, 1894, Prof. Johnson and R. Hensman. It has since been found on the east coast.

It is probable that all the species mentioned, except *C. rosea*, are generally distributed round the coast of Ireland.

AN ORNITHOLOGICAL EXPLORATION IN DONEGAL, FERMANAGH, SLIGO, AND ROSCOMMON.

BY RICHARD J. USSHER.

(A Report laid before the Royal Irish Academy, 25th May, 1894).

On 30th May, 1891, accompanied by Mr. Robert Patterson, of Belfast, I drove from Donegal to Killybegs. Near Donegal is Lough Easke, on which a colony of Black-headed Gulls breed. It is in a wooded demesne, the haunt of the Goldcrest. Chiff-Chaff, Long-tailed Tit, Tree Creeper, Bullfinch and Nightjar, birds almost entirely absent from the bare regions of Western Donegal we were about to traverse. Near Killybegs we observed Starlings breeding at Bruckliss, where we were informed they had bred for the first time in 1890. This spread of the Starling as a breeding species is similar to the spread of the Missel Thrush early in this century, whose advent into Western Donegal is remembered by Mr. William Sinclair. He states that it had reached Tyrone at least ten years previously. Missel Thrushes breed near Killybegs in sites easily reached, probably from the scarcity of trees. One nested among the rocks on a hill with Hazel scrub about it.

At Killybegs we derived much information and assistance from the kindness of our host, Mr. Arthur Brooke, whose local collection of eggs give evidences of the breeding of many interesting birds in County Donegal. Among these I may mention Golden Eagle, Merlin, Peregrine, Ring Ouzel and Chough, all from this western peninsula; Merganser and Woodcock from Lough Easke; Dunlin from near Ardara; Common and Arctic Tern, Great Black-backed Gull and Storm Petrel from islets round this coast; Black Guillemot from Horn Head; Manx Shearwater from Arranmore; and Red-throated Diver from near Dungloe. We subsequently found many of these species in their breeding-haunts. We found a Lesser Redpoll nesting in a willow beside a road, and Mr. Brooke says it breeds commonly here. Mr. Brooke has observed the Whinchat near Killybegs, and Archdeacon Cox has seen it near Glenties. This is not so surprising when we bear in mind that it is also a summer visitor to the neighbouring counties of Tyrone, Mayo, and Sligo, though an exceedingly local bird.

On June 1st, accompanied by Mr. Brooke, we drove into an elevated mountain tract on the north side of the peninsula, where we met the Golden Plover whistling in its breeding-haunts. We were led to a range of mountain-cliffs whence Mr. Brooke had obtained eggs of Choughs this year. It was the first inland breeding-place of this species I had seen, a fissure in the face of a high rough cliff, overlooking a valley that led down to a gorge in another range about a mile off, through an opening in which we could see the still more distant sea. Choughs were heard by us in another glen, in the cliffs of which we were told they breed, about a mile from the sea.

Beside a lonely lake in these mountain wilds was a solitary cottage with a few Elders beside it, the only attempt at bushes. There we were surprised to see the Spotted Fly-catcher, a bird associated with more luxuriant scenes, but we found it here and there through Western Donegal during our tour. We then ascended and crossed one of the highest mountains in the district, and while doing so we beheld a Golden Eagle come flying along, almost over us, pertinaciously pursued by a pair of croaking Ravens, one of which continued to make stoops at it from above, apparently striking it at times. Besides the Ravens we saw a small falcon, probably a Merlin, making repeated stoops at the Eagle. The latter continued to fly steadily along with an occasional flap of its enormous wings, whose upcurved primaries were distinguishable. It passed away still pursued by the Ravens.

We then visited the Eagle's nest from which had been taken a single egg in April. On the further slope of the mountain we found a vast deep coombe containing a good-sized and evidently very deep lake, beyond which, beneath another great descent, lay the sea. The rugged slope below us led down to a precipice which overlooked the lake. Each of us then descended with the rope round him, and having passed an overhanging piece of rock that formed a canopy, came at once to the recess in which was built the huge nest. It was a broad platform of coarse heather-stems which here grow to a great size and were bare, probably having been built into the foundation of the nest for years. There was no cavity in it, but the top or bed for the eggs consisted of dried tufts of Wood-rush. I found the cranium of a Hare and a feather of

the Eagle. Previously to 1891 it was last occupied in 1887, when two young Eagles were taken from it in May, the nest then containing some hares and a grouse. Since 1887 the Eagles had brought out their broods unmolested in the sea cliffs. In 1891 before the breeding season two Eagles were said to have been shot by a farmer. It is the only place in Donegal where any continue to breed. A gentleman told us that he had formerly shot Eagles off their nest near Lough Easke, and further north we were told by Colonel Crampton Lees that Eagles used to breed between Errigal and Muckish.

On June 2nd, we passed through Ardara, and walked through a marshy tract separated from the sea by sandhills. In this marsh Snipe and Lapwings were breeding numerously, and on the drier portion covered with tussocks of coarse grass I started a Dunlin from her nest containing four eggs. It was overshadowed by the long grass and comfortably lined with finer grass. We saw and heard quite a number of Dunlins, whose twirring note is so unlike that of other species. I learn from Mr. J. Steele-Elliot, who visited this marsh on 8th June, 1892, that he found five Dunlins' nests there.

Driving towards Portnoo, through a stony tract, in which were small lakes, we found a number of Common Gulls assembled on a small grassy island in one of them. On examining the spot we found twenty-three nests, recently despoiled of all their eggs, and one nest containing eggs ready to hatch, as the young birds were squeaking in them. We subsequently found a few nests of the Common Gull on islets in lakes near Dungloe. This species breeds in the barer parts of Donegal and Western Connaught, and a very few on one of the Kerry isles, but further south than this it is not believed to breed, nor anywhere on the eastern side of Ireland, where it is exclusively a winter visitor. It is thus the most local of our six breeding species of gulls, and Ireland is the southern limit of its breeding-range in Western Europe.

Passing Portnoo we drove to Glenties. It was getting dusk, and in more than one place where there were low trees or bushes we remarked Cuckoos collecting to roost, as they are wont to do in bare tracts like this district wherever there is a little covert. We often met with Cuckoos, though the Magpie seems to be a scarce bird in Western Donegal.

On June 3rd, we drove from Glenties by Doochery Bridge to Dungloe, through one of the wildest, most mountainous districts I have ever seen (without ascending to any great altitude). Bird life was exceedingly scarce, an occasional Sandpiper by a stream, or Ring Ouzel perched on a rock, but as we approached Dungloe we passed some small lakes containing islands, covered with bushes or low trees, in which Herons were nesting conspicuously, for want of better trees. We saw a remarkable instance of this on an island in Lough Aleck More, where an ancestral nest of Heron measured 4 feet 9 inches across, having evidently been added to from year to year until it was as large as the Golden Eagle's nest we had visited. It stood on the bare skeleton of what had been a low tree not more than six or eight feet above the ground. On other islands and rocks in this lake, and Lough Meela, on the other side of Dungloe, Common Terns, Black-headed Gulls, and a few pairs of the Common Gull were breeding.

Next day, on Lough Meela we observed two Sheldrakes and a Lesser Black-backed Gull. Swifts were numerous on the lake and about Dungloe as well as at Glenties, being found in the West of Ireland, as elsewhere, wherever there are buildings of sufficient size for them to nest in.

We then visited the small mountain lake which is the breeding place of the Red-throated Diver. It was the most elevated and perhaps the most lonely of a number of small lakes some miles from Dungloe and from the sea. We saw the pair of Divers, whose dark plumage assimilated to the leaden hue of the waves of this lake. It partially overflowed on one side, and its edges were flat and so wet that we sank to the ankle at almost every step. In places these margins were mats of herbage, chiefly buck-bean, which yielded under one. On such a margin we were shown the nesting-hollow, scraped out with a peaty bottom on the edge of the water, a little vegetation fringing and partly concealing it. We saw the old nesting-site of last year, which was similar. We were told that the male usually remained on the lake while the female was hatching, but that they sometimes go to the sea to fish, and return flying to the lake late in the evening with a loud laughing cry, especially before rain. Both birds kept together, and always at the side of the lake furthest from us. We were told that the Diver was about to lay, but the fact is

that, since the discovery of this species breeding in Ireland, both first and second clutches are regularly taken for collectors, one gentleman in England having received three clutches one season from near Dungloe, probably indicating a second pair of birds. The Red-throated Diver will soon be driven from its breeding haunts in Donegal unless it can be protected, if it be not too late already.

On our way to Gweedore the driver remarked that Thrushes and Blackbirds, which we rarely saw, were more numerous in winter, thus confirming the observation of Rev. A. H. Delap to the same effect concerning the western woodless parts of Donegal.

On June 5th, embarking in a boat, we sailed round Owey Island, the western side of which is full of fissures in which a number of Black Guillemots appeared to be breeding, as we saw more of them about the spot than I have ever seen elsewhere. A pair of Great Black-backs seem to have their nest on a lofty stack of rock. We saw Swifts, too, off this remote island.

On Innishfree we found three Turnstones, two of which were in full breeding-plumage. It is the third instance in which I have met with Turnstones off the Irish coast in June, but apparently not breeding. We also saw a Dunlin in breeding-plumage. We saw a great number of adult Gannets throughout the day, though they do not breed nearer than Ailsa Craig, also many Manx Shearwaters. Choughs were seen on the coast, which is rather low and sandy, and after landing we were shown a most peculiar inland breeding-place of this bird.

We had come up the estuary of a little river to a village. Proceeding inland over a bare tract, chiefly rock, we came to a bridge over this river about a mile and a half from the open sea; above this bridge the river flowed through a low narrow gorge in the granite, with perpendicular sides. On one side, where a deep part of the river occurs, the rock overhangs, forming a canopy over a receding ledge or shelf on which the Chough's nest is placed. We saw the Choughs issue from it, and the rock beneath the canopy covered with their dung. Their eggs had been taken from this nest on previous years. Colonel Crampton Lees has seen a flock of forty-three Choughs about the estuary in autumn.

In the little village near the sea we saw Goldfinches feeding their young in an Apple-tree. The owner said that several nests of Goldfinch had been built the same season in this and the adjoining tree, which are the only apple-trees in this very bare part of the country. A Missel Thrush had her nest in an ash in the same small garden. I have remarked the nests of Chaffinch and Missel Thrush close together, the smaller bird evidently seeking the vicinity of her stronger neighbour to ward off Magpies.

On June 6th and 7th, we explored Horn Head, a mountain-peninsula, which, the proprietor told us, measured thirteen miles round, rising to a height of five hundred feet. It is one of the largest, if not the largest, breeding-place of sea-fowl in Ireland. We went round the cliff-tops, and I also went round their base in a boat. For miles and miles the great colony continues, the cliffs being thickly populated up to about two hundred feet from the water, the birds becoming above that much fewer. One cannot see them readily at close quarters as on the Saltees, but one gets some magnificent general views as at the Campbell. There is not a great variety of species: Kittiwakes, Razor-bills, Guillemots, and Puffins, forming the great majority of the bird-life. There are colonies of Herring Gulls and Cormorants. We did not see a Black-backed Gull of either species, nor did we identify the Common Gull, which is more of a "Lough Gull," as it is called. We were shown a pair of Peregrines, the female bird proving by her outcries and actions that she had eggs or young. Our guide, who takes young Peregrines, says that three pairs breed at different points of the Head, and the proprietor, Mr. Stewart, can remember when three pairs of Eagles bred round these cliffs (doubtless White-tailed Eagles), and that once four pairs had bred there the same year. The last Eagles bred there as late as 1880, but none have since done so. We were shown two of their breeding sites, in one of which were the remains of a nest. We saw Choughs feeding near the Campbell, and flying out of a low cliff near the entrance of Dunfanaghy Harbour, where they breed. They seem to avoid the great precipices tenanted by other birds, but a pair breed annually in a small creek close below inhabited houses. I saw a Raven on the higher cliffs, and a Black Guillemot and Sheldrake at the entrance of the harbour.

As we were walking round the tops of the higher cliffs, practically on a mountain-top, we met a female Ring Ouzel which chuckled and displayed herself close to us, to lure us from her young—just able to fly. We had met with the Ring Ouzel from time to time in the mountainous and rocky parts of Western Donegal, much lower down than it is usually found in other counties.

On June 8th, I proceeded alone to Enniskillen, where I was informed by Mr. Thomas Plunkett, the well-known antiquarian, that he has often taken Choughs' eggs at Knockmore, a mountain in Co. Fermanagh, about ten miles from the sea. I had heard of this nesting-site of Choughs from another gentleman.

On June 9th, taking a boat, I sailed twelve miles down Lower Lough Erne, a splendid lake abounding in islands covered with natural wood, chiefly of oak, tracts covered with which are preserved on the neighbouring estates. I here became acquainted with several species of birds, new to me, in their breeding haunts.

At Devenish we put up a pair of Shovellers from a reed bed. As we advanced we found Mergansers numerous, nearly every island seeming to be inhabited by a pair. At an island where is a large ancient cross we met with Redshanks breeding, one of which sat on the top of a White-thorn bush uttering his alarm-cry. I here saw six Mergansers and six Tufted Ducks, and found the nest of the latter species in a bank or old fence among long grass, black-thorn, scrub, etc. It contained seven fresh eggs.

While passing an open reach of the lake we saw a pair of Great Crested Grebes swimming, with little more to be seen than the top of the back and the long thin stick-like neck and quaint tufts or tippet. Their note was not unlike the croak of a Rook, and when diving they sank quietly forwards without a splash.

We came to a small stony islet over which hovered a vociferous cloud of Black-headed Gulls. It was strewn with their numerous nests, most of which had two or three eggs; some contained young. Some Wild Ducks and Mergansers flew up, but several Tufted Ducks swam off low in the water, of these we found two nests with eggs among tall grass or

flags. This species is rapidly increasing on Lough Erne in the breeding season.

We then rowed to a remote island, its centre occupied with natural wood, with a broad beach on which stones of various sizes occurred. On this beach a scattered colony of some twelve or fifteen pairs of Lesser Black-backed Gulls were breeding. It is twenty miles from the open sea, and, except on a mountain-bog in Co. Antrim, is the only inland colony of these birds I have seen, though others exist in other lakes. The nests were here and there among the stones on the beach, some having evidently been robbed. Common Sandpipers were numerous. On this island I heard the song of the Garden Warbler, now so familiar from my acquaintance with it in the Shannon Valley. The late Sir Victor Brooke knew it well at Castle Caldwell, lower down the lake, and considered that there must be ten or twelve pairs in the place in 1869.

At Enniskillen I was shown a Spotted Crake in the possession of Mr. Lunham, which was shot with another of the same species late in the summer or early in the autumn of 1890, by George Husbands, on Upper Lough Erne, where he saw two more.

On June 10th, I visited the mill-dam at Castle Irvine, a marsh abounding in breeding Mallards, Teal, Snipe and Lapwings. Here a male Shoveller got up, and Captain D'Arcy Irvine, who accompanied me, as well as the late Sir Victor Brooke, told me that Shovellers breed there. I also learned that Crossbills had remained and presumably bred at Castle Irvine the three preceding years, though previously unknown there.

On the road from Collooney to Hollybrook, Co. Sligo, I was struck by the tameness of a pair of Mergansers, male and female, which were quite unconcerned at my gazing at them while the car stopped. They were on a small open lake about a hundred yards from me—overlooked from the road.

Hollybrook, the seat of the late Colonel Ffolliott on Lough Arrow, occupies a beautifully wooded tract between limestone heights at the back, rising into cliffs (the home of the Peregrine) and the lake shores in front, which are indented and covered with a tangle of natural wood, several large islands lying not far off. On one of these I saw a pair of Dunlins in breeding plumage, and Ringed Plovers and Redshanks, which were excited about their eggs or young. We

also saw Tufted Ducks, which in 1893 appeared to be much more numerous. Several of their nests were taken on Lough Arrow in June, 1892, by Mr. H. L. Jameson, who also took three eggs of Great Crested Grebe, and discovered between Lough Arrow and Ballymote many Whinchats, some with young, a species reported to me by Colonel Ffolliott, but which I did not see there. I saw, however, Great Crested Grebes, and a Woodcock sitting on her eggs. Reed Buntings are always to be found hatching at this season on the islands in Irish lakes. It was reserved for my second visit to Hollybrook, in 1893, to discover there the Garden Warbler singing in two parts of the demesne. I observed it morning and afternoon and on successive days, so that it is evidently a regular visitor there.

On June 12th, accompanied by Colonel Ffolliott, I visited Lough Key, contiguous to the demesne of Rockingham, Co. Roscommon, an exceedingly beautiful, wooded lake, with numerous islands abounding in bird-life, being preserved. We passed a Lesser Black-backed Gull perched on a stone, and visited two small islets crowded as thickly as possible with nests of the Black-headed Gull, which had hard set eggs or young: among these I found a nest of Tufted Duck containing thirteen eggs with some flags growing round it. In every part of the lake we saw Tufted Ducks and Mergansers, usually paired, showing that the females had not begun to hatch. We also put up three male Shovellers, and in a reed-bed saw a Great-crested Grebe. On a small islet within a short distance of Rockingham House and terrace-garden I found five nests, with two and three eggs each, of Common Tern among large stones at the verge of the scanty soil of the island, and backed by the bushes growing thereon.

On Hermitage Island a colony of Cormorants were breeding in Ash-trees, which preponderate there and form a dense dark grove. I reckoned fourteen nests (but there were probably more) placed from thirty to forty feet above the ground; most contained fully fledged young. Several of the old Cormorants remained on their nests while we were beneath. I was informed that Herons breed on this island along with Cormorants, as they do at Lough Cutra in Co. Galway, where a much larger colony of both species build in high trees.

GEOLOGICAL NOTES FROM WEST GALWAY.

THE GALWAY AND CLIFDEN RAILWAY.

BY ROBERT J. KIRWAN, B.A., B.E.

In this paper I propose more particularly to describe the rock sections exposed by the cuttings for the portion of the new Galway and Clifden Railway lying between Oughterard and Recess. The rocks cut through belong for the most part to the schistose series, the origin and age of which have long been involved in doubt. The officers of the Geological Survey, who first examined and mapped this district, believed these schists to be metamorphosed sedimentary rocks of Cambrian age, while some geologists believed them to be Pre-cambrian; and the overlying quartzites were supposed to be Cambrian or Lower Silurian. Within the last few years the Survey has carefully re-examined some parts of Connemara, and similar areas occurring in Mayo and Donegal, with the result that the older theories have been found altogether untenable.[1] Most of the schists are proved to be igneous rocks, which have been altered during successive periods of metamorphism. There is, however, one notable exception. The crystalline and often schistose limestones of such frequent occurrence as bands in the schists must be the remains of a sedimentary deposit, probably of Ordovician age. Later still than the metamorphic periods came violent earth-movements, which crushed the rocks over large areas, but especially along certain well-marked lines in the neighbourhood, of which even the hard resisting quartzites have been crushed into small fragments or even powdered. These crushed rocks, when recemented by infiltered matter, form interesting conglomerates or breccias, some of which were supposed to be Carboniferous shore-beds by the surveyors. Of a later age than some of these earth-movements, but older than many, are the great granite outbursts which have penetrated the schists and quartzites, as veins, dykes, and intrusive masses. In this district are also dykes of eurite, which may be later offshoots of deeper portions of the granite, which

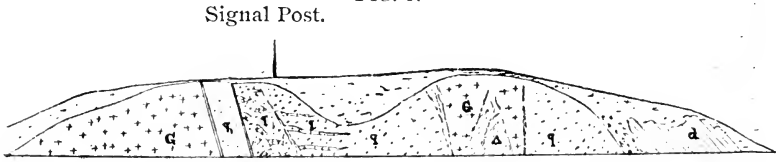
[1] See "Report of the Director-General of the Geological Survey," 40*th Rep. Depart. of Science and Art* (1893), p. 266, and *ibid.*, 41*st Report*, (1894), p. 270.

remained fluid after the crust had solidified. In the country to the south of the railway are several considerable intrusive masses of hornblendic rocks, which may for the most part be referred to the diorite series. This rock, in process of weathering, splits readily into large blocks, and appears for this reason to have been particularly adapted for transportation by glacial agency. It is frequently met with in the form of boulders in the cuttings, and erratic blocks of the same rock are distributed over a wide area, being particularly numerous on the high ground west of the lower end of Lough Corrib. Cutting all the other rocks and quite unaffected by earth-movements are dykes of fresh-looking basalt and dolerite. These are probably much newer than the other rocks of the country, and may be contemporaneous with the Eocene basalts of Ulster. The above general account of the rocks of the district will be useful for a correct appreciation of the following detailed descriptions. The terms right and left are supposed to apply to an observer proceeding from Galway towards Clifden.

Cutting at Oughterard.

This cutting is about 700 yards long, with an average depth of 25 feet of rock; the diagram, fig. 1, shows the right face of the cutting. At the Oughterard end is a dark Carboniferous

Fig. 1.



d Carboniferous Limestone. q Quartzite. q_1 Fine Quartzite.
G Granite. Δ Hornblende Schist.

limestone, with numerous minute shining specks and large concretionary masses of calcite. This limestone is fossiliferous, some brachiopod shells and crinoid stems being seen in it. The undisturbed and well-bedded appearance of this exposure forms a marked contrast to the crushed condition of the older rocks which make up the rest of the cutting. After the limestone comes a space occupied by the debris of the neighbouring rocks, mixed with clayey matter. Next in order is a great mass of crushed green quartzites, which show

well the effect of the violent earth-movements previously referred to. This quartzite makes up more than half the cutting; it contains much iron pyrites, the decomposition of which causes the water flowing from the cutting to be highly impregnated with iron, and the face of the cutting is for the same reason much stained. Near the centre of the quartzite is a mass of white granite, which seems to have been brought into its present position by faults, the lines of which may be traced by the highly crushed appearance of the rock in them. In this granite are some large picked-up pieces of quartzite. Deep blue fluor-spar also occurs as concretions in this granite. A wedge-shaped piece of dark schistose rock, probably a much altered and crushed hornblende schist, has been thrust into the granite apparently by faults. In this schist are some veins of hæmatite. There seems to be some hornblende schist mixed with the quartzite in parts of the cutting. At its farther end the quartzite is traversed by numerous small granite veins, mostly horizontal; some of them are very felsitic, and much of the felspar is of a greyish black colour (probably labradorite), and the granite often contains calcite veins which may be due to the decomposition of lime felspars. Opposite the signal, a well-marked fault brings in a dark quartzite with larger granite veins; these, however, have been so much cut up and displaced by minor faults that the granite seems to occur in patches. The green quartzite is cut off suddenly by a well-marked fault, and about twelve feet farther on is another fault, similar and parallel to the last. Between these fault-planes is a mass of greyish-brown rock without granite veins. Professor Cole, to whom I submitted a specimen, suggests that it may be a mylonite, formed by the crushing together of quartzite and granite; but it would do well for a fine-grained quartzite. The fault-planes bounding this rock are worthy of special description; they are each about a foot wide, with parallel walls, and are occupied by clayey matter and some fragments of the adjacent rocks. In the clay are curious little spherical masses of the rock included between the faults. These spherules are about the size of ordinary shot, and might have been formed by an oscillatory movement of the adjacent rocks. The last of the faults just described is bounded on its farther side by a mass of red granite. This granite is much

jointed, and is traversed by some well-marked fault-planes. In some places it appears to be slightly foliated, and the joint-planes contain chloritic matter. Near the end of the cutting, the granite approaches the character of a breccia. Through a considerable part of the cutting, the rock is covered with a layer of peat containing numerous tree-roots.

On emerging from this cutting the line runs for over a mile through bog. At the farther end of the bog, on the right-hand side of the railway, is a lead mine, from which a considerable quantity of ore was raised. The works have long been abandoned, and are now full of water; but a full description of them may be found in the survey memoir[1] of the district. In the rock cast from the mine some good specimens of barytes may be found.

About a mile beyond the mine some protrusions of hornblende schist have been cut through on the right of the line. This schist contains well-developed crystals of hornblende, probably due to secondary crystallization. At one place a lump of epidote, about three inches in diameter, may be seen in the schist.

At the bridge over the river, near the village of Garabaldi, are white crystalline limestones with strings of chloritic matter, which give them a schistose appearance.

Between the river bridge at Leam and the road-crossing are hornblende schists with some limestone. Crossing the railway, cutting the limestone and schist, is a narrow dyke of basalt. The surface of the schist at this place is often ice-polished, and shows very prettily the curled and contorted foliation.

Cuttings along Lough Bofin.

Opposite the south end of the lake are hornblende schists with quartzitic bands. Farther on are schists with granite veins, which contain large flakes of silvery white mica. North of the island are quartzites, some of which are very coarse-grained and schistose. The quartzite is often cut by granite veins. In one place the granite seems to graduate into eurite; but Professor Cole, on microscopic examination, finds the supposed eurite to be a fine quartz-breccia, with very few evidences of felspar.

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[1] Memoir of Geol. Survey of Ireland to sheet 95, p. 65.

Between the last cutting by the lake and the bridge are coarse and fine hornblende schists. On the left side a small intrusion of garnet-rock may be seen in the schist. This garnet-rock is of frequent occurrence in the country south of the Maam Bay arm of Lough Corrib ; but, being a very friable rock, it has suffered much from denudation and does not form a prominent feature. A little farther on are veins of coarse felspathic granite, which cut both the normal granite and the schist. The felspar in these veins is dark grey or black, resembling labradorite ; it gives a lime reaction in the blow-pipe flame, and I have also verified the presence of lime by microchemical reactions.

Some fluor-spar may be seen in the joints in the granite, and there is a small vein of hæmatite in the schist. At the same place a wide dyke of fresh-looking dolerite crosses the line; this rock weathers brown, with numerous whitish star-shaped markings.

The cutting between the bridge and the public road consists at the lake end of a mass of whitish rock, which contains what appear to be fragments of altered hornblende-schist, and may be due to the disintegration and alteration of that rock. Farther on, a wide dyke of dolerite, similar to that last described, is cut through.

Between the public road and Loughaunierin are some very micaceous quartz schists, and much crushed hornblendic schist. Opposite the houses on the road-side, veins of felspathic granite with black felspar may be seen in the schist, while near the lake there is a dyke of dolerite. North of Tawnagh-beg Lake there is a considerable cutting in granite, which is much crushed, and appears to occupy part of the Maam Valley fault of the Survey. The joints of the granite are generally much chloritised, and the rock is traversed by many veins of pure quartz, which are also bounded by chloritic matter. The quartz was probably deposited from hot waters, at the close of the granite intrusion. Some well-formed clear quartz crystals are to be seen in hollow portions of the veins. The chloritic matter on the edges of the veins effervesces strongly with acid, which probably indicates the presence of carbonate of lime; and in one specimen from this cutting a mass of garnet with barytes is seen on the edge of the quartz vein.

A little beyond this cutting, a dyke of compact basalt about one foot wide was cut through in making an outlet for the drains. Northward from the granite cutting the Maam Valley fault may be traced to Lough Corrib, its course being marked by great masses of crushed quartzite. In one place a newer dyke of intrusive rock cuts across the fault; Professor Cole regards this as a quartz-aphanite. A basalt dyke seems to have come up alongside and mingled with the aphanite.

Near the basalt dyke in the outlet before described, a large boss of schist has been cleared of peat, and on the fresh surface may be seen a network of granite veins, which suggests that the granite was intruded in a very liquid condition. The line now enters the bog, through which it runs for nearly four miles, with the exception of some cutting in rock, which often rises in bosses above the surface. In excavating the foundations for Maam Cross station, limestone was met with under the peat, and this rock may also be seen west of the road at the station. North-east of Lough Shindilla some schists, much cut up by granite, may be seen on the right. The schists contain much quartz, probably deposited from hot waters.

Cutting North of Lough Shindilla.

At the east end are greenish and purplish quartzitic mica schists. On the purple foliation planes are often pale-green bands about $\frac{1}{4}$ inch wide, straight and fairly parallel, and cut by similar systems of bands. These seem to be due to decomposition, with production of chlorite, along very fine joints. Near the centre of the cutting are quartzitic schists that contain carbonates, probably calcite, in the mass, and more abundantly on the joint-planes. Farther on, the schist approaches the character of a granulite. The schists in this cutting appear in great part to occur in regular beds, and might possibly be metamorphosed sedimentary rocks. There are many granite veins in the cutting; some are narrow, with straight parallel walls, and they are generally vertical. These veins were probably formed by the granite filling old joints. The granite in them is rather coarse-grained; the mica flakes are generally most plentiful in the centre, but are sometimes arranged in two zones parallel to the walls. There are other larger and more irregular veins, often with ill-defined edges, as if the schist and granite had fused together.

The mica appears to occur in thin flakes rather than in the usual nests, and on this account it frequently appears as small rods on the broken surface of the rock. The granite veins are all somewhat displaced by small faults. Pieces of pure-looking quartz are common in the schist, which sometimes appears to send veins into them. These may be due to silica deposited in cavities left by the solution of pieces of limestone, which were picked up by the schist when it originally invaded the sedimentary rocks as an intrusive mass (see below).

Cutting between Loughs Shindilla and Oorid.

A diagram of this cutting is shown in fig. 2. The average depth of rock is about 12 feet. The eastern end is made up of crushed quartzitic mica-schist, with perhaps some hornblende-schist and granulite. The joints usually contain much chloritic matter. Proceeding westward, the schist becomes more hornblendic. There are several patches of crystalline limestone (λ), more or less mingled with the schist. One of these patches is entirely enclosed by the schist, and near it is a piece of pure quartz with included patches of limestone. This suggested to me the explanation of the origin of pieces of quartz

Fig. 2.

in the last cutting described. Close to the bridge, which carries the public road over the cutting, is a large vein of normal granite. West of the bridge there is a remarkable series of hornblende schists, which seem to have almost entirely escaped the crushing action which affected the rest of the cutting. The first of these is a fine-grained actinolitic hornblende-schist (A), which Professor Cole, on microscopic examination, finds to contain irregular patches of a pale mineral, probably granular epidote; also a minute sap-green isotropic granular mineral, of high refractive index, which crystalised out early in the history of the rock. This is probably a green garnet, but really requires separation with dense

liquids for its determination. In the schist are some whitish lenticular patches, which effervesce with acid, and appear to be rolled-out fragments of limestone. A handsome schist (B), with bronze mica and prismatic crystals of hornblende, appears to cut the last. The joints of these schists contain much chloritic matter, so as to form occasional lenticles of chlorite-schist. Some intrusions of a remarkable granite may be seen here. In general it is very felspathic, with occasional large flakes of black mica (biotite). In places it is compact in texture. Scattered through the mass are numerous small dark inclusions. Professor Cole has examined a specimen of this rock under the microscope, and finds the dark blotches to be actually much altered garnets. Some residual garnets occur, in a soft green product that has formed all along their cracks. A few pale pink unaltered garnets may be found on careful search; and some small cavities, to be seen near the surface of the rock, appear to be left by the destruction of the garnets. The garnet in this granite is probably all that remains of picked-up pieces of the schist, through which it flowed.

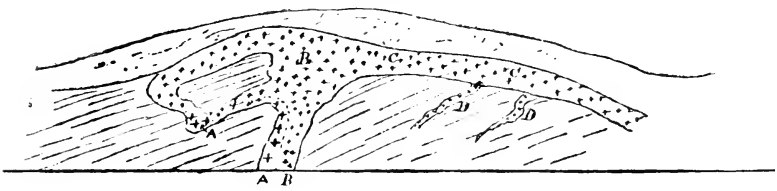
The rock marked *c* in the diagram is a schist composed mainly of bronze mica with hornblende crystals. It weathers easily into a micaceous mould, which forms a considerable deposit around it. Professor Cole believes this rock to be an altered diorite. Indeed, I think it not improbable that the hornblendic schists to be seen here are simply the metamorphosed representatives of the diorites and finer associated hornblendic rocks, which occur in the district south of the great chain of lakes.

Cuttings along Oorid Lough.

In the cutting nearest the east end of the lake, there is an interesting granite intrusion in the schist. Fig. 3 is a sketch of part of the right side. The portion marked B is a normal granite with dark flakes near the edges, which appear to be torn-off portions of the schist. In the normal granite are patches (A) of very coarse felspathic granite, with large flakes of greenish mica, which appears to be much chloritised biotite. The portion C that flows over the schist appears to be slightly foliated.

The veins D are in part very fine-grained, approaching the character of eurite. West of the mass just described, there is an outburst of granite similar to that in the last described cutting, but not containing garnets.

FIG. 3.



In the other cuttings along the lake, there are coarse hornblende schists, composed of lenticles of hornblende closely packed in a felsitic matrix. There are are also veins of coarse granite with large hornblende crystals, apparently picked up from the schist. In the rock excavated from one of these cuttings a portion of a granite vein was found, in which the mica flakes were all arranged with their planes perpendicular to the walls of the vein. There are also some soft green schists almost entirely composed of mica, a species of schist very common in the cuttings west of Recess.

In the lower portion of Cloonloppeen stream, a little above the road, some remarkable pot-holes may be seen. Of two large ones close together, one contained a single large stone over a foot in diameter, and the other a great number of small stones about one inch in diameter.

CUTTINGS ABOUT BOHESHAL.

West of Cloonloppeen Bridge is a cutting in hornblende schist. In this may be seen a granite vein with hornblende crystals. Here also a vein of handsome fresh-looking garnet-rock was cut through: it is, however, altered, with the formation of calcite and pyrite. As it lay nearly in the line of the cutting, only a small portion is now to be seen *in situ*; this is near the west end, low down on the left side. On the right side what may be a continuation of the vein is seen in a boss of hornblende schist, if the latter is indeed *in situ*. The vein appears to have been hollow in places, with well-formed garnet crystals lining the cavities. Professor Cole, who examined a specimen under the microscope, finds it to be a pyroxene-

epidote-garnet rock, which may hence be regarded as a true eclogite. The epidote and garnet appear to have crystallised simultaneously, and are intergrown in a kind of graphic structure.

The next cutting has at its eastern end banded hornblendic schists. The rest of the cutting is in great part made up of mica schist alternating in thin layers with calcareous matter, all being much crumpled. The calcareous matter may be due to the decomposition of lime-felspars, as Professor Cole has suggested to me. There are some veins of calcite deposited in the joints, the mineral being in pyramidal crystals. Galena occurs in these veins.

Along the lake, most of the cuttings are in hornblende schist with quartzitic bands. In one place there are bands of garnetiferous granulite; sometimes the garnets are in well-formed crystals up to one inch in diameter, and may be found weathered out. In other places the garnets are in larger crushed masses, or they may be streaked out into lenticles or bands.

Cutting West of Derryneen Bridge.

The eastern end of this cutting is composed of hornblende-schists with quartzitic bands (granulite?) Near the west end is a large mass of little disturbed hornblende schist. Professor Cole has made a microscopic examination of this schist, and finds it to contain layers of calcite, with pink garnets and a mineral that is probably a pale epidote. The schists are cut by some veins of coarse granite, usually very quartzose, and containing some calcite. In the granite are picked-up pieces of the schist, which appear to have been partially fused. The granite veins are often slightly displaced by faults.

From this neighbourhood a capital example of folded strata on a large scale may be seen on the side of Letterbreckaun, the most northerly of the Maam Turk Mountains, about 5½ miles distant.

The cuttings between Derryneen and Recess are all in quartzitic mica-schists, somewhat similar to those in the cutting north of Shindilla.

In Recess station-yard, a large vein of very coarse felspathic granite may be seen in the schist; it resembles the coarse

granite described as occurring in patches in a cutting north-east of Oorid Lough. A large outburst of a similar granite was observed on the southern slope of Lecavrea Mountain, where it is cut by veins of the normal granite.

Between Recess and Clifden there are many interesting cuttings which I have not had an opportunity of examining closely.

Before concluding this paper I must express my indebtedness to Professor Cole, of the Royal College of Science, for interesting notes on specimens from the cuttings which I submitted to him. These notes, with his kind permission, have been embodied in the foregoing descriptions.

REPORT ON INSECTS COLLECTED AT COOLMORE, CO. DONEGAL,

FOR THE ROYAL IRISH ACADEMY FLORA AND FAUNA COMMITTEE, JULY, 1894,

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

(*Concluded from page* 99).

LEPIDOPTERA.

Nymphalidæ.

Melitæa aurinia, Rott.—Coolmore, a large number were washed up on the beach on July 3rd, and I captured three flying in a field near the shore.

Cœnonympha pamphilus, L.—Coolmore, Bruckless.

Zygænidæ.

Ino statices, L.—Coolmore, a single specimen washed up with other insects on beach.

Hepialidæ.

Hepialus velleda, Hb., var. **gallica.**
H. humuli, L. } Coolmore.

Cymatophoridæ.

Thyatira derasa, L.—Coolmore, at sugar.

Noctuidæ,

Acronycta psi, L.—Coolmore, at sugar.
A. rumicis, L.—Coolmore, at rest on walls of house.

Leucania impura, Hb.
Axylia putris, L.
Xylophasia sublustris, Esp.
Mamestra brassicæ, L.
Apamea gemina, Hb.
A. oculea, Gn.
Miana strigilis, Clerck.
Agrotis exclamationis, L.
Noctua plecta, L.
} Coolmore, at sugar.

Euplexia lucipara, L.
Hadena adusta, Esp.
H. dentina, Esp.
Plusia pulchrina, Haw. } Coolmore.

Rivula sericealis, Scop.—Templenew.

Geometridæ.

Rumia cratægata, L.
Metrocampa margaritaria, L. } Coolmore.

Boarmia repandata, L., var. **sodorensium,** Weir—Coolmore. A female which agrees with Hebridean specimens in colour but is of the usual size of the type form.

Pseudoterpna pruinata, Hufn.
Acidalia dimidiata, Hufn.
Cabera pusaria, L.
C. exanthemata, Scop.
Strenia clathrata, L.
Larentia viridaria, Fb.
Eupithecia castigata, Hb.
Melanippe montanata, Bork.
M. galiata, Hb.
Melanthia ocellata, L.
Cidaria populata, L. } Coolmore.

Pterophoridæ.

Mimæsoptilus plagiodactylus, Haw.—Coolmore.

Crambidæ.

Crambus pascuellus, L.—Coolmore.

Tortricidæ.

Sericoris cespitana, Hb.—Coolmore. Also at Bundoran.

S. lacunana, Dup.—Bruckless. Occurs at Armagh.

Sciaphila conspersana, Dougl.—Coxtown. Occurs at Armagh.

S. virgaureana, Tr.—Templenew. Occurs at Armagh.

Grapholitha nigromaculana, Haw.—Coolmore. Taken also at Beleek.

Ephippiphora pflugiana, Haw.—Coolmore.

E. trigeminana, St.—Coolmore. Also at Bundoran.

Carpocapsa splendidana, Hb.
Dicrorampha herbosana, Bav.
Catoptria scopoliana, Haw.
Xanthosetia hamana, L.
Argyrolepia hartmanniana, Clerck. } Coolmore.

Tineidæ.

Tinea rusticella, Hb.—Coolmore.

Prays curtisellus, Don.—Coxtown, on Ash.

Cerostoma radiatella, Don.—Coxtown, on Oak.

Phibalocera quercana, Fb.—Coxtown, on Oak.

Depressaria heracleana, De G.
Bryotropha terrella, Hb.
Œcophora pseudospretella, Sta.
Eudrosis fenestrella, Scop.
Coleophora alcyonipennella, Kol. } Coolmore.

Elachista luticomella, Zell.—Coolmore, Coxtown.

Lithocolletis coryli, Nic.—Coxtown.

THE BRITISH FLORA IN 1895.

The London Catalogue of British Plants. Part I. Ninth Edition. London: George Bell and Sons, 1895. 6*d.*; with cloth covers and interleaved, 1*s.*

CONSIDERING that the last edition of our standard list of British plants was issued in 1886, and that since that time "no new Edition of either of our native Floras has appeared"; and bearing in mind the great advances made in British botany during this period, particularly in our knowledge of critical genera, and in the comparison and correlation of British forms with continental, it is not to be wondered that botanists have awaited with some impatience the issue of the Ninth Edition of *London Catalogue*, which will now be welcomed as affording a complete and up-to-date list of the native flora, a census of the distribution of that flora in the larger island, and an invaluable check-list for purposes of cataloguing and of exchange.

The present issue is edited, like the last, by Mr. F. J. Hanbury, F.L.S., but the number of assistants in various groups is so large, and the assistance they have given so considerable, that the Catalogue might almost be considered as the collective work of English systematic botanists. Messrs. Groves are responsible for the batrachian *Ranunculi*, and of course for the *Characeæ*; Mr. Marshall for *Epilobium*; Mr. Beeby for *Viola*, *Anthyllis*, and *Juncaceæ*; Mr. Townsend for *Euphrasia*; Mr. E. F. Linton for *Thalictrum* and *Alchemilla*; Mr. W. M. Rogers for *Rubus* and *Rosa*; the late Dr. F. B. White for *Salix*; and Mr. Bennett for *Potamogeton* and *Carex*. The last-named, and Miss Bennett, have executed the laborious task of bringing the census numbers up to date.

In glancing through the Catalogue (which, we note, has swelled from 40 pages in the last edition to 50 in the present), several conspicuous changes strike the eye. The authorities for generic names have been added, but pre-Linnean authorities are not quoted. The sub-division of certain critical genera has extended enormously—a necessary if somewhat alarming result of the close attention which they have been receiving of late years in Britain and the Continent. Thus, *Rubus* now runs to just 100 "species," and about as many varieties: while *Hieracium* even excels this, numbering 104 "species," and varieties *ad lib.*; those of *H. murorum*, alphabetically indexed, exhausting all the letters with the exception of Z! But whatever may be the value of these myriad forms in relation to our accustomed conception of the term *species*, and while the advisability of burdening these unfortunate genera with such an overwhelming mass of names may be open to question, no one can doubt the necessity of carefully studying their variation, their distribution, and their habits.

The number of hybrids in the new Catalogue is also striking. In *Viola*, *Carduus*, *Primula*, *Linaria*, and *Rumex* this feature is apparent, but much more so in *Epilobium* and *Salix*, where every species apparently hybridizes with almost every other. In *Euphrasia* a new departure is made, a suggestion of trinomial nomenclature being introduced; the species is divided into four varieties, which are again divided into a number of *forms*.

"Changes of nomenclature are, unfortunately, again numerous" writes the Editor, and, as he remarks, it could hardly have been otherwise, considering that these changes represent the result of nine years critical study of questions of priority and validity. Some of the changes now introduced will be no doubt startling to those who have become used to the nomenclature of the eighth Edition, and have not followed the subsequent alterations as proved necessary in papers in the *Journal of Botany* and elsewhere. *Castalia speciosa*, *Schollera oxycoccus*, and *Boretta cantabrica*, for instance, will sound unfamiliar to most of our readers. Among changes in generic names *Neckeria* replaces *Corydalis*, *Bursa* replaces *Capsella*, *Buda* replaces *Lepigonum*, *Pucumaria* replaces *Mertensia*, and the formidable names of *Homalocenchrus* and *Weingærtneria* replace *Leersia* and *Corynephorus*. A number of old specific names also have disappeared.

Not the least important part of the Catalogue is the modest numbers which follow the specific names and in many cases the varieties, showing the number of vice-counties of England, Wales, and Scotland, in which the plant is known to grow, and forming an index of its frequency. Irish distribution plays no part in this census. Ireland is, in fact, placed on the same footing as the Channel Islands! Where a species occurs in either of these areas *only*—not in Great Britain—this is shown by the letter "I" or "C." For Irish botanists this is, of course, unsatisfactory, since neither here nor elsewhere have they any key to the *county* distribution of the greater part of their flora, and even the publication of the second edition of *Cybele Hibernica*, so grievously checked by the lamented death of Mr. More, will supply this for only the rarer Irish plants; but a few years of combined and steady work should go far to supply materials for an Irish "Topographical Botany," and bring our knowledge of plant-distribution in Ireland more on a level with that of the sister island.

R.LL.P.

NOTES.

BOTANY.

MOSSES.

Ephemerum serratum, Hampe., in County Antrim.—The only recorded localities in County Antrim for this minute annual moss are in the neighbourhood of Belfast and Lisburn, where it was first noticed by Templeton in 1801, and again in 1805, one of the localities given under the former date being "in a field near Lambeg Moss." Subsequently Drummond gathered it also in "fields now occupied by the Botanic Gardens," *vide* "Flora of the North East of Ireland." Since that time so far as I am aware there is no record of the plant having been observed in the district. Mr. S. A. Stewart and other biologists have made diligent search for it, season after season, for many years, but have never met with it. Its occurrence in a light sandy field at Glenmore, near Lisburn, where it has just now been found, may, therefore, be noteworthy, and its re-discovery so near Templeton's original localities after the lapse of ninety-four years may be considered interesting. There seems to be no reason why this species should not be found in other parts of the county, but so far it has escaped detection. In County Derry it has not been met with, and for the County Down Mr. Stewart mentions only one locality.

JOHN H. DAVIES, Lisburn.

MARSILIACEÆ.

Pilularia in Connemara.—The Pillwort (*Pilularia globulifera*) being one of our rarest Irish plants, and recent notes of its occurrence being apparently exceedingly rare, it may be worth stating that I dredged it in abundance at the western end of Glendalough Lake, Connemara, in May, 1894. Usually this curious little plant grows in water only a few inches deep, or out of the water on marshy ground, but here it flourishes in water from about four to six or eight feet in depth, while the leaves, which are usually two to four inches long, in my specimens attain a length of six to twelve inches. The Pillwort has been recorded from this neighbourhood long ago (Wade, *Plantæ Rariores*, 1804), but it has not apparently been found in Connemara in recent years.

R. LLOYD PRAEGER.

PHANEROGAMS.

The Buckthorn in King's Co.—A correction.—On p. 173 of the *I.N.* for 1894, in my account of the Seagull Bog near Tullamore, I find that by inadvertence I wrote Alder Buckthorn (*Rhamnus frangula*) for Common Buckthorn (*R. catharticus*). The latter is the species that occurs in that district.

R. LLOYD PRAEGER.

ZOOLOGY.

WORMS.

Bipalium Kewense, Mosel.—A specimen of this rare Planarian worm was captured last month by Mr. Moore in one of the greenhouses of the Glasnevin Botanic Gardens near Dublin. It has only recently been discovered that this remarkable worm is a native of Madeira. There is some possibility therefore of its being also indigenous to Western Europe, though the fact of its having hitherto only been found in greenhouses on that continent appears to be in favour of the generally held belief that it is an introduced species.

R. F. SCHARFF, Dublin.

Some Notes on Irish Leeches.—In collecting Newts for me in the ponds near Cashel (Co. Tipperary), Miss Kelsall discovered two species of leeches. If we look into the nomenclature of the Irish land and freshwater leeches in Thompson's "Nat. Hist. of Ireland," vol. iv., p. 424, we find that some revision is needed. He records sixteen Irish leeches, six of which are marine and need not concern us at present. His *Erpobdella tessulata* should I think be referred to *Hemiclepsis tessellata* (O. F. Müller). Dr. R. Blanchard of Paris is of opinion that to this species should also be referred Thompson's *Glossiphonia Eachana*. Then *Erpobdella vulgaris* should be known by the name of *Herpobdella octoculata*, L. This is one of the species collected by Miss Kelsall in Co. Tipperary. It is a very active leech and according to Thompson "as merry as a grig." The next species *Glossipora tuberculata* should be called *Glossiphonia complanata*, L., being an older name, and for the same reason *G. hyalina* should be changed to *G. heteroclista*, L. and *G. bioculata* to *G. stagnalis*, L. Thompson next refers to two species of *Piscicola*, viz. :—*P. geometra*, L., and *P. percæ*, Templ. Lastly we come to the true leeches. The Irish horse leech was considered a distinct species from the continental by R. Templeton, and described by the name of *Aulostoma hcluo*. Thompson on the other hand identified it as *Hæmopsis vorax*, Johnst. It is probable that we have two species, but Templeton's is, as was pointed out to me by Dr. Blanchard, nothing but the well-known continental *Hæmopsis sanguisuga*, L. I hardly think that the record of the Medicinal Leech in Ireland (*Hirudo medicinalis*, L.) rests on sufficient evidence, and I have not seen an Irish specimen, but it is quite probable that it does occur in this country.

Altogether the number of Irish land and freshwater leeches remains at about the same number as given by Thompson, viz.—ten species. One of the commonest seems to be *Glossiphonia complanata*, which was the second species obtained by Miss Kelsall, whilst Mr. Halbert has recently procured it near Clondalkin, Co. Dublin.

R. F. SCHARFF.

CRUSTACEANS.

Porcellio pictus, Brandt.—A specimen of this pretty Woodlouse was taken last month by Miss Kelsall, near Cashel, Co. Tipperary. It is one of the rarest of the Irish species, having only been previously known from three localities, viz.—Dublin, Belfast, and Maryborough.

R. F. SCHARFF.

Irish Psithyri.—I took two females of *Psithyrus vestalis*, Fourc., at Dundrum, Co. Dublin, on 2nd May. These bees are of considerable interest from their habits, being "cuckoo-parasite" on the true Humble bees *(Bombi)*, which they closely resemble in appearance. I hear from Mr. Carpenter that Mr. F. Neale took a specimen of *Ps. rupestris*, Fab., at Limerick last year.

PERCY E. FREKE, Dublin.

AMPHIBIANS.

Irish Newts.—Additional specimens of the Common Newt (*Molge vulgaris*, L.) have been received from the following localities since the publication of last month's *Irish Naturalist*:—Curraglass, Co. Cork (C. Longfield); Bagenalstown, Co. Carlow (D. R. P. Beresford).

R. F. SCHARFF.

BIRDS.

Rare birds in County Cork.—The following rare birds I have seen at Mr. G. Rohu's taxidermist, Cork: a Bartram's Sandpiper (*Bartramia longicauda*, Bechst.), shot at Newcestown, Co. Cork, on 4th September, '94; a Gadwall (*Anas strepera*, L.), shot at Castle Bernard, Co. Cork, on 15th February, '95; and an Avocet (*Recurvirostra avocetta*, L.), shot at Ringaskiddy, Co. Cork, feeding in company with another, on 15th February, '95. The above three specimens appeared to be adults.

W. BENNETT BARRINGTON, Cork.

White Stork near Athy.—Mr. J. W. Young writes in the *Field* of April 27th, that, when driving from Athy to Stradbally, he saw a Stork *(Ciconia alba)* fly past in a south-easterly direction. Though he at first mistook the bird for a Gannet, he states that he afterwards saw it near enough to render the identification certain.

Summer Visitants at Knocknacarry, Co. Antrim.—Swallows appeared on April 14th; the Cuckoo was heard on the 21st, and the Corncrake on the 20th. The Cuckoo is said to have been seen on April 18th.

S. ARTHUR BRENAN, Knocknacarry.

Spring Migrants at Armagh.—In spite of the severity and length of the winter these birds were not much later than usual. The Chiffchaff was, as always, first, appearing on March 25th, Swallows I observed on April 9th, but they did not appear in numbers till the 20th. The Willow Wren came on April 13th, somewhat later than ordinarily, while the Corncrake made his sweet voice to be heard on the 19th. On the 27th April arrived the Cuckoo, the Grasshopper Warbler, and the Sand Martin, and on May 2nd the House Martin and the Swift.

W. F. JOHNSON, Armagh.

Arrival of Spring Migrants in Londonderry District.—As might be expected from the lateness of the spring the early visitors were behind time. The Chiff-chaff came on 6th April. I did not hear the Willow Warbler until 17th April. The Swallows arrived on the 14th, and the Cuckoo and Corncrake were first heard on 24th April. The Swift was seen by Mr. Milne on 29th April, an unusually early date for this locality. I first heard the Sedge Warbler on 2nd May, and the Whitethroat on 4th May.

D. C. CAMPBELL, Londonderry.

MAMMALS.

Irish Mammals—A correction.—The statement which I made on page 86 of the current volume of the *Irish Naturalist*, that "Probably the Squirrel moults twice in the year—roughly speaking, in Spring and Autumn, and *before each* moult the old coat becomes thin and faded," should read "*before the Spring moult.*" Owing to absence from England, I was unable to look over the proof of the second part of my review of Mr. Lydekker's book.

G. E. H. BARRETT-HAMILTON,
Kilmannock, New Ross.

PROCEEDINGS OF IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent donations comprise a monkey from Mrs. Burrowes; an Otter from W. H. Harvey, Esq.; a Pike from F. Godden, Esq.; Badgers from J. H. Nicholson, Esq., and Capt. French; a number of Newts from P. Mahony, Esq. A St. Kilda Lamb has been born in the Gardens, and a pair of Crown Pigeons, two pairs of Chukar Partridges, a pair of Alpine Choughs, a pair of Leadbeater Cockatoos, and seven monkeys have been purchased. Two of the most interesting animals in the Gardens, the Orang-utan and the Tapir, have unfortunately died.

16,860 persons visited the Gardens during April.

DUBLIN MICROSCOPICAL CLUB.

APRIL 18th.—The Club met at Dr. M'WEENEY'S, who showed cultures of a fungus (*Phoma Betæ*, Frank), which causes a disease in Mangel Wurzel, characterized by blackening of the root-stock and speedy decomposition. The cultures in moist chambers illustrated various stages in its development. The great swelling of the spores previous to germination was specially remarkable.

Mr. MOORE showed *Gloeosporium orchidearum* which had appeared on the leaves of a species of *Masdevallia* received from Belgium. This is one of the fungoid pests which cause so much damage to orchids. When attacked the leaves turn black, and the tissue in the interior of the leaf becomes disorganised, gradually breaking down, and changing into a soft black decaying mass. The disease spreads rapidly through the plant and is very difficult to check.

Mr. MCARDLE exhibited *Lejeunea flava*, Swartz (the yellow green form) which he collected in some quantity in Lord Howth's demesne last month. This is an addition to the Howth and to the Co. Dublin lists of Liverworts.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

APRIL 2.—The President in the chair. Mr. JAMES WILSON, M.E., read a paper entitled "The Alps, with Rope and Axe."

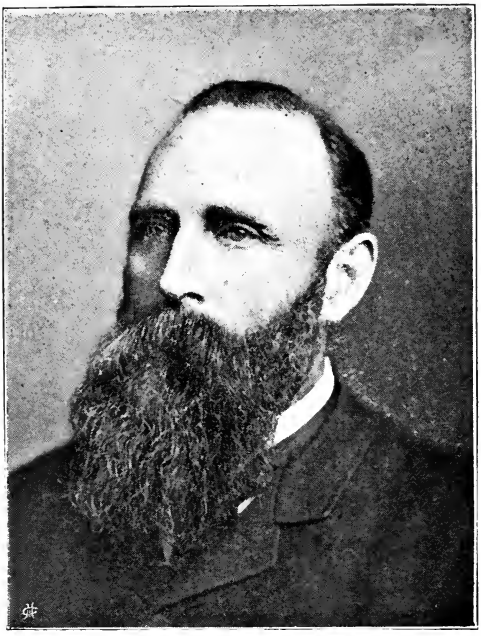
Dublin Naturalists' Field Club.

April 27th.—The first Excursion of the summer was made, when a party of 33 members and visitors visited the neighbourhood of Portrane. Proceeding to Donabate Station by the 1.30 train, no halt was made until the shore was reached, where Prof. Sollas, F.R.S., who conducted during the day, drew attention to the interesting geological features there displayed. At the southern extremity of the broad sandy beach that stretches away up towards Rush are seen dark red conglomerates of the Old Red Sandstone formation. These are succeeded by a mass of dark volcanic rock, the junction being unfortunately not visible. Further south Ordovician slates appear, containing blocks and fragments of the volcanic rock before-mentioned, and of limestone. Bands of limestone interstratified with the slate next make their appearance, and the limestone increases in quantity to the southward until it entirely replaces the slate, and forms a bold cliff of hard rock, teeming with corals and other fossils. The leading features of each of these ancient formations were pointed out by Prof. Sollas, and many specimens were obtained. Messrs. Colgan and Praeger collected flowering plants and noted, in spite of the late season, several plants in bloom that are not usually seen so early in the year, such as the Bugloss (*Lycopsis arvensis*), Storksbill (*Erodium cicutarium*), and Field Violet (*Viola arvensis*). The rare Sea Wormwood (*Artemisia maritima*), previously known to grow here sparingly in one spot, was seen in abundance in several places on the cliffs; on the way to the shore a Water Ranunculus (*R. tricophyllus*) was found already in bloom; the abundance of the Great Bank Sedge (*Carex riparia*) in this neighbourhood was noted, and the rare typical form of the Blood-veined Dock (*Rumex sanguineus*) was gathered. An examination of the pebbles on the beach proved very instructive. Here, with pieces of conglomerate, slate, limestone, granite, and pretty pebbles of chain-coral and other fossils, were fragments of volcanic rocks from the Carlingford and Dundalk districts, flints from Co. Antrim, and abundance of the peculiar granophyre which comes from the far-distant Ailsa Craig in the Clyde. The party returned to Donabate through the fields and woods, and caught the 6.55 train to town.

Mrs. Ross, Rare-an-ilan, Dalkey, was elected a member of the Club.

Cork Naturalists' Field Club.

The annual meeting was held, May 1st, in the Library, School of Science and Art, Prof. Hartog, President, in the chair. The Secretary (Mr. J. L. Copeman) read the report, which showed the Club had been doing good work. The following excursions had taken place: Youghal, Little Island, Quarries (Victoria Cross), Spike Island, Innishannon, the Ovens—and a joint three days' excursion with the Dublin and Limerick Clubs to Fermoy, Lismore, and Mitchelstown, on which some 36 went. Full accounts of this excursion and its valuable scientific results have appeared in the *Irish Naturalist*, the monthly organ of the various Irish Field Clubs. Several lectures were given during the year, including one by Professor Grenville A. Cole, F.G.S., Dublin College of Science, on "The Story of the Rocks of Munster," and one by Joseph Wright, Esq., F.G.S., of Belfast, on "Foraminifera." Both these were given under the auspices of the Irish Field Club Union, and which has been formed during the past year, and which is certain to prove in the future a great stimulus to Field Club work all over Ireland. A course of four lectures on Practical Botany was also given by Miss Martin, and it is expected that during the coming year a course equally valuable will be given on some other subject. The following officers were elected for the coming year:—President: (Vacant); Vice-Presidents: Professor M. Hartog; W. H. Shaw, M.E.; Thomas Farrington, M.A.; Miss H. A. Martin, M.E.C.P.



VALENTINE BALL,
C.B., LL.D., F.R.S.

The Irish Naturalist.

Vol. IV. JULY, 1895. No. 7.

VALENTINE BALL,

C.B., LL.D., F.R.S.

VALENTINE BALL was born in Dublin on the 14th July, 1843, and his busy and varied life ended in an everlasting rest on the 15th of June, 1895. The second son of Robert Ball, LL.D., for many years Secretary of the Queen's University of Ireland and Director of the Museum of Trinity College, Dublin, he seemed in a great measure to have inherited his father's love for Natural History. In one respect, however, there was a marked difference between the father and the son; Robert Ball, though always willing to assist the student by a verbal communication of the knowledge which he so largely possessed, was only with difficulty persuaded to put this knowledge into print, and his published writings are extremely few; Valentine Ball was an indefatigable note-taker and a voluminous writer. Calling to mind that from the time that he was fifteen years of age, until his untimely death, he was occupied with a constant routine of official work, which seldom gave much time for any leisure, it is amazing to think of the numerous works and papers on Natural History, giving the widest limits to that term, which appeared from his pen.

Shortly after his father's death, in 1857, he entered Trinity College, Dublin; he passed his Degree examination in 1864, but he did not graduate until 1872, when at the Winter Commencements of the University of Dublin, he took the B.A. and M.A. degrees by accumulation. In the summer of 1864 he was appointed by Professor Oldham to the staff of the Geological Survey of India, on which he continued until 1881. This period of his life was full of labour, each season's work was accomplished amid many disadvantages. In his "Jungle Life in India" published in 1880, he gives an account of his often very arduous occupations on the Survey, sometimes in

most trying climates, and always surrounded by many social and domestic drawbacks. Amidst such, however, his love of nature sustained him, and he pathetically alludes to this in the dedication of his "Journeys and Journals of an Indian Geologist," "To my father, to whose early training and guidance I owe a love for Natural History, which has afforded me solace in many a lonely hour."

While his chief work in India was among the rocks and coal-measures of Western Bengal and the Central Provinces, no object of nature met with, seems to have been left unrecorded, and we find contributions from his pen on the stone implements, on the various races of men, on the mammals and birds, and even on some of the local floras of India. The Geological Survey of India had its origin in the desire of the Government to have the coal-fields of the country systematically investigated, and the work of the Survey for some time was wholly devoted to this object; most of V. Ball's Reports and Memoirs published by the Survey relate to various coal-fields. After the principal coal-fields had been mapped and described, the general examination of the Geology of India was attempted, and in 1879 a general geological sketch-map of nearly the whole of India, with two volumes of descriptive matter, forming Parts 1 and 2 of the "Manual of the Geology of India" were published. Towards this great work all the staff contributed, more or less, but the third part, relating to the Economic Geology, which appeared in 1881, was compiled by V. Ball; to whom the then Superintendent of the Survey wrote "the student as well as the man of enterprise will long owe gratitude for the great store of facts thus brought within easy reference."

In 1881 V. Ball resigned the position of Officiating Deputy Superintendent of the Geological Survey of India on his being appointed to succeed the Rev. Dr. Haughton as Professor of Geology and Mineralogy in Trinity College, Dublin. Some of his friends would have had him remain in his professorial chair, where, if the teaching was somewhat monotonous, the opportunities for original work were great; the long vacation too afforded time for geological work in Europe, and there was the custody of a collection, which had been once partly under his father's care, and which Dr. Haughton had left well stocked, for an University Museum, with minerals,

rocks, and fossil forms. But V. Ball had always been ambitious to superintend some great museum, where he could have the freest scope to carry out his ideas of order and arrangement; so the quiet of the academic grove was left for the responsibilities and anxieties of presiding over the fortunes of the Dublin Museum of Science and Art, the foundation stone of the new building of which had not as yet been laid.

The spirit was willing, but the difficulties of reconciling many antagonistic views were great, and the trials to a sensitive mind of having to oppose the wishes of many of those who were brought into semi-official connection with him were sources of trouble, that often ruffled the even tenor of his life, and it is painful to think may have shortened it.

For over twelve years—even of those parts of them, when from ill health, he was obliged to take some rest—the Science and Art Museum was in his every thought. One cannot but admire the energy and zeal which he brought to bear upon this work; he could not understand what it was to go slowly, and in very truth, he most generally, even when he went quickly, went well. If possible he would have arranged every article with his own hands. It was on the failure of such attempts, that he realised that no human being could have done so.

During these years his moments of recreation were spent in bringing out a model and charming edition of the travels of Tavernier, and in writing numerous articles on the plants and animals of India. His scientific writings have such merit that he needed not to have left any further record of his life, but yet above all these, the Dublin Museum of Science and Art will still stand as a witness for ever, to be associated with his name.

Of the high character of the man, of his trueness in friendship, time must soften sorrow, ere we could trust ourselves adequately to write.

E. P. W.

INSECTS COLLECTED AT THE SEAGULL BOG TULLAMORE,

FOR THE ROYAL IRISH ACADEMY FLORA AND FAUNA COMMITTEE, MAY, 1895.

BY J. N. HALBERT.

THE members of the Dublin Field Club spent a most enjoyable and instructive day on the 25th of last May, when, not in any way deterred by the warnings given in the programme about deep and treacherous holes, etc., a large and adventurous party turned out to explore the Seagull Bog, Tullamore. The selection of the time could not have been more fortunate, as the dry weather previous to our visit rendered access easy to many of the most dangerous, though, at the same time, most interesting parts of the bog. The flora of that portion of the Bog of Allen which the Black-headed Gull has chosen for its breeding haunt is decidedly above the average, as may be learned by a perusal of Mr. Praeger's interesting paper in the *Irish Naturalist* for August, 1894, and the adjacent, richly varied woods of Clonad and Derryclure mark the locality as about the most likely to repay the incursions of the insect-hunter. To the latter undoubtedly the most pleasing feature is the abundance of birch, hazel, and various willows scattered over, but most common on the outskirts of the bog, and which were proved to harbour the best species.

As the captures were rather too numerous for inclusion in the usual report, it has been thought advisable to detail them in a separate list. I cannot find any previous Irish records for the following species :—*Polydrusus tereticollis*, De G., *P. cervinus*, L., and *Hylastes palliatus*, Gyll., while a fourth species, *Elater pomorum*, Herbst., has only once before been recorded from a specimen taken by the Rev. W. F. Johnson in a somewhat similar locality near Armagh. As one would expect, the most notable feature in the bog collecting is the abundance of the various species, for, with the exception of the insect mentioned, and with a little more available time, large numbers of the others could have been obtained. Several of the universally common kinds have been omitted from the list.

COLEOPTERA.

Cicindela campestris, L.—Common on the drier parts of the heath near Clonad Wood.

Hydroporus Gyllenhali, Schiod.
H. obscurus, Sturm.
H. pubescens, Gyll.
} Seagull Bog, common in the pools.

Tachyporus obtusus, var. **nitidicollis**, Steph.—Clonad Wood, common.

Proteinus ovalis, Steph.
Atomaria fuscipes, Gyll
Epistemus gyrinoides, Marsh.
} Seagull Bog, all fairly common.

Rhizophagus depressus, F.—Clonad Wood, common under bark of decayed fir.

Microcara livida, F.
Cyphon padi, L.
} Seagull Bog, both common.

Telephorus lituratus, Fall.—Seagull Bog, common. This insect seems to have been overlooked by the early collectors. As in the case of *E. pomorum*, Mr. Johnson has taken a specimen on Churchill Bog, Co. Armagh.

Elater pomorum, Herbst.—Three examples of this very local species were swept off a birch tree. It is usually taken under bark, and in decayed branches.

Corymbites quercus, Gyll.—Seagull Bog; the variety *ochropterus*, Steph., occurred, but not so commonly as the type.

Donacia discolor, Panz.—Seagull Bog, common.

Lochmæa suturalis, Thoms.—Perhaps the commonest beetle in the Bog.

Galerucella nymphææ, L.—Seagull Bog, sweeping herbage.

G. lineola, F.—Seagull Bog, common on willow.

Apteropeda globosa, Tel.—Seagull Bog, several by sweeping.

Crepidodera helxines, L.—Seagull Bog, common on willow.

Anaspis frontalis, L.—Clonad Wood, common.

Polydrusus tereticollis, De G.
P. ptergomalis, Boh.
} Clonad Wood, common on hazel, etc.

P. cervinus, L.—Seagull Bog, common on birch, ash, etc.

Phyllobius calcaratus, F.
P. pyri, L.
} Clonad Wood, common on various trees.

Anoplus plantaris, Naez.
Cœliodes rubicundus, Herbst.
} Seagull Bog, common on birch.

Ceuthorrhynchus ericæ, Gyll.—Seagull Bog, abundant on heath.

Limnobaris T-album, L.—Seagull Bog, sweeping herbage in dry drain.

Hylastes palliatus, Gyll.—Clonad Wood, in decayed fir stump.

HEMIPTERA.

Nabis ericetorum, Schœtz.—Seagull Bog, off heath. Not previously recorded from Ireland.

LEPIDOPTERA.

In lepidoptera the best finds were full fed larvæ of *Dasychira fascelina* on hazel, a species which seems to occur only in the Bog of Allen, and one *Geometra papilionaria* on birch. Numerous species of *Eupithecie* were flying on the Bog, but the attempt to capture these in a heavy sweeping net was not at all satisfactory. A specimen of *Numeria pulveraria* was secured at rest in Clonad Wood. Mr. E. Williams found the Green Hair Streak (*Thecla rubi*) still frequenting a part of the Seagull Bog where he had taken it in numbers some years ago, while the beautiful moth *Anarta myrtilli* was also noticed regaling itself on the flowers of the Bog-bean (*Menyanthes trifoliata*), and on the way back to the station *Tortrix ministrana* was captured flitting about the wooded margins of the road.

NOTES ON THE FLORA OF HOWTH.

BY R. LLOYD PRAEGER, B.E.

The bold promontory of Howth, with its heathery hills, its steep sea-slopes, and rugged cliffs, has long been a favourite haunt of the naturalist, and indeed for him Howth has varied attractions—the shattered and contorted Cambrian rocks, carved into jutting crags and fantastic pinnacles by the restless sea; the shell-bearing gravels and Boulder-clays that overhang the town; the eddying bird-life of the cliffs; the busy insect world that teems in summer among the rocks and flowers and woods; and the marvellous variety of plant-life, all combine to render this favoured spot an oft-visited resort of the lover of nature, whatever be his bent. It is to the botanist, perhaps, that Howth especially appeals, for here are gathered together in a small area many of the rarest Irish plants; and leaving rarities out of account, who would not willingly journey miles to view those great slopes overhanging the blue water, decked with the crimson flowers of the Bloody Cranesbill, and white sheets of Sea Campion, and masses of yellow Bedstraw and purple Thyme; to see the storm-beaten sea-rocks, hung with grey Samphire, and the glossy foliage and yellow stars of the rare Golden Samphire, and splashed with purple patches of Sea-lavender; or the wide heaths above, blazing with Gorse and Heather? Nor less attractive is the

low neck of land that joins the headland to the mainland; where

> "All the sands that left and right
> The grassy isthmus-ridge confine,
> In yellow bars lie bare and bright
> Among the sparkling brine";

for here the wastes and banks are gay with yellow Melilot, and scarlet Poppies, and pink Convolvulus, and many rarer plants that twine amid the lavish profusion of summer vegetation.

The wild-flowers of Howth can boast the distinction of having a book devoted to themselves. Mr. Hart's excellent little Flora[1] is well-known to most of my readers, and ought to be well-known to all of them. Many a time, while I was still living in Belfast, did I pore enviously over its pages, for the Flora of Howth contains well nigh four-score of species which either are unknown in the North-east, or are so rare there as to constitute the prize of a day's collecting; indeed many of them are plants which to any Irish botanist possess considerable interest on account of their restricted range in this country. Nor have the botanical resources of Howth been yet quite exhausted. During the course of several rambles over the hill last summer, I was much pleased to find one or two species that are not recorded among the 545 native or naturalized plants which are enumerated as inhabitants of Howth in the work referred to; also a few others, which, though recorded from Howth by previous writers, were excluded by Mr. Hart on the ground of their absence there at the present time. When Miss R. Mahaffy communicated to me several interesting additions which she has made within the last few years, it occurred to me that our combined observations might be worthy of publication in the pages of the *Irish Naturalist;* and I have endeavoured to make the present paper as far as possible complete, by including any published additions to the flora (so far as I was aware of them) which have appeared since the publication of Mr. Hart's "Flora." These latter are few in number, and are soon enumerated. In the *Journal of Botany* for 1891 (p. 377), Mr. Hart contributes three additional species—the Portland Spurge, *Euphorbia portlandica*, found on the rocky islet of Ireland's Eye by Sir Robert

[1] The Flora of Howth, by H. C. Hart, B.A., F.L.S. Dublin: Hodges, Figgis, and Co., 1887, 3s. 6d.

Ball; *Urtica pilulifera*, an alien nettle, noticed by the present writer; and the rare grass *Festuca uniglumis*, found on the sandy shore at Baldoyle by Mr. H. C. Levinge, where, last season, not knowing at the time of Mr. Levinge's discovery, I was delighted to find fine specimens of it. In the *Irish Naturalist* for 1893 (p. 174), Mr. David M'Ardle, who has discovered so many interesting liverworts among the rocks of Howth,[1] added the little club-moss, *Selaginella spinosa*, to the flora. In the *Journal of Botany* for 1894 (p. 76), I record seven Brambles not known on Howth hitherto, nor most of them in Co. Dublin or in District 5; these were gathered on a pleasant July day spent with a number of members of the Belfast and Dublin Naturalists' Field Clubs. In the same journal (p. 359) I add *R. micans* to this list. So far as I am aware, this completes the enumeration of published additions to the Flora of Howth.

Of unpublished additions, it is probable that interesting notes are in possession of some of the many wild-flower lovers who spend summer days or weeks on the breezy slopes of Ben Edar; and if the present sketch has the result of bringing to light information that otherwise might remain unrecorded and unknown, then it will not have been written in vain; in this way, the very incompleteness of my notes may prove their greatest merit.

PLANTS NOT INCLUDED IN THE "FLORA OF HOWTH."

Crambe maritima, L.—Not yet quite extinct at Howth. I found it last year sparingly on the gravelly strand of Ireland's Eye. Formerly grew on the south side of Howth (*Irish Flora*, 1833), but Mr. Hart says that it has been extinct there for many years.

Reseda suffruticulosa, L.—Has grown for many years near the Forge, Sutton.—Miss R. Mahaffy. Apparently naturalized here.

Silene anglica, L., var. **S. quinquevulnera**, L.—On the railway bank near Howth station.—Miss R. Mahaffy. Perhaps merely casual here.

Rubus scaber, W. & N.—Howth Demesne.—Rev. C. H. Waddell. "A hirsute variety."—W. M. Rogers.

R. silvaticus, W. & N.
R. macrophyllus, W. & N.
R. micans, Gren. and Godr.
R. mucronatus, Blox.
R. fuscus, W. & N.,
R. corylifolius, Sm., var. **sublustris** (Lees).
R. Balfourianus, Blox.

} Howth. Praeger, *Journ. Bot.*, 1894, pp. 76, 359.

The above were collected mostly in the Demesne; a few of them near the Bailey; the exact locality of each was not noted. The plants were

[1] See M'Ardle: Hepaticæ of the Hill of Howth. *Proc., R.I.A.*, 3rd S., No. 1, 1893.

named by Rev. W. M. Rogers. *R. suberectus*, *R. villicaulis*, and *R. discolor* are mentioned by Mr. Hart as occurring on Howth. The last-named is common there; the second might be expected; the first is a very rare plant in Ireland.

Myriophyllum spicatum, L.—Abundant in the pool by the sea at the Quarry. The larger pool there is full of what appears to be the same plant, but it was out of flower when I visited the place. *M. alterniflorum* is recorded from these pools by Mr. Hart. I could not find it there.

[**Bryonia dioica**, L.—One large plant on a rocky slope below Earlscliff where it has grown for some years. It does not grow in any garden in the neighbourhood.—Miss R. Mahaffy.]

[**Œnothera biennis**, L.—Established by the railway near Howth station, where it has grown for at least five years.—Miss R. Mahaffy.]

Apium nodiflorum, Reichb., var. **ochreatum**, DC.—In a spring on the east side of Ireland's Eye.

Galium mollugo, L., var. **insubricum** (Gaud.)—Howth.—H. C. Levinge, *Bot. Ex. Club Report*, 1893.

Arctium nemorosum, Lej.—On the Burrow; and I believe it occurs elsewhere.

A. intermedium, Lange.—North corner of Ballykill field near the Pavilion.

Taraxacum officinale, Web., var. **erythrospermum** (Andrz.).—Sandy places east of the Cosh.

[**Crepis setosa**, Hall. fil.—In a field between Drumleck and the Needles.—Miss R. Mahaffy. An alien which has not, I think, been noticed in Ireland hitherto.]

Orobanche minor, Sm.—On a bank at Tansy.—Miss R. Mahaffy Abundant in a clover field near Sutton station.—R.Ll.P. A plant which is steadily spreading in Ireland.

Mentha Pulegium, L.—Old pasture fields near Bailey post-office. Miss R. Mahaffy. An interesting addition to the flora.

Stachys palustris x sylvatica.—In a potato patch near Howth chapel. The more common hybrid form, nearer to *S. palustris* than to *S. sylvatica*.

Chenopodium murale, L. — On rubbish-heaps south-west of Howth chapel, and on waste ground on the Burrow. Was recorded from Howth in the *Brit. Assoc. Guide* (1878), but excluded by Mr. Hart as probably a mistake.

Euphorbia portlandica, L.—Ireland's Eye, Sir R. Ball.—Hart, *Journ. Bot.*, 1891, p. 377.

Urtica pilulifera, L.—By a ruined cottage on edge of the north cliff near Bailey Lighthouse, R. Ll. Praeger.—Hart, *Journ. Bot.*, 1891, p. 377. An alien plant, which I did not refind there last year.

Ruppia rostellata, Koch.—Plentiful in the pool by the sea at the Quarry.

Blysmus rufus, Panz.—Margins of the pool by the sea at the Quarry. Previously recorded from the vicinity—probably from this identical spot—by Mackay, who says (*Flor. Hib.*, 1836), "between Baldoyle and Howth," but disallowed by Mr. Hart.

Festuca uniglumis, Soland.—On the western edge of the Cosh [not *coast*, as printed], H. C. Levinge.—Hart, *Journ. Bot.*, 1891, p. 377.

Selaginella selaginoides, Gray.—Small bog on the north side of Howth Hill.—D. M'Ardle, *I.N.*, 1893, p. 174.

Among the above plants there are a few whose occurrence on Howth possesses more than a local interest. *Crambe* is now one of the rarest plants in the district, and possibly the station mentioned is its last appearance prior to extinction. *Arctium nemorosum* appears to be very rare in Co. Dublin. *Orobanche minor* has only recently been observed in the County (Colgan, *I.N.*, 1893, p. 285). *Mentha Pulegium* is a good addition to the flora of Co. Dublin, and to District 5. For *Chenopodium murale* Mr. Colgan has only one recent station in County Dublin, so the addition of two others is welcome, and I may here add a third—Rathfarnham—where I gathered it in a gravel pit with *Matricaria Chamomilla* last December.

To the above notes I may add the following :—

ADDITIONAL STATIONS FOR RARER HOWTH PLANTS.

Sisymbrium Irio, L.—Roadside east of Sutton railway station.

S. thalianum, Gaud.—Steep banks above the sea at the north side of the Bailey—D. M'Ardle.

Sinapis nigra, L.—Rough ground above Carrickbrack House.

Viola hirta, L.—Dry field east of Glenaveena.

Trifolium striatum, L.—Plentifully above the Martello tower at Sutton.—Miss R. Mahaffy. Mr. Hart records it from Ireland's Eye alone, disallowing Dr. Moore's "Howth" record in *Cybele Hibernica*.

Rosa tomentosa, Sm.—Near Waldron's tavern, and below Glenaveena.—Miss R. Mahaffy.

Pyrus Aria, Sm.—Sparingly on a rock near the summit of Ireland's Eye. I failed in spite of careful search to find it in its only recent recorded station "rocks high up on Dung Hill, looking north" (*Flora of Howth*).

Valerianella Auricula, DC.—Roadside near Sutton station.

Helminthia echioides, Gaert.—Steep banks at the Needles.

Gentiana Amarella, L.—On Shelmartin, Miss R. Mahaffy. Mr. M'Ardle writes that he formerly found it plentifully in a stony pasture field at Sutton, but he thinks the place is built over now.

G. campestris, L.—On Ireland's Eye, near the Martello tower.

Hyoscyamus niger, L.—Abundant on the southern slope close to the Bailey lighthouse, R. Ll. Praeger, *I.N.*, 1894, p. 156. On Shelmartin, and at Corr Castle—Miss R. Mahaffy. Miss Mahaffy tells me that the seeds are smoked by certain persons, which may account for the spread of this plant.

Stachys arvensis, L.—Needles field, Miss R. Mahaffy.

Carex extensa, Good.—Rocks on the shore near the Bailey.

Phragmites communis, Trin.—By the sea below Earlscliff.

As the above plants are mostly somewhat rare in the county, and have only one or two stations attached to them in the "Flora of Howth," the additional localities mentioned have been considered worthy of record.

Pyrus Aria and *Valerianella Auricula* are not known in Co. Dublin except on Howth; while *Sisymbrium thalianum*, and some of the others are of rare occurrence in the county. I may add that possibly *V. Auricula* is establishing itself in this neighbourhood, as I gathered it in some abundance last June in sandy fields at Portmarnock, where so many colonists appear to find a congenial resting-place.

That interesting and anomalous group, the *Characeæ*, are not included by Mr. Hart in his Flora. Being aquatic plants, they are but poorly represented on Howth, as would be expected; yet several species occur, and even the dry rocky surface of Ireland's Eye has one spot which is perennially damp enough to allow of the existence of one species. The following are, so far as I know, all the notes of Howth *Characeæ*.

Chara fragilis, Desv.—Howth, 1860, D. Moore—Groves, *I.N.*, 1895, p. 8. Shallow pools on the Sutton side of the hill, near the quarries, D. M'Ardle. In Balsaggart stream, near its source ("approaching var. *capillacea*," H. and J. G.), 1894, R. Ll. P.

C. vulgaris, L.—Sutton, 1871, W. T. T. Dyer—Groves, *I.N.*, 1895, p. 38.

C. vulgaris, L., var. **longibracteata,** Kuetz.—In a marshy spring on the east cliff of Ireland's Eye, 1894, R. Ll. P.

C. vulgaris, L. near var. **melanopyrena,** A. Br.—A curious little plant which grows in the brackish pool by the sea at the Quarry is so named by Messrs. Groves. This variety is not recorded from Ireland.

Nitella opaca, Ag.—Hill of Howth, 1860, D. Moore—Groves, *I.N.*, 1895, p. 41. Ditch in the marsh at source of Balsaggart stream, 1894, R. Ll. P. This species is probably the *N. syncarpa* recorded from Howth in *Brit. Assoc. Guide.*

In bringing these brief notes to a conclusion, I have to express my indebtedness to Miss R. Mahaffy and Mr. D. M'Ardle for notes and specimens of their Howth finds, and to Messrs. Groves and A. Bennett for assistance in the naming of critical plants.

BIRDS OBSERVED BREEDING ON THE COASTS OF SLIGO AND MAYO.

BY ROBERT WARREN.

(A Report laid before the Royal Irish Academy, 28th May, 1894).

THE coast line of the County Sligo, and that of the County Mayo, as far as Belderig Harbour, is of the Carboniferous formation, and, wherever of sufficient altitude, is eminently adapted for the nesting-places of cliff-breeding birds.

The sea-face of the cliffs consists of series of horizontal shelves and ledges, caused by the weathering and decay of the softer strata, the harder only remaining, and thus forming the ledges upon which the birds have their nests. But at Belderig Harbour, a "fault" occurs, and from that little cove westwards, the North Mayo coast-line is formed of rock of the metamorphic series, so crushed and jumbled together, that the face of the highest cliffs appear crumbling away; the falling particles, in many places, forming steep slopes, and where lodging, providing most convenient nesting-places.

On the long line of coast between Sligo and Killala Bays, there are only two parts sufficiently high for the breeding-haunts of cliff-breeding birds; the larger one of Aughriss Head, and the lesser one of the Killeenduff cliffs. Aughriss Head, situated about twenty-four miles from Ballina, and fourteen to sixteen from Sligo, is a short promontory jutting out from the coast line, about a mile in width, rising to 150, or 200 feet above the sea, and sloping down inland to the level of the adjacent country. It is composed of Carboniferous limestone, and the whole sea-face of the cliff, from base to summit, is divided into shelves and ledges of various widths, running horizontally along the face, and parallel to each other; but as the rock dips down towards the land side, the outer edges of the shelves are tilted upwards at a slight angle, thus forming sheltered positions for the nests almost invisible from the outside.

In such a favourable breeding-haunt it was strange that none of the Great Cormorants were to be seen, but immense numbers of the Green Cormorants were nesting on the cliffs, the nests being scattered all over the face of the cliff in every crack and crevice available, and in some of the more sheltered

ledges; and, irrespective of the birds sitting by their nests, we counted over a hundred resting on a low flat reef at the base of the cliff, while fully as many more were on the water. Razorbills and Guillemots were in thousands, perfectly innumerable, thickly packed together on the ledges, while the sea was dotted over with numerous flocks, varying in numbers from five to a hundred individuals in each flock. The Kittiwake Gulls were in two large colonies, one on a range of cliff about three hundred yards in length, and the other on one about fifty or sixty yards shorter; while on a space of a hundred yards between the two, was located a colony of Herring Gulls numbering about fifty pairs of birds.

The only other birds seen about were Rock Pigeons and Jackdaws, frequenting the caves and holes, while Ringed Plovers with their young ones were running about the bare edges of the cliff where the winter storms had worn away the soil. Choughs were said to have bred here some years ago, but no trace of them was to be seen on the occasion of my visit on the 22nd of July, 1891. On a visit to this head on the 9th of June, 1893, I saw nothing new at the breeding-haunt, although I had the advantage of viewing the sea-face of the cliffs from a boat.

Killeenduff cliffs, situated about three miles from the little town of Easky, are a bold range about 100 feet high, and although most favourably circumstanced for the breeding of seafowl, are only frequented by a few pairs of Green Cormorants, and Rock Pigeons in the caves; a colony of House Martens having their nests in the face of the cliff, the nests looking like little dabs of mud stuck against the rock.

After leaving Killeenduff no rock-breeding birds are to be met with until Killcummin Head, the western boundary of Killala Bay in the County Mayo, is reached, where a few pairs of Green Cormorants nest, as well as some Jackdaws, and Starlings; a pair of Peregrine Falcons had an eyrie in the highest part of the cliff, and about thirty years ago a pair of Choughs also bred there.

On Killala Pool (the inner part of the bay) several pairs of Black Guillemots are to be seen throughout the year, and probably breed in the cliffs between Kilcummin Head and Lackin Bay.

On the "Inch," a low gravelly island on the western side of the Pool, a colony of the Common and Lesser Terns breed, as well as Ringed Plovers; while on the sandhills of Bartragh Island Sheldrakes breed in the Rabbit-holes.

For six miles west of Killcummin Head no breeding-haunt (unless that of a pair or two of the ubiquitous Green Cormorants) is met with until Downpatrick Head is reached, with its pillar-like rock of Doonbrista standing upright 126 feet out of the water, and 100 yards from the head. This rock is perfectly inaccessable, its wall-like sides (in some places overhanging) rising out of deep water, and although now so isolated, and inaccessable to man, was at some remote period of time joined to the mainland, and inhabited, which is proved by the remains of a stone wall still to be seen on the summit.

On the ledges of the head and rock, Kittiwakes swarmed in thousands, and when disturbed by the report of a gun, looked like a shower of snow as they darted out from the face of the cliffs. Green Cormorants were also in large numbers both on the rocks and head; while on the flat grassy summit of the former a colony of twelve to fifteen pairs of the Great Black-backed Gull held undisputed possession; a few pairs of Herring Gulls having to content themselves with the ledges just below the top. Razorbills and Guillemots thickly crowded together on the shelves of the head and rocks, in some places in dense masses, quite innumerable, though not in such large numbers as at Aughriss Head.

Leaving Ballycastle (or Buntraher Bay, as it is named on the maps), a few pairs of Black Guillemots were seen in the sheltered cove, and the cliffs begin to rise in height westward, until Keadue is reached, between two and three miles from Ballycastle; just before reaching Keadue, and situated about 150 yards from the sea, in the centre of a grass field, a curious chaldron-like hole is seen, almost circular, and about 30 yards in diameter, the sides perpendicular and about 50 or 60 feet in depth to the rocky bottom, into which the tide flows through a tunnel-like cavern. It was low tide when we were there, but when the tide is high it rushes in with tremendous force in stormy weather, sending the spray up to a great height. While sitting on the edge of the cliff over the hole we observed

some Jackdaws feeding their young in the crevices of the sides, and were agreeably surprised to hear the musical calls of a Chough, and shortly after saw a pair go into a hole near where the Jackdaws were, and heard them feeding their young ones.

Keadue is an immense amphitheatre-like bay, running for a quarter of a mile into the land, and about as wide at the entrance, surrounded by a perpendicular wall of rock 350 feet in height, upon the edges of which a large colony of Herring Gulls had nests (perhaps a hundred pairs), while several pairs of the ubiquitous Green Cormorants were scattered about the face of the cliffs, having nests in the holes and crannies; and about halfway on the western side a beautiful pair of Peregrine Falcons had their eyrie some thirty feet below the top, on a flat ledge under an overhanging slab of rock.

As there were conflicting accounts of the species of eagle breeding on the North Mayo coast, I was anxious to visit their haunts, and ascertain if possible which species really bred there; and also to continue my observations of the coast-breeding birds from Downpatrick Head and Keadue, as far west along the coast as possible. However, owing to the long-continued bad weather of the summer of 1892, I was unable to leave for my first visit until the 30th of June, when, at a quarter past 8 o'clock, a.m., I left Ballina on my twenty-mile drive to Belderig, via Killala and Ballycastle. On reaching the latter village, while our horse was resting and feeding, I walked on before as far as Keadue, and during my three miles walk through the valley and along the river, I met a great variety of birds. Sedge Warblers singing in the reeds by the river banks; Corncrakes calling from the little patches of oats, the three species of Bunting; Thrushes, Common and Mountain Linnets, Goldfinches, Swifts, Swallows, and Sand Martins; a few Chaffinches and Green Linnets—stragglers from the few trees and bushes near the villages; Meadow Pipits and Skylarks, the latter very numerous. However, as soon as the bog district was reached, a little beyond Keadue, only the two species of larks were to be seen. Though whenever there was a solitary cottage, even in the bog, with its little patches of oats and potatoes, there a few Twites and buntings were seen.

The road from Ballycastle to Belderig runs along the coast, not far from the cliffs, through a desert of bog and moor, but half-way between those places is Glenglossera, a small and very picturesque glen, or rather ravine, reaching the sea through a narrow cove in the high cliffs; at the head of the glen is the pretty shooting lodge of Mr. Mudge, surrounded by evergreen shrubs and natural brushwood, the latter clothing the sides of the ravine, and offering such a contrast to the wilderness of bog all round, that it looks like a lovely oasis in the midst of a desert.

On the cliffs near the mouth of the cove over the sea a pair of Peregrines have an eyrie. In August, some years ago, when Grouse-shooting, Mr. Mudge shot two Golden Eagles, an adult bird which he has at his English residence, and an immature specimen which he showed me in a case at Glenglossera.

Belderig is a small village, consisting of a few cottages thinly scattered over a broad valley or depression of the land, opening out into the little harbour between the cliffs, while bog and mountain surround it inland.

The sea-cliffs from Belderig to Broadhaven Bay are the finest I have seen on the Irish coast, consisting of a mountain range varying in height from six to eight hundred feet, culminating in Benwee Head, 829 feet high. The cliffs are highest on the sea-face, and slope down inland to the level of the great bog, turf covering them to an immense depth. Even on the outer edge of the cliffs it is seven and eight feet deep, and falling with the crumbling face of the cliffs, and lodging where there are vacancies between stones and rocks, forms most convenient nesting-places for the Puffins and other birds.

This line of coast is indented by great bays, at short distances from each other, and it is chiefly on the high wall-like cliffs of these bays that the sea-fowl breed in such numbers.

(TO BE CONCLUDED).

FIELD CLUB WORK IN THE NORTH.

Annual Report and Proceedings of the Belfast Naturalists' Field Club, for the year ending 31st March, 1895 (thirty-second year). Belfast: Printed for the Club, by A. Mayne & Boyd. Price of extra copies to members, 2*s*.

THIS publication has just been issued, in the shape of a well-printed volume of over 200 pages, of which half is devoted to the Proceedings of the Club, and half to a "Supplement to the Flora of the North-east of Ireland," being one of the series of scientific memoirs relating to the natural history or archæology of their district which this Society issues from time to time. Just thirty years ago the Belfast Field Club issued their first report, an eight-page pamphlet, covering two years' work—a contrast to the present stout volume, which indicates the growth of this Club during the intervening period. From the Committee's report we learn that the membership now stands at 516, being by far the highest number ever reached. The principal events of the summer were a joint excursion with the Dublin Field Club in June, a week's visit of the North Staffordshire Field Club to Belfast during the same month, and a three-day excursion to North Donegal in July. The formation of the Irish Field Club Union, which is already bearing good fruit, is referred to as calculated to work for the general benefit of all the Clubs concerned. The list of papers read at the winter meetings looks at first sight varied and representative of the several branches of the Club's work, but on analysis we find that seven papers deal with geology, only two with zoology (and of these the titles alone are given in the Proceedings), none with botany, and the remaining five with literature, art, ethnography, &c. This weakness in zoology and botany is certainly to be regretted, in view of the immense amount of work still required in the North in these departments.

In the reports of the excursions also, which occupy 21 pages, the same weakness is conspicuous; not half-a-dozen animals, nor more than a score of plants are recorded as having been found by the members on their nine field-days, and as a matter of fact almost the whole of this small list was supplied by members of the Dublin Club on the joint excursion to the Boyne. The cause of this deficiency in field-work appears to be that the Belfast Club is suffering from a plethora of members. Is this Society doing more work now than during the many years when the membership ranged from 200 to 300? We doubt it. It is certainly doing less field-work on its excursions, and the importance of maintaining the *esprit de corps* on these summer trips cannot be over-estimated; picnicking and consequent demoralization are always ready to swoop down on the unwary Field Club that allows its excursions to degenerate into pleasure-trips. When we read of 120 members having attended the driving excursion to Langford Lodge—well known as a "show place"—we are not surprised to find that absolutely

no field-work was done on this occasion: it appears to be a law of Field Club mathematics that the work done on an excursion usually varies inversely as the number of members present. Perhaps it is to this cause that we owe a redeeming feature of the Report under review—the excellent researches that are being carried out by a few ardent members of the Geological Committee on the glacial deposits of the district, and in other branches of local geology. Miss Thompson's report shows that the boulder-clays and associated beds, and the larger erratic blocks, are being carefully examined, and some interesting discoveries have already rewarded the researches of the Geological Committee; while Mr. Hoskins' analysis of Antrim glauconite, and Prof. Cole's notes on hullite, are valuable contributions to our knowledge of these minerals.

But if the Belfast Field Club is weak in its field-work, it is certainly strong in a different department of its labours—that of indoor instruction to its members. Three courses of lectures were held during the past winter, and all of them appear to have been decidedly successful. Prof. Cole gave his second geological course, "The Study of Life on the Globe"; Prof. Johnson contributed twelve lectures on "The Study of Plant Life"; while under the care of Mr. P. J. O'Shea the class for the study of the Irish language has continued to make satisfactory progress. The geological and botanical lectures were followed by practical demonstrations. These classes should serve as useful adjuncts to field-work, and as a stimulus to the same, but it should never be imagined that they can replace it.

As a relief to the complete absence of botanical papers in the Proceedings, we have the 100-page appendix, "Supplement to the Flora of the North-east of Ireland," now published by S. A. Stewart and R. Lloyd Praeger. This paper shows that even if work on the Club excursions has been insignificant, the botanical members have not been idle when on excursions of their own. It is now just seven years since Stewart and Corry's "Flora" was published, and the present supplement shows a goodly number of additions to the lists of plants of the three counties—Down, Antrim, and Derry—dealt with in the work in question. As a matter of statistics, the flora (phanerogams, vascular cryptogams, mosses, and hepatics) of the district is raised from 1,169 species to 1,229; that of County Down is increased by 60 species, of County Antrim by 58, and of County Derry by 45. These additions include a number of plants of much interest. *Spiranthes Romanzoviana* is indeed a bright jewel to add to the local botanists' crown; *Carex pauciflora* is a highly interesting addition to the list of Irish mountain-plants; the critical *Polygonum maculatum* is also an addition to the flora of Ireland; while a number of species, such as *Ranunculus circinatus*, *Drosera intermedia*, *Saussurea alpina*, *Orchis pyramidalis*, *Carex aquatilis*, were not previously known to grow in this part of our country. Withdrawals and corrections to Stewart and Corry's "Flora" are very few, showing the excellence and care with which the "Flora" was compiled. The species now withdrawn from

the list of local plants are only six in number:—*Ononis spinosa*, *Rosa micrantha*, *Silaus pratensis*, *Calamintha officinalis*, *Primula veris*, *Grimmia ovata*, and in only two of these cases—*Rosa* and *Grimmia*—is the plant withdrawn on account of a proved error of determination, the remainder being omitted since time has shown that they were merely casuals or escapes in the stations credited to them. A useful feature of the Supplement is the enumeration of a number of plants which have not now been seen in the district for some years; the rediscovery of these will be a useful work for the local botanist, since, on account of drainage and other changes, their confirmation as members of the present flora is a consummation devoutly to be wished. The supplement is wisely printed in pages of the same size as the "Flora of the North-east of Ireland," in order that it may be bound with it; and it furnishes a valuable addition to our knowledge of Irish botany.

PROCEEDINGS OF IRISH SOCIETIES.

Royal Zoological Society.

Recent donations comprise two pairs of Hooded Crows from H. H. Jonas, Esq., and J. P. Swan, Esq.; a Hedgehog from G. C. Gray, Esq. A Camel and a Chimpanzee have been purchased, and a Golden Agouti born in the Gardens.

8,790 persons visited the Gardens in May.

Belfast Naturalists' Field Club.

May 18th.—The first Excursion of the season was held on this date when the Club paid a visit to the old Cistercian Monastery of Greyabbey. A pleasant morning found a party of sixty collected at the Linen Hall Library at 10 a.m., and a start was made at once in brakes. Passing by Dundonald, Newtownards, and other places of interest, the first halt was made at Mountstewart, the seat of the Marquis of Londonderry. Here the fine mansion was thrown open to the members, after which the cromleac occupied the attention of the party, and was freely photographed. This cromleac, as Mr. W. Gray pointed out, was once the centre of a large tumulus, which has since disappeared, leaving only its core. Having examined this relic of olden time, and having noticed the good sense of the owner of the soil in leaving it intact, the party proceeded to Greyabbey. Mr. J. J. Phillips has written a most beautiful and interesting monograph on this fine old ruin, and the information imparted by it during the day greatly increased the pleasure of those who saw it.

Tea was provided on the hill close by, where a most extensive view delighted the eyes of all present. Strangford Lough and its islands, with the blue Mourne Mountains in the distance, and the ruins of the old abbey nestling amongst the trees beneath, added every feature necessary for a perfect picture; in fact, it is doubtful if there is so fine a view in all County Down as is here to be had in the evening sunlight.

At five o'clock the waggonettes were then once more mounted, and the party drove off, passing on the way, close to Mountstewart, a vast erratic of basalt resting on Triassic sands and marls. Mr. Welch has taken a capital photo. of this amazing sample of the power of ice in the great ice age. Belfast was reached at eight o'clock, where the members dispersed. The botanists of the party found nothing rare, but *Sedum telephium* and *Anchusa sempervirens*, which were in great quantity. In one spot the double variety of the Lesser Celandine and an extremely large variety of the Wild Hyacinth were growing in abundance. The geologists only spent a few minutes at a small section of boulder clay, from which, however, a good specimen of a striated block was extracted.

MAY 25th.—The geological section visited the Woodburn district, seventeen members being present. It is satisfactory to find that Professor Cole's recent lectures have greatly increased the interest in field geology, as evidenced by the large attendance at this excursion. The first halt was made outside the beautiful and well-kept glen of the Water Commissioners. A cliff of Lower Greensand yielded brachyolites, ventriculites, *Vermicularia*, pectens, and other fossils. Passing up the glen, where the waterfalls were in perfection, the party crossed meadows gay with orchis, bugle, rattle, and Water Avens, obtaining the Adder's Tongue, and plunged into the north glen, where the dark green glauconitic sands were reached after a good deal of scrambling. Many *Exogyræ* and *Terebratulæ* were gathered, whilst the glacialists secured some boulder clay from about 400 feet above the sea. Passing down stream some blocks of Lias yielded fish teeth and scales, and eventually the party returned to Troopers Lane.

JUNE 1st.—The second Excursion of the Club took place to Glynn and Gleno. A party of about 100 left Belfast by the 2.15 express to Larne, which was kindly stopped at Glynn station by Mr. Cotton to allow the members to alight. This Excursion was rendered especially interesting owing to the presence of Professor Johnson and Mr. S. A. Stewart, two well-known botanists, who gave good assistance to those members taking up this study. On leaving the station a halt was made at the churchyard, where the ruins of the old church were examined. The Secretaries then announced that a prize would be given for the collection containing the largest number of species of flowering plants gathered during the afternoon. Mr. Stewart headed the party who wished to go on to Gleno, whilst the remainder stayed in the glen. A walk of about two-and-a-half miles brought the former to the quaint little village of Gleno. At the waterfall the botanists searched carefully for mosses, liverworts, and algæ; although nothing very rare was found, *Fontinalis fluviatilis* among the mosses, and *Lemanea* among the algæ are worth noticing. Mr. Stewart obtained a specimen of *Zygodon Stirtoni*, which is found only at Killarney and one or two places in the North. The large limestone quarry alongside the stream yielded few fossils, but there were quite a number of the little *Amorphospongia globularis* weathered out on the surface in one part. The usual *Ananchytes ovatus*, *Belemnitella mucronata*, and *Terebratula carnea* were seen. A few photographs having been taken the party made for Glynn, where by the kindness of Mrs. Johnson the local arrangements had been made, and tea was provided in the schoolhouse by Messrs. Inglis and Co. This was followed by the judging of the nine collections of the competitors for the botanical prize, but it was only as the train neared Belfast that Professor Johnson and Mr. Stewart were able to say that Mr. Richard Hanna had taken the prize with ninety species; Miss Vinycomb was next with seventy-one, and the lowest was about sixty, so the competition was keen. The only plant of note was Dog's Mercury (*Mercurialis perennis*), which was in some quantity, and is locally rare.

Dublin Naturalists' Field Club.

May 25th.—An especially interesting excursion was made on May 25th, when a large party visited the bog near Tullamore in King's County, which is well known to naturalists as the largest breeding place in Ireland of the Black-headed Gull. Leaving Dublin at 9.15, a rapid journey in a special through carriage brought the members to Tullamore, where they were joined by some local friends, and drove immediately to the vicinity of the bog. Here they were met by Mr. R. Digby, J.P., and the Rev. Canon Russell, D.D., who acted as guides during the day. No time was lost in getting out on the bog, where the unusual spectacle of some fifty persons wending their way cautiously among the pools and marshes to the centre of the vast spongy plain produced a great commotion among the only inhabitants—thousands of graceful sea-birds, that rose in clouds before the party, and eddied like snowflakes overhead, filling the air with their wild musical din. Here among the bog-pools were numbers of slightly-formed nests, many of which contained brown spotted eggs, others young birds in the beautiful brown and black mottled down of infancy, while others of larger size, covered with dark feathers, ran about among the heather, or skulked in the beds of rushes. The photographers of the party busily took snap-shots at the birds, old and young, while the botanists were well pleased to find abundance of the Cranberry (*Vaccinium Oxycoccos*), with its pink blossoms dotting the wet moss, the waxy bells of the Andromeda (*A. polifolia*), the Great Sundew (*Drosera anglica*), a somewhat rare fern, *Lastrea spinulosa*, and other plants; and the entomologists captured a variety of rare bog insects, a list of which is contributed by Mr. J. N. Halbert to the present number (p. 172). The edge of the bog was regained without mishap, and the party next explored the beautiful wood of Clonad. Here were found both species of Buckthorn (*Rhamnus catharticus* and *R. frangula*), the Intermediate Avens (*Geum intermedium*), the Columbine (*Aquilegia vulgaris*), the Water Avens (*Geum rivale*), and many other interesting species. In meadows adjoining grew the Green-winged Orchis (*O. morio*), and fine plants of the Royal Fern (*Osmunda regalis*) were obtained on the banks of a stream in the neighbourhood. The following fungi were collected by Mr. Greenwood Pim and Dr. E. J. McWeeney:—*Agaricus (Gabra) hypnorum*, Fr.; *A.* (*Gabra*) *mycenopsis*, Fr.; and *A.* (*Omphalia*) *umbelliferus*, Fr., on *Sphagnum*; *Peronospora parasitica* on *Sisymbrium Alliaria*; *P. pygmæa* on *Anemone nemorosa*; *Æcidium crassum*, Pers., on *Rhamnus catharticus* (the spermogonia were also found on the upper side of the leaf); *Œcidium aquilegiæ*; *Puccinia epilobii*; *P. coronata*, Corda, abundant on both species of Buckthorn; *Penicillium olivaceum* (Ca.), on discoloured spots on *Aquilegia* leaf. The whole party, now reinforced by a number of the local gentry, assembled at the forester's house at five o'clock, where an ample tea was provided by the Misses Gardiner, of Leinster-street, Dublin. Subsequently a short business meeting was held. Mr. Greenwood Pim, M.A., F.L.S., who occupied the chair, on behalf of the members warmly thanked Mr. Digby and Canon Russell for the great assistance they had given during the day. Mr. A. J. Pentland and Miss Pentland were then elected members of the Club. The return journey was made in time to catch the 7.42 train to town, and Dublin was reached punctually at ten.

NOTES.

BOTANY.

Irish plants in the new London Catalogue.—It may be interesting to point out some of the changes as regards Irish plants which have been made in the ninth edition of this useful work. Irishmen will regret that St. Dabeoc's Heath no longer bears his name (*Dabœcia*), but is changed to *Boretta*, and that the Lough Neagh sedge *Carex Buxbaumii* becomes *C. fusca*, but the law of priority is inexorable. Two other exclusively Irish plants, *Asplenium Clermontæ*, and *Potamogeton longifolius*, Bab., are marked as hybrids. We have cause to be grateful, however, that *Rosa hibernica* still retains its name, though it had a narrow escape, and that the following now help to swell the small number of Irish plants, *Thalictrum collinum* var. *calcareum*, *Carex rhynchophysa*, and the varieties *Hartii*, *Stewartii*, and *occidentale* from the long array of Hawkweeds. The new spelling of *Spiranthes Romanzoffiana*, and *Isoetes lacustris* v. *Morei* should be noted; the latter, which was spelled *Moorei* in the eighth edition, was I suppose a misprint.

C. H. WADDELL, Saintfield.

HEPATICÆ.

Jubula Hutchinsiæ (Hook.).—I am glad to be able to record a new station for this beautiful scale-moss, which I have only seen before in the North of Ireland at Rostrevor and Tollymore Park. It was found by Miss S. M. Thompson in a damp fissure of the rocks on the coast south of Newcastle, County Down. There is no appearance in the North of its variety *integrifolia*, which is said to be one of the links between the flora of S.W. Ireland and that of Spain and the West Indies.

C. H. WADDELL, Saintfield.

ZOOLOGY.

CRUSTACEA.

Cladocera from the West of Ireland.—The following Cladocera have been identified by me in material collected at various times by Prof. D'Arcy W. Thompson (of Dundee) in the neighbourhood of the town of Galway—*Sida crystallina*, Müller; *Daphnia pulex*, De Geer; *D. longispina*, Müller; *D. galeata*, G. O. Sars; *Simocephalus vetulus*, Müller; *Ceriodaphnia megalops*, G. O. Sars; *Bosmina longispina*, Müller; *Eurycercus lamellatus*, Müller; *Acerperus harpæ*, Baird; *Alonopsis elongata*, G. O. Sars; *Lynceus affinis*, Kurz.; *Graptoleberis testudinaria*, Fischer; *Alonella nana*, Baird; *Pleuroxus trigonellus*, Müller; *Chydorus sphericus*, Müller; *Leptodora hyalina*, Lilljeborg. Of these species the rarest is *Lynceus affinis*, a form only recently added to the British lists. It has lately been found, however, by Mr. Scourfield in North Wales, by Mr. T. Scott in the West of Scotland, and by myself near Birmingham.

T. V. HODGSON, Birmingham.

INSECTS.

Plague of Beetles in Galway in 1688.—I send an extract from Boate describing a curious plague of beetles in Galway in 1688:—"In the summer of 1688 a vast swarm of insects of the Scarabeus or beetle kind appeared on the S.W. coast of Galway, not far from the town. They were brought by a S.W. wind and proceeded towards Headford to Tuam, where, and in the adjacent country, they lay by thousands among the trees and hedges, hanging to the boughs in

clusters, and sticking to the backs of one another, like bees when they swarm. In this manner they continued quiet during the heat of the day, but towards evening they simultaneously took wing with a strange noise resembling the distant beating of drums, and in such vast and incredible numbers as to darken the air for many miles around. In a short time they devoured all the leaves of the trees, and the country, though it was then in the middle of summer, was left as naked as if it had been in the middle of winter. The grinding of the leaves in the mouths of this vast multitude made a sound similar to the sawing of timber. They destroyed all the gardens round the country, and particularly Mr. Martin's beautiful plantations at Dangan; entered the houses, and, crawling about, fell into the food of the people; and wherever they happened to stride they left a slight mark behind. Their spawn they deposited near the surface of the ground, where it did considerable damage by devouring the roots of the corn and grass. These formidable invaders were, however, easily killed; smoke was their greatest enemy, and one wet day destroyed great heaps of them. They proved good food for the swine and poultry, and, according to some, were also used by the poorer sort of people. From the time of their first appearance they continued to proceed progressively with the westerly wind, and in 1696 they reached the Shannon; but they were gradually destroyed. The year before about 40 or 50 horse loads were found lying dead along the shores of the bay, for miles westward of Galway. It was supposed this new colony, coming from their native lands, Normandy or Brittany in France, met with a contrary wind, which, having blown them into the sea, they were drowned, and their bodies cast ashore. Since that time nothing of the same kind has appeared."

RICHARD J. KELLY, Dublin.

[It is only a few days since we received complaints from Co. Galway of the serious ravages of the small chafer *Phyllopertha horticola*, L., during the present summer. Very probably the beetles referred to in the above interesting old record belonged to that species.—EDS.]

Lepidoptera from Sligo.—In the March number of the current volume (p. 77) I record the capture by Rev. R. A. M'Clean of *Erebia epiphron* var. *cassiope* near Sligo. Having now looked through his entire collection, the following species of moths seem to be worthy of record:—

GEOMETRIDÆ.—*Eurymene dolobraria, Epione apiciaria, Acidalia remutaria, Bapta temerata, Numeria pulveraria, Scodiona belgiaria, Hybernia rupicapraria, Anisopteryx æscularia, Emmelesia tæniata, Eupithecia dodoneata, E. lariciata, Larentia multistrigaria, Melanthia ocellata, Cidaria miata, C. siterata, C. corylata, C. silaceata, C. suffumata, Pelurga comitata.*

SPHINGIDÆ.—*Smerinthus ocellatus.*

NOTODONTIDÆ.—*Pterostoma palpina.*

CYMATOPHORIDÆ.—*Thyatira batis, T. derasa, Cymatophora duplaris.*

NOCTUIDÆ.—*Grammesia trigrammica, Stilbia anomala, Mamestra persicariæ, Celæna Haworthii, Dianthœcia nana, D. capsincola, D. cucubali, Epunda lutulenta,* vars. *sedi,* and *lunebergensis, Cleoceris viminalis, Agrotis vestigialis, A. cursoria, A, præcox, A. strigula, A. confusa, Panolis piniperda, Xanthia fulvago, X. flavago, Charicleaumbra, Xylocampa areola, Xylina ornithopus, X. socia, Plusia bractea.*

LITHOSIIDÆ.—*Gnophria rubricollis.*

PYRALIDÆ.—*Botys ruralis, B. fuscalis, Scoparia ambigualis, Nomophila noctuella, Scopula luteolis, Crambus margaritellus, C. hortuellus, C. geniculeus.*

TINEIDÆ.—*Diurnea fagella, Hyponomeuta cagnagellus.*

TORTRICIDÆ.—*Tortrix ministrana, Sericoris lacunana, Argyrotoza conwayana, Pardia tripunctana, Catoptria ulicetana, Argyrolepia hartmanniana.*

ZYGÆNIDÆ.—*Zygæna loniceræ.*

HEPIALIDÆ.—*Hepialus hectus.*

GEO. H. CARPENTER.

BIRDS.

Notes on Black-headed Gulls.—The following notes are from observations which I made at Lough Mask, Co. Mayo, and Gull Island, Gartan Lake, Co. Donegal.—The birds all seem to begin to lay at the one time—once an egg is laid either the cock or hen is on the nest so that the eggs come out very irregularly; they lay from three to five eggs, generally three or four, but in a few nests there may be six. When the chicks are all out they stop for about a week at the "gullery" and then all suddenly disappear. The young chicks do not seem to be able to swim, as some that fell off the island at Gartan were drowned. One year the gamekeeper at Toormakeedy robbed the regular gullery to get the eggs to feed his Pheasants, and the Gulls moved to a rocky island and crag in the small river that flows into the north end of Lough Mask, here they could be easily watched as one could creep within 100 yards of them. When the chicks were about ten days old they all suddenly left. To-day when passing the gullery was alive, the next day there was scarcely a Gull to be seen, and on going to the island one only found one or two late clutches. After the gullery was deserted I found in the Co. Mayo in the grass fields and in the Co. Donegal in the corn-field a hovering pair of Black-heads that mobbed me if I came near as if their young were about, but although I worked the ground very close I never could find one; but in two or three weeks the country would have numerous small flocks consisting of two adults and three or four young ones flying about feeding. I firmly believe the Gulls bring their young to these fields, in fact it is all but positively proved—but how do they do it? Do they carry them? The Mallard Duck does carry its young as at Cragg, Lough Derg, Co. Clare; so also does the Woodcock. Why therefore may not the Black-headed Gull do likewise? The Terns and the Grey-backed Gull keep about Lough Mask till their young are well able to fly.

G. H. KINAHAN, Dublin.

GEOLOGY.

Exposed Lias at Whitepark Bay, North Antrim.—Heavy storms in former years exposed small patches of Lias shales near the "Kitchen Middens" in this bay, but these were very soon covered up again, sometimes by next few tides. The great storm of December 22nd last, has left lasting traces of its fury here, and by removing many thousands of tons of sand and shingle from the centre of the strand to the east end has exposed the beds for a distance of over a thousand long by from twenty to one hundred and fifty feet wide. All that now remains are large masses of Chalk scattered over the Lias. There does not seem to be even after four months exposure any sign of the sand covering up again, but it might be well for geologists to take advantage of this fine exposure while they may; the beds are fairly fossiliferous, indeed it is from here and from the little section a little higher up along the banks of the stream that the Causeway guides get the majority of the specimens of ammonites which they sell to tourists, and there are plenty of indications that they are working there now. It would be impossible to accurately describe the great change the storm made from the little port at Ballintoy to this point. Almost all the shingle which lay in gullies around the sea-stacks has been thrown up high beyond high water mark; at one place lying along a field 30 to 40 feet inside the low ditch.

Even more destructive was the storm on the West Strand, near Golf Hotel, Portrush, where the sand has been removed in immense quantities all along the face of the dunes, exposing for almost a quarter of a mile the well-known submerged peat beds there, which before the storm showed only in a small patch about two feet below the Hotel; it being now from seven to eight feet high there the alternate layers of peaty matter and sand can now be well examined, insects, &c., searched for. Roots and branches of trees, evidently of the pine tribe, are common, and what appeared to me like leaves or stems of Zostera? or other estuarine plant.

R. WELCH, Belfast

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THE ORCHIDS OF COUNTY DUBLIN.

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

So far as it is possible to judge with our still very imperfect knowledge of the various Irish county floras, the County Dublin is exceptionally rich in orchids. Out of a total of, say, twenty-three Irish species, no less than sixteen are included in the actual Dublin flora, while further research may be expected to raise the number to eighteen by the re-discovery of two recorded species which have not been recently observed. This proportion of sixteen to twenty-three is somewhat exceeded in the Counties of Cork, Galway, and Kerry, with areas, respectively, about eight, seven, and five times as great as that of the County Dublin; Wicklow, with more than twice the Dublin area, numbers about seventeen species; Westmeath,[1] with exactly double, and Armagh,[2] with one and a half times the area of Dublin, each number twelve species in their orchid floras; Donegal, with five times the Dublin area, has, perhaps, no more than an equal number of species; and, finally, the three north-eastern counties of Ireland: Derry, Antrim, and Down, with a combined area more than eight times that of the County Dublin, have one less than its number of orchid species[3]—fifteen. On the whole, then, the orchid flora of the County Dublin may be set down as exceptionally rich when compared with that of other Irish counties, though it must be confessed that its richness lies rather in the number of its species than in the presence of any of the rarer Irish members of this peculiarly interesting order of plants.

The following notes, selected rather hastily from some years' observations in the highlands and lowlands of the county, will

[1] See Mr. H. C. Levinge's "Plants of Westmeath," *I.N.*, 1894.

[2] See Mr. Praeger's "Flora of Armagh," *I.N.*, 1893.

[3] Excluding *Epipactis palustris* and *Cephalanthera ensifolia*.

be found, perhaps, to contain nothing strikingly novel for students of the Dublin flora. It is hoped, however, that they may serve to exhibit with some clearness the county distribution of the Dublin orchids, as at present known, and thus show the direction in which further inquiry may be useful.

Malaxis paludosa (Sw.)—Bog Orchis.—Still in some abundance in its old station on Glendhu Mountain, where I had the pleasure of pointing it out in September last to Dr. Leitch, of Silloth, who on the same day discovered another station for the species on the mountains to the eastward above Glencullen Bridge, at a height of 1,000 feet. For ten years this plant has maintained itself in precisely the same patch of *Sphagnum* on Glendhu Mountain. It would be of interest to know whether it still holds its ground in its earliest recorded Dublin station, at the head of Glenasmole, where it was found eighty years ago by John Templeton, who, in his MS. *Irish Flora*, records the discovery in these words:—"In marshy places about Kelly's Glen, River Dodder, July, 1814, in company with Dr. Taylor and Mr. Mackay; in flower July 23rd, 1814." Mr. John Bain, who more than once gathered the plant here in his early botanical excursions with Dr. Mackay about the date of the publication of the *Flora Hibernica* (1836), tells me that Templeton's station is no doubt the mossy plashes on the right above Grierson's, now Cobb's, Lodge at the head of the glen. *Malaxis*, it may be noted, should be sought for not only in living *Sphagnum* beds, but also round their edges, where a constant trickle of moisture passes over freer ground. In its Glendhu station it usually occurs in groups or clusters, a number of small plants, one inch or less in height, surrounding a larger, sometimes three-inch, central plant. This outer ring arises, no doubt, from the growth of the characteristic leaf-bulbils dropped by the more mature central plant.

Ranging in Dublin from 1,000 to 1,300 feet.

Listera cordata (R. Br.)—Lesser Tway-blade.—Probably abundant in the Dublin mountains wherever the heather is well grown and not too dense below. First recorded for the county in the late Mr. A. G. More's *Recent Additions* (1872). Mr. H. C. Hart tells me that he gathered the plant on Feather Bed Mountain in 1867. It occurs frequently on Glendhu Mountain, on Kippure, and on the slopes between Kilmashogue and the Three Rock.

Ranging from 1,200 feet on Kilmashogue to 2,000 feet on Kippure.

Listera ovata (R. Br.)—Common Tway-blade.—Abundant in the county, especially on moist "drift" banks. Specimens gathered last year on the railway cuttings between Raheny and Killester, where this orchid grows in great profusion, measured 2 feet 2 inches in height, with leaves 6 inches by 3 inches. The three-leaved form mentioned in Smith's *English Flora* (4th Ed., 1830), is probably not uncommon in the county. Mr. W. H. Bloomer has shown me fine specimens of it gathered

on the railway banks, near Shankill, and I have found the form frequent in woods near the head of Saggard Slade.

Ranges from sea-level at Balbriggan to 1,000 feet on Slieve Thoul.

Spiranthes autumnalis (Rich.)—LADY'S TRESSES.—Apparently very rare in the county. Recorded from Bray Common, from Killiney, and from Loughlinstown, but not recently. Found on the North Bull about the year 1885 by the late Mr. A. G. More. It would be desirable to search for this plant along the top of the drift banks from Killiney to the Bray river, towards the middle or end of August.

Epipactis palustris (Crantz)—MARSH HELLEBORINE.—This species appears to have been formerly much more abundant in the county than at present. Templeton, in his MS. *Flora*, gives the following localities :—"Jamestown, ½ mile beyond Kilgobbin, Co. Dublin, Dr. Stokes, October 26, 1801. Plentiful in a bog in the neighbourhood of Killiney Bay, and among the sand-hills at Baldoyle Strand." The first of these is its earliest recorded Dublin station : in the third, better known as Portmarnock sand-hills, it still holds its ground, Mr. Praeger having gathered it there last year. The plant is now perhaps extinct in the stations Stagstown and Kingstown[1] given by Wade in his *Plantæ Rariores* (1804). Should this be so, it would make all the more acceptable the new station quite recently added in Glenasmole, where a considerable number of plants was discovered by Rev. C. F. d'Arcy on this year's June excursion of the Dublin Field Club.

Lowland in the county, reaching only to 600 feet (in Glenasmole).

Epipactis latifolia (Sw.)—HELLEBORINE.—Recorded in Mackay's *Catalogue of the Indigenous Plants of Ireland*, 1825, for Portmarnock sands, an unsatisfactory *habitat* for a woodland species. In Mackay's *Flora Hibernica*, published eleven years later, the Portmarnock station is transferred to *E. palustris*. Though the plant is marked in the *British Association Guide*, 1878, as "rather rare" for Dublin and Wicklow, I had no recent records for the county, until last month (July, 1895), when I had the good fortune to discover about a dozen plants of this species in a wood near Ballybetagh, north of the Scalp.

Orchis pyramidalis (Linn.)—PYRAMIDAL ORCHIS.—A decidedly calcicole[2] plant, abundant in Dublin, where it finds in almost all

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[1] Not, of course, the modern Kingstown, the Dunleary of Wade's generation; but the district of Kingston, lying about a mile N. of the Scalp, where the Rev. S. A. Brenan informs me he gathered the plant in 1860.

[2] This convenient word is adopted from Coutejean's "Geographie Botanique," Paris, 1881, as it clearly denotes the observed connection between lime-soils and certain species of plants, without in any way begging the very vexed question as to whether the influence of the mineral is chemical or mechanical.

quarters a congenial habitat on the limestone drift spread over so large an area. It occurs in all the eight botanical districts into which I have divided the county, and is apparently lowland here, as elswhere in Ireland, hardly reaching to a higher level than 600 feet.

Orchis Morio (Linn.)—GREEN-WINGED ORCHIS.—Like the preceding species, though rare in many parts of Northern and Southern Ireland, the Green-winged Orchis is widely distributed through Dublin, where it has been observed in seven of the eight county districts. It grows in great profusion at Baldrummond, N.E. of Ballyboghil, where I found it in May last, thickly spread over some acres of damp pasture. It is frequent in sandy fields to the E. of Portrane peninsula and abundant on the drift banks of Glenasmole and its tributary glen of Glassamucky.

Ranges from sea-level to 1,000 feet at Piperstown.

Orchis mascula (Linn.)—EARLY PURPLE ORCHIS—Occurs in all eight districts of the county, where, however, it seems less abundant than in the North of Ireland.

Ranges to 750 feet in Glassamucky glen.

Orchis incarnata (Linn.)—Apparently rare in the county, having been found, so far, in only two of its districts. It is recorded from sandy pastures at Sutton and Portmarnock, and occurs in considerable quantity by the Grand Canal at Hazlehatch and in the Slade of Saggard, above the old bridge.

Ranges from sea level to 600 feet at Saggard Slade (1).

Orchis maculata (Linn.)—SPOTTED ORCHIS.—The commonest orchid of County Dublin, as it is, perhaps, of all Ireland, and indeed of the British Isles. Well distributed through all eight districts of the county.

A high ranging species in Dublin, as it is throughout the British Isles, reaching to 1,950 feet on Seefingan mountain.

Ophrys apifera (Huds.)—BEE ORCHIS.—This, perhaps the handsomest of the Dublin orchids, occurs in five of the county districts, all the stations, with one exception, the Green Hills, being near the coast. It is apparently rare in all its Dublin stations, save at Skerries, where Rev. T. B. Gibson found it in abundance in 1892.

A lowland and distinctly *calcicole* species, probably occurring in many other stations on drift banks and gravel eskers.

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(1). *O. latifolia*, Linn., is for the present omitted from the county list, as it is to be feared that, though recorded from many stations, it has not been discriminated from *O. incarnata*. Treating the two species as an aggregate, the county distribution will be extended to four districts.

Habenaria conopsea (Benth.)—FRAGRANT ORCHIS.—Widely distributed in the county, occurring in seven of the districts, and very abundant in many places on the drift, especially in railway cuttings. It grows most luxuriantly in the cuttings near Killester on the Great Northern Railway, where I have gathered specimens measuring fully 1 foot 11 inches in height.

Lowland in the county, reaching only to about 650 feet (in Glenasmole.)

Habenaria viridis (R.Br.)—FROG ORCHIS.—Rather common, occurring in six of the county districts, and abundant in many stations in the uplands, as on the Brittas Hills, in Upper Glenasmole and round Friarstown and Piperstown. This species seems to be quite indifferent as to soil. It appears on the basalt at Ballynascorney, on the limestone drif at Balbriggan and Glenasmole, in sandy pastures by the shore near Skerries, and in stiff non-calcareous clays on Carrickbrack in the Naul Hills.

Ranging from sea-level to 1,000 feet on Mount Seskin and Kilakee Mountain, and to 1,050 feet on Knockanavea.

Habenaria albida (R.Br.)—Rare, recorded only from two districts of the county. Templeton, in his MS. *Flora*, enters it as found "in pastures on the sides of Kelly's Glen, Dodder River," the date of the record being certainly not later than 1820. It still maintains itself in this station, where Mr. Greenwood Pim gathered it in 1889, and Dr. M'Weeney so recently as in 1894.

Habenaria chlorantha (Bab.)—BUTTERFLY ORCHIS.—Rather frequent in the three mountain districts of the county, as on the northern slopes of Slieve Thoul, in Upper Glenasmole and at Ticknock. This is, no doubt, the species recorded by Wade in his Catalogue of Dublin Plants (1794) under *Habenaria bifolia* as found "at Stagstown" (Ticknock) and "between Lugmore and Kilty-loones" (Kiltalown).

Ranges to 900 feet on Slieve Thoul.

To the foregoing notes on the orchids clearly entitled to a place in the present-day flora of the County Dublin, may be added a few words on the following two species, which, though recorded for the county, have not been recently observed.

Neottia Nidus-avis (Rich.)—BIRD'S NEST ORCHIS.—For this there are two old records, both for the same locality, Woodlands, on the Liffey, a most likely station for the plant. Wade, in his *Plantæ Rariores* (1804), gives us the first record in these words:—"In the thickets among the rotten leaves, Luttrellstown[1] wood, Co. Dublin, flowering so early as April." The flowering season here given would appear to point to *Lathræa*, which still

[1] The old name for Woodlands.

grows in Woodlands, rather than to *Neottia*. Yet Wade could hardly have mistaken one plant for the other, and his record is supported by the following from the MS. *Flora* of John Templeton, a more competent authority:—"In Luttrelstown wood, Co. Dublin, Mr. Brinkley;[1] seen in abundance by Dr. Taylor and myself, July, 1814." I have not myself had an opportunity of looking for the plant in Woodlands at the proper season, and it is most desirable that a thorough search should be made. Perhaps some reader of the *Irish Naturalist* can refer me to a record more recent than Templeton's.

Habenaria bifolia (R. Br.)—There does not appear to be any definite recent record for this. The older records belong to a period before the species was limited by the separation from it of *H. chlorantha* (Bab.). There is nothing in the known Irish distribution of the plant to make its appearance in the county improbable.

I shall be happy to receive notes, accompanied by specimens, of further County Dublin localities for any of the rarer orchids mentioned in these jottings, and more especially for either of the two which I have ventured to exclude from the actual county flora.

BIRDS OBSERVED BREEDING ON THE COASTS OF SLIGO AND MAYO.

BY ROBERT WARREN.

(A Report laid before the Royal Irish Academy, 28th May, 1894.)

(*Concluded from page* 184.)

On reaching Belderig and stopping at the post-office and public-house, I made enquiries about the eagles, but could get no definite information about them, until a young keeper from Glencalry, coming for letters, hearing my enquiries, advised me to see an old cliff-climber, named M'Andrew, who it was said knew more about eagles than any man in the country, for he lived all his life near the cliff in which the eyries were situated. The old man lived about three miles away in the mountain, and the keeper offering to show me the way to his house, we set off at half-past three, on our three miles walk over two ranges of hills and through soft wet bog.

[1] Dr. Brinkley, Astronomer at Dunsink and afterwards Bishop of Cloyne. He appears to have botanized a good deal in the County Dublin.

Reaching the cottage at about six o'clock we found the old man cutting grass, but on hearing what we wanted, he became quite excited, threw down his scythe, and would have talked of eagles and their nests all night if allowed. He told me that eagles as long as he remembered regularly bred on that part of the coast until about three years before, when he had the nest robbed by a boy who he let down with a rope over the cliff, and that since then the pair had removed further west to the Porturlin cliffs. On questioning him as to their appearance he described them as follows, saying "The eagle that bred on the cliffs was the *Grey Eagle*, almost as grey as a Goose," and that they lived chiefly on hares, sometimes taking a Duck, or a Hen, and occasionally a lamb, but that they were not nearly so destructive to lambs as the *Black Eagle* that occasionally visited them from the mountains inland near Corick and Bangor"; thus distinguishing between the light-coloured Sea Eagle of the cliffs, and the darker-coloured Golden Eagle of the inland mountains. Finding I had no chance of seeing the eagles I was about to return, when the old man asked if I would like to see some birds on the cliffs, and Loughtmurriga, the former nesting-place of the eagles. So after less than a quarter of a mile's walk up the boggy side of the hill, we came to the sea-cliffs of a great bay, semicircular, like a vast amphitheatre, bounded by wall-like cliffs 600 and 700 feet high from the water. Lying down I looked over the edge, and was amazed at the thousands of birds covering the face of the cliff, and flying about between it and the water, giving the idea of bees swarming round a hive—Puffins, Razorbills, Guillemots, and Kittiwake Gulls, all building in that order, except that the Puffins were everywhere on the face of the cliff from the lowest tier of Kittiwakes' nests up to the very summit. However, I should mention that, for any one of the other birds there must have been a hundred Puffins. I lay for a long time looking on in wonder and amazement at the scene before me, for, although I had read of such gatherings, I was never until then able to realize the fact.

We then moved about three hundred yards to the east and came on another bay opening out from the cliff of Loughtmurriga, 790 feet high; here the birds were still more numerous. Puffins in tens of thousands, all over the face of the cliffs, burrowing in the turfy slopes, and occupying every hole and

corner behind stones and rocks, and every crack and crevice available for a nest. At the base of Loughtmurriga was the island of Moistha (Islan Master of the Ordnance Survey map) separated by a little strait three fathoms deep, and only wide enough for a rowing boat to pass through.

Moistha is an oval-shaped island, 350 feet high, having a rounded grassy top, upon which the Puffins were innumerable, and especially so on the western slope facing the evening sun. Fully a quarter of an acre was thickly carpeted by them, as thickly as they could stow, while the sun shining on their snow-white breasts, and red bills, caused them to look like an immense bed of tulips, or other bright-coloured flowers in a grass garden.

Near the highest part of the cliff, we saw a young Peregrine nearly fledged sitting at the mouth of a hole, in which probably the nest had been ; our attention was directed to him by the loud screaming of the parent birds, after we reached the top of the cliff. A pair of Ravens (the man told us) bred every year in the cliff, until that season, when the Peregrines (or "Blue Hawks," the local name) drove them away. I remained watching this wonderful sight of sea-birds until past eight o'clock, and then returned to Belderig, which I reached close to eleven.

Next morning, the weather still continuing fine, I drove to Porturlin, which, although only seven or eight miles by water, is sixteen miles by road, through a dreary wilderness of flat wet bog, with numerous black-looking pools and loughs interspersed throughout its wide expanse ; and so bare of life, that besides the skylarks, only one solitary Golden Plover appeared in view during the long drive there and back ; and the road was so bad, that for the latter half of the way we had to go at a walking pace, and did not get to Porturlin until nearly two o'clock.

This little fishing village is situated in a deeper and narrower valley than Belderig, reaching the sea by a narrow cove through the cliffs, while to the west of the village, close behind, rises the Hill of Doonmara, 649 feet high, the commencement of the range running on to Portacloy and Broadhaven, also indented by great bays, with crumbling cliffs similar to Belderig.

On arriving at the village, we met all the men and boys just returning from their morning mackerel-fishing, in which they were most successful, the crews of eleven curraghs bringing in on an average 300 to 400 fish each, all taken with hand-lines. I spoke to several about the eagles, but although they all knew and saw the birds frequently, none knew where they bred; until a boy, just coming up while I was speaking, said he knew where the nest was on the cliffs, containing two young ones nearly fledged. So, engaging him to come with me and show the nest, we set off to climb Doonmara behind the village, but when we got to the top, reaching the level plateau of bog that extended along the range of cliffs, he saw the canoes again going out fishing, and not wishing to lose his share of the evening take, he returned, leaving me to puzzle on by myself in search of the eagles. I walked along the cliffs for half an hour, when I came to the first bay indenting the high cliff of Altmore, and if I was surprised at the numbers of birds at Loughtmurriga, I was fairly astonished here when I looked on the cliff, for I think there were tens, and hundreds of thousands of Puffins; the entire face of the stupendous cliffs was covered with them, and the sea below was almost obscured from sight by the swarms of birds on the wing—thousands of Kittiwakes Guillemots, and Razorbills, nesting in the same order as on the other cliffs.

I walked on for half a mile, and came to the second bay running into the cliff of Altredmond, which takes its name from a coastguard whose boat was upset near the base of the cliff; all the crew perished, he only escaping by climbing up the face of this stupendous precipice, where no human being ever climbed before, or ever will again. Looking down over the edge it is impossible to realize how any being without wings could climb from the water, and reach the summit in safety. In this bay the birds were in still greater numbers. Three quarters of an hour's walk brought me to the third bay, which was the same; the cliffs covered, the water dotted over with little flocks, while those on the wing actually swarmed, and gave me the idea of the great "Loonories" in the Arctic Regions as described by Captain Markham and Sir Leopold M'Clintock.

I still walked on ahead, but no eagles appeared, and I came to the fourth and largest bay of all, and, strange to say,

although quite as favourable in appearance as the other bays for seabirds' breeding haunts, none were to be seen, except a few pairs of Guillemots near the entrance.

Not wishing to go any further from Porturlin, as it was late in the day, although there were still some miles of coast unexplored, I sat down to rest, and carefully examined the cliffs with my glass; but I saw no birds of any kind except a pair of Peregrines, and these by their noisy anxiety indicated that they had either eggs or young somewhere near. After a time I perceived a greyish object stirring behind a stone on a ledge, but, unless when moving, perfectly indistinguishable, and this proved to be one of a pair of young Peregrines sitting behind a grey stone; they were about as large as grouse, and some dark feathers appearing amongst their white down gave them that grey colour so like the stones by which they were sitting. After satisfactorily identifying the birds, I set out on my return, and having walked about a quarter of a mile, I heard the screaming of a Peregrine in the distance, and after a time the noisy screams coming nearer, I looked about and perceived just in front of me, flying towards me, a magnificent eagle closely followed by a screaming Falcon. Both birds passed over me, the eagle carrying a hare by the head and forequarters, the rest of the body dangling from his talons as he flew slowly along towards the cliffs, and disappearing below the edge, passed out of sight. I had a good view of the bird with my glass, and seeing the white feathers of the tail, have no doubt of its being the Sea Eagle (*Haliætus albicilla*). The bird had evidently come a long way over the bogs from the inland district, and was carrying the hare to its young in the cliff of "Spink," where the boy told me the nest was situated.

Having thus had the pleasure of seeing the eagle, but not being successful in finding the nest in consequence of the desertion of my guide, I returned to Porturlin, and got back to Belderig between nine and ten o'clock. The weather changed that night, and I was obliged to return home next day on a twenty-mile drive in a storm of wind and heavy rain, which continued for ten days, and prevented my revisiting the cliffs; when the weather cleared up it was too late in the season.

The foregoing notes, being the result of my two days' visit in 1892, were so satisfactory that I was encouraged to pay a

more prolonged visit to this district in 1893, and take more time to explore the range of cliffs as far as Portacloy.

So, on the 23rd of May, in company of my friend Mr. H. Scroope, junr., I set out on my second visit to the North Mayo coast, with the intention of walking along the cliffs from Belderig to Porturlin, and thence to Portacloy, and if the weather permitted to explore the sea side of the cliffs from the water. During our drive from Ballycastle to Belderig we found the Herring Gulls and Green Cormorants breeding here and there along the line of cliffs, and in consequence of being so thinly scattered not appearing numerous anywhere after passing Keadue.

On reaching Belderig at three o'clock, it being too late in the day to go on to Porturlin, we walked from the harbour along the cliffs to the first headland (Benwecruagh) and Horse Island, where the old disused copper mine is situated; the island is a mere mass of rock, about half an acre in extent, probably a hundred feet in height from the water, and joined to the mainland by a ridge or causeway formed by the fallen debris from the cliff, just above the highest spring tides. On the flat summit of the island Oyster-catchers bred, and we found their eggs in a depression in the rock, resting on a few small stones for a lining to the nest. Oyster-catchers breed all along the coast, on the small island rocks, and on the bare summit of the cliffs in many places. In a hole of the cliff in the south-west side a pair of Choughs had a nest, and not far from it a pair of Black Guillemots had a nest also, while another pair were in the water at the base. I was surprised to see the Black Guillemots breeding so high, at least ninety feet above the water. A pair of Grey Crows haunted the cliffs also, and we were told these birds bred in many places along the cliffs of that part of the coast. Guillemots and Razorbills also had nests on the headland and inside the entrance of some large caves at the base.

Next morning we set out on our seven miles' walk over the cliffs to Porturlin, and when crossing the river that flows just below the village of Belderig, we were surprised at hearing a Whinchat singing, and shortly after saw him on a furze-bush on a bank, but although we searched carefully for the nest were unsuccessful, although we were certain it was near, for the bird was always near the same part of the little field. We were

glad to have ascertained that the range of the Whinchat extended so far to the north-west of the county, for the only other locality in North Mayo where I have met this bird is near Killala.

On walking along the cliffs, we found that, irrespective of the great breeding-haunts in the bays, there were many smaller colonies of Kittiwakes, Guillemots, and Razorbills scattered all along; and that many were passed over unnoticed in consequence of not being within view from the land side, it being quite impossible to see them without a boat. On the east side of Loughtmurriga, on a ledge a short way below the summit of the cliff, we saw the old nest of an eagle that had been robbed about four years ago; it was an immense heap of sticks, apparently composed of the thick stems and roots of heather. The various rock-birds were as numerous as ever, but in consequence of the Puffins being hatching inside their holes, the birds sitting on the cliffs and on Moistha Island did not appear in such numbers as when visited later last season.

On the land side of Loughtmurriga, in a patch of the only long heather we met, we were surprised to see a pair of Stonechats and their fully-fledged young flitting about. The slope of the hill on which this long heather was growing had less turf on it, and was drier, which was the cause of the more luxuriant growth. On arriving at Porturlin we engaged a curragh and four men to take us out to Pig's Island (Pig's-back its local name), about half a mile to the west of the harbour, a long narrow island about 150 feet high, with steep sides, and having a great archway through the centre. On the sheltered ledges underneath an immense colony of Kittiwakes bred, while in holes in the turf and under stones large numbers of Puffins and Razorbills were hatching, and Herring Gulls on the grassy top. We put a boy on the rocks, and he scrambled up and got us some Puffins' and Razorbills' eggs, and a clutch of Herring Gulls also, but the wind rising and the sea getting up, he was obliged to hasten down, and it was with great difficulty we got him safe on board again. It was very provoking the wind rising and not giving time to search for the Stormy Petrels that had nests in the turf over the arch, and from which, some weeks later, an addled egg and several birds were sent to Mr. Scroope. On several rocky islets at the

base of Altmore inside Pig's Island, thousands of Razorbills and Guillemots were sitting—birds that would have been unnoticed from the land side. It was most disappointing that during our stay the wind kept blowing persistently from the north-west, raising such a swell on the rocks that we had no opportunity of exploring by boat, and until this can be done the list of birds met with must necessarily be imperfect. We then got to our car, and back to Belderig for the night, and next morning drove by road to Porturlin, sending the car on from there to meet us at Portacloy after our walk along the cliffs.

Having engaged a very intelligent boy for a guide, we set off on our walk over the cliffs. The bays at Altmore and Altredmond have certainly the largest number of sea-birds yet met with; I am certainly within bounds when I say the Puffins were in hundreds of thousands, almost millions. At Altredmond we saw another old nest of the eagle; after passing the last-mentioned bay we came to another, the large bay mentioned in my first visit as having no sea-birds except a few Guillemots and Razorbills near the entrance. A little beyond it was a smaller bay bounded by the headland of "Spink," where the eagle's nest was last season. This was a curiously shaped pointed rock, the outer end rising up into a sharp pinnacle twenty or thirty feet high, upon which the eagles used to stand, having a fine look-out all round them, both inland and over the sea, so that they could not be approached unawares from any side; and some feet below the nest was situated, but not visible from the land side; but although we saw nothing of the eagles that day, the boy told us they were all the season about the cliffs. In the same cliff a pair of Peregrines had a nest, and we saw the Teiral take a Puffin out of a flock and carry it to his mate and young at the nest. From that bay right on to Portacloy the sea-birds were breeding in large numbers, while at Portacloy we found the largest colony of Guillemots and Razorbills that we had yet seen, breeding by themselves apart from other birds. There was another eyrie of Peregrines in the cliff on the east side of the cove, and a colony of Choughs, of which we saw the site of one nest. Not having time to explore what remained of the few miles of coast between Portacloy and Broadhaven, including Benwee Head, we returned to Belderig for the night,

thus ending a most enjoyable and interesting visit to a line of coast which, for the number and variety of the birds breeding on it, and for its wild and rugged scenery, cannot be equalled in Ireland.

APPENDIX.

In the first part of this report, published in the July number of the *Irish Naturalist*, I erroneously stated (page 182, line 5) "that for six miles west of Kilcummin Head no breeding haunt is met with until Downpatrick Head is reached." I was unaware, until a few weeks ago, of the fact of birds breeding in that part. I had never visited it, nor could I get reliable information until my young friend, Mr. G. Scroope, of Ballina, passing along the coast in an excursion steamer on the 28th of June, observed several breeding stations on the cliffs between Lacken Bay and Downpatrick Head. Stimulated by this information, on the 11th inst., in company of Mr. G. Scroope, his father, and brother, I drove to Lacken Bay, and then walked along the cliffs as far as Crevagh Head, where we were obliged to return by heavy and persistent rain coming on.

We met five breeding stations of Kittiwake Gulls (the smallest of about 130 pairs), while Razorbills and Guillemots frequented each station. Herring Gulls were met with at only two. A pair of Great Black-backed Gulls were also observed, but not breeding, having evidently come from their great breeding-haunt on Doonbrista, off Downpatrick Head.

As Crevagh Head is only half-way to Downpatrick, many other stations are probably on the unexplored cliffs extending in that direction, which at some future time I hope to visit. The Green Cormorants breed all along the line of coast, but none of the Great species were seen anywhere on the cliffs during our walk.

CAPTURES OF COLEOPTERA IN IRELAND DURING THE SPRING OF 1895.

BY JAMES J. WALKER, R.N., F.E.S.

HER MAJESTY'S ship "Northampton," employed on special training and recruiting service, visited several Irish ports during April and May of the present year, and I lost no opportunity of working hard for Coleoptera whenever I was able to land. I was favoured with fine weather during nearly the whole of the cruise, but a hard gale of wind experienced at two of the most interesting places—viz., Bangor and Buncrana, interfered somewhat with collecting, and no doubt reduced the number of species which would otherwise have been observed. At the suggestion of the Rev. W. F. Johnson of Armagh, I forward a full list of my captures to the *Irish Naturalist* as a small contribution to our knowledge of the Coleopterous fauna of Ireland. All the species on which I had any doubt have been examined and identified by my friend, Mr. G. C. Champion.

Taken at Queenstown, Co. Cork, 27th April to 8th May, 1895:—

Carabus nemoralis, Mull.—Scarce.
C. granulatus, L.—Common under stones, &c.
Notiophilus biguttatus, F.
Nebria brevicollis, F.
Loricera pilicornis, F.
Clivina fossor, L.—Common.
Badister bipustulatus, F.—Occasional under stones.
Acupalpus dorsalis, F.—Local, by sweeping in damp places and under stones.
A. exiguus, var. **luridus,** Dej.—With the preceding, scarce.
Harpalus latus, L.—Common, under stones on dry hill-sides.
H. proteus, Payk.—Not common.
Dichirotrichus pubescens, Payk.—Under stones on the shore.
Pœcilus cupreus, L. } Occasionally found running on paths,
P. versicolor, Sturm. } &c.
Pterostichus madidus, F.
P. vulgaris, L.
P. nigrita, F.
P. strenuus, Panz. } Not rare, in damp places.
P. diligens, Sturm.

Abax striola, F.—Occasionally under stones.

Amara lunicollis, Schiod.
A. communis, Panz.
A. trivialis, Gyll. } On paths, &c., close to the town.

Calathus cisteloides, Panz.

Anchomenus parumpunctatus, F.—Damp places.

Bembidium rufescens, Guer.—Scarce, under stones.
B. obtusum, Sturm.
B. lampros, Herbst.

Demetrias atricapillus, L.

Dromius linearis, Ol.
D. nigriventris, Thoms.—Scarce, under stones on hillsides.

Agabus bipustulatus, L.

Cyrinus opacus, Sahl.

Aleochara brevipennis, Gr.—One specimen.
A. lanuginosa, Grav.
A. mæsta, Grav.

Oxypoda longiuscula, Er.—In wet places.

Astilbus canaliculatus, F.

Homalota vestita, Gr.—On muddy sea-shore.
H. graminicola, Gyll.

Tachyporus obtusus, var. **nitidicollis,** Steph.—Not rarely, by sweeping, &c.

Tachinus rufipes, L.

Megacronus cingulatus, Mann.—One specimen, under a stone.

Mycetoporus splendens, Marsh.

Quedius tristis, Grav.
Q. molochinus, Grav.
Q. fumatus, Steph.—One example.

Staphylinus pubescens, DeG.—Four specimens, on dusty road.
S. cæsareus, Ceder.—Common.

Ocypus ater, Grav.—Occasionally under stones.

Philonthus splendens, F.—One fine male, by sweeping.
P. laminatus, Creutz.
P. marginatus, F.

Xantholinus linearis, Ol.

Baptolinus alternans, Grav.—Under decaying fir bark.

Lathrobium boreale, Hoch.
L. brunnipes, F.—Common.
L. quadratum, Payk.—One specimen, in wet place.

Platystethus cornutus, Gyll.—By sweeping.

Bryaxis hæmatica, Reich.—One, by sweeping.

Silpha atrata, L.—Common, and very variable, from the most pronounced form, *subrotundata,* Steph., to specimens indistinguishable from those I have from Kent and Hampshire.

Choleva sericea, F.—By sweeping.

Hister carbonarius, Ill.—Taken on the wing.

Coccinella xiv-guttata, L.
C. xvili-guttata, L.
C. xiv-punctata, L.

Epuræa melina, Er.—By sweeping.
E. florea, Er.

Omosita discoidea, F.—Scarce.

Meligethes viridescens, F.

Coninomus nodifer, Westw.—One or two, by sweeping.

Micrambe vini, Panz.—Common, on furze-blossom.

Onthophagus fracticornis, Payk.—Locally common, in sheep-dung.

Aphodius erraticus, L.
A. fossor, L.
A. ater, DeG.
A. merdarius, F.
A. rufipes, L.
} More or less plentiful, in dung.

Athous hæmorrhoidalis, F.—Common, by sweeping.

Cyphon variabilis, Thunb.

Helodes marginata, F.—Common, by sweeping on the banks of a stream.

Cis festivus, Panz.—Rare, under Beech bark.

Lema lichenis, Voet.—Common, by sweeping, varying to quite black.
L. Erichsoni, Suffr.—Six specimens of this rare species were taken on May 7th and 8th, by sweeping on grassy banks.

Chrysomela Banksi, F.—Scarce.

Gastroidea viridula, De G.—On dock, rather sparingly.

Phædon armoraciæ, L.

Galerucella tenella, L.

Haltica lythri, Aubé—One specimen, by sweeping.

Phyllotreta nemorum, L.
P. brassicæ, F.—On *Cardamine pratensis*.

Aphthona nonstriata, Goeze—Abundant, on *Iris pseudacorus*.

Plectroscelis concinna, Marsh.

Helops striatus, Fourc.—Not rare, under fir-bark.

Rhinosimus planirostris, F.—By sweeping.

Meloe proscarabæus, L.—Very local, occurring in one lane only.

Rhynchites minutus, Hbst.—Several, by sweeping.

Apion subulatum, Kirby.
A. miniatum, Germ.
A. cruentatum, Walt.
A. trifolii, L.
A. nigritarse, Kirby.
A. virens, Hbst.
} All more or less common, by sweeping.
A. striatum, Kirby.—Not rare, on furze-blossom.
A. Gyllenhali, Kirby.
A. hydrolapathi, Kirby.
} By sweeping.
A. humile, Germ.

Otiorrhynchus sulcatus, F.—Not rare.
O. picipes, F.—Common.

Strophosomus coryli, F.—Common.

Liophlæus nubilus, F.—Several specimens.

Sciaphilus muricatus, F.—Common.
S. retusus, Marsh.—Not rare, on Furze-blossom, &c.

Sitones cinerascens, Fahr.—Two examples, by sweeping.
S. regensteinensis, Hbst. } Common, on Furze.
S. tibialis, Hbst. }
S. flavescens, Marsh.
S. sulcifrons, Thunb.—By sweeping.

Hypera punctata, F.
H. rumicis, L.—Common, on docks.
H. plantaginis, DeG.
H. trilineata, Marsh.—One or two, by sweeping.
H. nigrirostris, F.

Liosoma ovatulum, Clairv.—Common, in damp places. I have taken the var. *collaris,* Rye, here in moss, in November, 1894.

Orchestes quercus, L. }
O. alni, L. } Rarely, by sweeping,
var. **ferrugineus,** Marsh. }
O. fagi, L.—Abundant on beech.

Erirrhinus acridulus, L.—In damp places.

Dorytomus tortrix, L.—Under poplar bark, rare.

Mecinus pyraster, Herbst.

Anthonomus pedicularius, L.—By sweeping.

Ceuthorrhynchus assimilis, Payk. }
C. erysimi, F. }
C. contractus, Marsh. } By general sweeping.
C. pollinarius, Forst. }
C. pleurostigma, Marsh. }
Ceuthorrhynchidius troglodytes, F. }

Rhinoncus pericarpus, L.

Balaninus pyrrhoceras, Marsh—Scarce.

Rhopalomesites Tardyi, Curt.—Remains common in Beech, but living specimens not observed.

Phlœophthorus rhododactylus, Marsh—One specimen, off Furze.

Pityophthorus pubescens, Marsh (*micrographus,* Brit. Cat.)—One, by sweeping.

At Midletown, Co. Cork, I took the following species on the afternoon of May 6th :—

Amara ovata, F.—One, under a stone.

Aleochara brevipennis, Grav.—One, in dusty road.

Staphylinus cæsareus, Ceder.—Two examples.

Tachyporus obtusus, var. **nitidicollis,** Steph.—By sweeping.

Boletobius trinotatus, Er.—By sweeping, under firs.

Lathrobium boreale, Hoch.

Platystethus cornutus, Gyll.

Omalium excavatum, Steph.
Silpha atrata, L.—Brown variety.
Anisotoma calcarata, Er.—One male specimen.
Olibrus bicolor, F.
Micropeplus margaritæ, Duv.
Monotoma spinicollis, Aube.—By sweeping, under fir trees.
Coccinella hieroglyphica, L.—One specimen.
Aphodius sticticus, Panz.—One example, by sweeping under firs.
Lema Erichsoni, Suffr.—Two examples, by sweeping among weeds.
Prasocuris junci, Brahm.
Hydrothassa marginella, L. } By sweeping, in a marshy place.
Rhinosimus planirostris, F.—By sweeping.
Apion subulatum, Kirby.—Common.
A. Gyllenhali, Kirby.—Several, by sweeping.
A. humile, Germ., &c.
Phyllobius oblongus, L.—Scarce and immature.
Barypeithes sulcifrons, Boh.—By sweeping under fir trees, rare.
Sciaphilus muricatus, F.—Not uncommon.
Cœliodes iv-maculatus, L.—Abundant, on nettles.
Phytobius iv-tuberculatus, F.
Hylastes ater, Payk. } By sweeping under fir trees.

On May 13th and 14th inst., I met with the following species, between Bangor and Newtownards, Co. Down :—

Carabus nemoralis, Mull.—One specimen.
C. granulatus, L.
Pœcilus versicolor, Sturm.—In the road.
Pterostichus madidus, F.
P. niger, Schall.—One specimen.
P. nigrita, F.
Aleochara fuscipes, F.—In carrion.
Staphylinus pubescens, DeG.—One example, caught on the wing.
S. erythropterus, L.—Under stones, and running on the road.
Philonthus æneus, Rossi.
P. laminatus, Creutz.
Lathrobium elongatum, L.
L. fulvipenne, Grav.
Eusphalerum primulæ, Steph.—Not rare, by sweeping.
Silpha atrata, L.—Brown variety only.
Anisotoma calcarata, Er.—Five specimens of both sexes, by sweeping.
Choleva agilis, Ill.—One specimen.
Epuræa æstiva, L.
E. melina, Er.—By sweeping.
Micropeplus margaritæ, Duv.
Latridius lardarius, De G. } By sweeping.
Coninomus nodifer, Westw.

Cytilus varius F.—Three specimens.

Aphodius depressus, Kug.—In dung.

Athous hæmorrhoidalis, F.—Common.

Agriotes obscurus, L.

Corymbites quercus, Gyll. var. **ochropterus,** Steph. } In great abundance, by sweeping in grass fields; intermediate forms common.

Telephorus limbatus, Thoms.—By sweeping.

Lema Erichsoni, Suffr.—Two specimens, by sweeping, on 13th. May.

Lochmæa suturalis. Thoms.—By sweeping heather.

Blaps mucronata, Latr.—One in Newtownards.

Rhinosimus planirostris, F.—By sweeping.

Apion carduorum, Kirby.
A. viciæ, Payk.
A. ervi, Kirby.
A. Gyllenhali, Kirby.—Rather common, by sweeping under trees.
A. hydrolapathi, Kirby.—Common.
A. humile, Germ, &c.

Otiorrhynchus picipes, F.

Strophosomus coryli, F.

Sciaphilus muricatus, F.—Common.

Liophlæus nubilus, F.—Common, some of the specimens very large.

Phyllobius oblongus, L.—Not rare, by sweeping.

Barypeithes sulcifrons, Boh.—Not rare in one place, by sweeping under trees.

Barynotus obscurus, F.—Under stones and by sweeping.

Sitones tibialis, Herbst.
S. sulcifrons, Thunb.

Hypera rumicis, L.
H. polygoni, L.—One or two, by sweeping.
H. trilineata, Marsh.—One specimen.

Liosoma ovatulum, Clairv.—Common, in damp places.

Cœliodes cardui, Herbst.—Rarely, by sweeping.

Ceuthorrhynchus ericæ, Gyll. } By sweeping heather at "Helen's
C. contractus, Marsh. } Tower."
C. quadridens, Panz.—Not rare, by sweeping.
C. pollinarius, Forst.
C. angulosus, Boh.—Three examples of this very rare species were taken on May 14th, by sweeping under trees bordering a marshy place, about a mile from Bangor.
C. pleurostigma, Marsh.—Common.
C. rugulosus, Herbst.—One or two by sweeping.

Rhinoncus pericarpius, L.

Litodactylus leucogaster, Marsh.—One, by sweeping on banks of a pond.

Phytobius 4v-tuberculatus, F.—One or two, by sweeping.

(TO BE CONCLUDED.)

NOTES ON A NEW BRITISH BEETLE.

Otiorrhynchus auropunctatus, Gyll.

WITH REMARKS ON THE DISTRIBUTION OF IRISH ANIMALS.

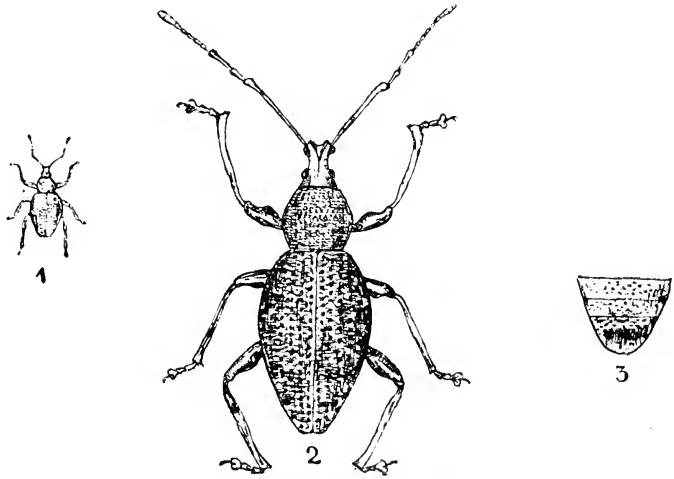
BY GEORGE H. CARPENTER, B SC.

THREE years ago, Mr. H. K. Gore Cuthbert, in a paper on the Weevils of South Louth,[1] recorded a species from the north of the Boyne mouth obtained by beating Alder and Beech as *Otiorrhynchus maurus*, Gyll., a mountain beetle of which the only Irish specimens were taken in 1875 by Mr. G. C. Champion on Slieve Donard[2]. Mr. Cuthbert remarked that his insects were much lighter in colour than the typical *O. maurus*. Mr. J. N. Halbert recently took the same species in some numbers at various points in Cos. Dublin, Meath and Louth, and, with his usual careful discrimination, observed structural differences between it and *O. maurus* of much greater value than the colour distinction. A suspicion that we had a Weevil new to the British list was awakened, and specimens were sent to some of the leading British coleopterists. One of them, Mr. G. C. Champion, in a recent note,[3] has pronounced the insect to be *O. auropunctatus*, Gyll., a Pyrenean species, found also in the Auvergne and in Spain, and a most noteworthy addition to our fauna.

The identification of this Weevil as *O. maurus*, Gyll., was natural enough, as, by the table for discriminating the *Otiorrhynchi* in Canon Fowler's "Coleoptera of the British Islands,"[4] the captor of our insect would be readily led to refer it to that species, with which *O. auropunctatus* agrees in its unspined front femora, and rugose pronotum and elytra. It is, however, not closely related to *O. maurus*, from which its much longer legs and antennæ distinguish it at once. The first two joints of the funiculus of the antennæ are considerably longer than the succeeding joints, and are themselves of unequal length, the second being half as long again as the first (fig. 2). The British species to which it approaches most nearly is *O. tenebricosus*, Herbst; from this, as Mr. Champion points out, it may be easily separated by its smaller size, and

[1] *Irish Nat.*, vol. i., 1892, p. 158. [2] *Ent. Mo. Mag.*, vol. xii, p. 82.
[3] *Ent. Mo. Mag.*, vol. xxxi., 1895, p. 133. [4] Vol. v., p. 174.

rougher surface. Mr. Champion further remarks that it resembles *O. atroapterus*, DG., in shape and size, but differs also from that species in its rougher sculpture. *O. auropunctatus* derives its name from the scattered patches of golden pubescence on the thorax and elytra—an adornment which becomes very easily rubbed off. Our Irish specimens vary in colour from rich chestnut brown to almost black.



Otiorrhynchus auropunctatus, Gyll.
Fig. 1 Female, nat. size. Fig. 2 Male, magnified.
Fig. 3 Hinder end of abdomen of Male.

The section of *Otiorrhynchus* to which *O. auropunctatus* belongs is characterised[1] by the very distinct longitudinal striation (fig. 3) beneath the hindmost abdominal segment in the male. This group is specially characteristic of the Mediterranean district and Southern Europe, only a few species —of which *O. tenebricosus* is one—extending their range into Central and Northern Europe. We have, therefore, in this beetle a most interesting addition to the group of animals of southern origin, which, absent or extremely rare in northern Continental Europe and in Great Britain, form so interesting a feature in the fauna of Ireland.

From the various captures of this weevil by Messrs. Cuthbert and Halbert, it appears to be distributed along the eastern Irish coast from Carlingford to Dublin. The localities where

[1] G. Stierlin—Bestimmungstabellen der Europ. Curculioniden Schaffhausen, 1883.

it has been found are Santry, Raheny, Portmarnock, and Donabate in Co. Dublin ; Laytown in Co. Meath ; Termonfeckin and Carlingford in Co. Louth. It is obtained by beating shrubs and trees. It is certainly remarkable that so comparatively large an insect should have been overlooked by the older naturalists ; not a specimen is to be found in the collection of that prince of Irish entomologists, the late A. H. Haliday. One can only conjecture that, in the localities where the insect occurs, he did not for some reason collect by beating or sweeping. The wide distribution of the weevil and the analogy of its range with that of other animals show that its presence here cannot be ascribed to recent introduction. While it is not possible to assert definitely that *O. auropunctatus* does not occur in Great Britain, it is hardly likely that it has been overlooked for many years in a country so well supplied with coleopterists.

From the discovery of this weevil in Ireland we are naturally led to speculations as to how it found its way here. In a case in the Dublin Museum, recently described by me,[1] I have ventured to roughly group the animals of the British fauna in three divisions :—those with a wide range over the whole of our islands, those characteristic of the south-eastern and lowland districts of Great Britain ("Teutonic Fauna"), and those characteristic of Ireland and the western and highland districts of Great Britain ("Celtic Fauna"). In this last division, two distinct groups of animals at least can be recognised. One includes animals of northern origin, characteristic of northern and arctic Europe, and sometimes also of the Alps, which have come into Ireland by way of Scotland ; of such the ground-beetle *Pelophila borealis*, is perhaps the most striking example. The other group comprises animals of southern origin, which, outside the British Isles, are found in the Mediterranean district, and extend their range in some instances as far as the Madeira, Canaries, and Azores. It is clearly to this latter group that *Otiorrhynchus auropunctatus* must be assigned.

Dr. R. F. Scharff's recent preliminary paper on the Origin of the Irish Fauna[2] will doubtless be fresh in the minds of all readers of these remarks, and his support of the theory

[1] *Report of Museums Association*, 1894,, pp. 109, 117.
[2] *Proc. R.I.A.* (3) vol. iii., 1894, p. 479.

of an ancient freshwater lake on the site of the present Irish Sea and St. George's Channel, with land-connections to the north and to the south of it, across both of which animals passed into Ireland, will be seen to correspond with the subdivisions of our fauna which I have here suggested. As Dr. Scharff states that the land-connections in question were of Pliocene age, it is clear that he does not believe in the total extinction of our fauna either by land-ice or by submergence during the Pleistocene Period, which is generally held by geologists and zoologists. For the reasons for this disbelief we must await the publication of his promised large memoir. I would, however, call attention to the fact that Mr. Jukes-Browne[1] locates a lake in a similar situation during the Pleistocene Period, after the Ice Age had passed away, and the land had risen once more from the glacial sea. He supposes the immigration of our fauna to have taken place then. But, whether earlier or later, it seems clear that the animals of the Celtic fauna were passing, one group southwards, the other northwards, between the St. George's lake and the coast of the Atlantic, then far to the west of the present Irish coast-line, before the animals of the Teutonic fauna crossed the site of the present North Sea into Great Britain. The breaking down of the land-connections with Ireland, and the conversion of the St. George's lake, first into a gulf, and then into a sea-channel, prevented, as has been pointed out by Dr. A. R. Wallace[2] and other naturalists, the extension of these into Ireland.

The distribution in Ireland of *Otiorrhynchus auropunctatus* recalls that of the land-snail, *Helix pisana*, which inhabits our eastern coast to the north of Dublin, extending however only from the south of Co. Louth to Rush in Co. Dublin, but appearing in Great Britain at points in South Wales and Cornwall. Its distribution abroad extends all over the Mediterranean region and to the Madeira, Canaries, and Azores. Another distinctively Mediterranean animal, the ground-beetle *Nebria complanata*, now placed by Dr. Ganglbauer[3] in a peculiar genus, *Eurynebria*, is also characteristic of the east coast of Ireland, but is found only to

[1] "The Building of the British Isles," London, 1888, p. 298, Pl. xiv.

[2] "Island Life," 2nd ed., London, 1892, p. 379.

[3] "Die Käfer von Mitteleuropa," vol. 1, Wien, 1892, p. 98.

the south of Dublin, in Counties Wicklow and Wexford. Like *Helix pisana*, it occurs also in South Wales and South-western England (North Devon). Now, most of the distinctive Celtic animals of southern origin are characteristic of the west coast of Ireland, where occur those plants of the Atlantic type which have made our western counties so fascinating a field for botanists. For example, the famous Kerry Slug, *Geomalacus maculosus*, and the Galway Burnet Moth, *Zygæna nubigena*, are unknown in eastern Ireland. It seems therefore that we can trace for the Celtic animals of southern origin a western and an eastern line of migration; the former along the Atlantic sea-coast of the old continental land, the latter along the valley of the river which flowed south-westward from the ancient St. George's lake, and which must have received the Severn and the rivers of eastern and southern Ireland as tributaries. Our fine Dublin House-Spider, *Tegenaria hibernica*, Cb., very closely allied to a Pyrenean species, must be regarded as belonging to the eastern migration. It occurs in Cork as well as in Dublin, but we must remember that the Lee as well as the Liffey was a tributary of the ancient eastern river. This spider, though undoubtedly indigenous, has apparently found human dwellings more comfortable than the open air in our north-western island.

If we accept Dr. Scharff's view that our Celtic fauna is pre-Glacial—and it is certain that it is older than the Teutonic fauna—we might believe that by the ancient Atlantic coast, and along the banks of this old river, such mild conditions of climate prevailed that species were able to maintain themselves in those localities, while most of the present land-surface of Ireland was covered with glaciers. The objection to such a view, which will at once occur to geologists, is the apparent submergence of the hills of Wales and Dublin to the extent of about 1,400 feet as evidenced by the shell-gravel on Moel Tryfaen and Two-rock Mountain. Moreover, the marine origin of the Boulder-Clay which Mr. J. Wright's recent discoveries of foraminifera in that deposit render highly probable, would require a submergence as fatal to a pre-Glacial fauna as the orthodox ice-sheet. But, if the migrations we are discussing took place in Pleistocene times as the ice passed away, and the land (after deep submergence and subsequent elevation) subsided towards its present level, the animals would

naturally reach their present stations on the western and eastern Irish coasts respectively. Some individuals of the eastern (river-valley) migration would retire eastwards towards what is now south-western England and Wales, where a few of their descendants are still to be found; but the incursion of the newer Teutonic fauna has made their persistence there harder than in Ireland, and so we find that some of the species, as *Otiorrhynchus auropunctatus*, are absent from Great Britain, while the rest are scarcer there than in Ireland. Some animals of the western migration seem to have passed on northwards into Scotland; the Galway Burnet Moth for instance occurs in Argyllshire. The land-connection to the north of the old lake remained after the southern river-valley had been submerged beneath the sea.[1]

As an example of a southern species which appears to have followed both the western and eastern lines of migration, we may take our peculiar holly-boring weevil, *Mesites Tardyi*, Curtis, belonging to a most characteristic Mediterranean and Atlantic genus. Abundant in the south-west of Ireland, this insect occurs near Westport, and in the Clyde and Argyll districts of Scotland; it seems therefore to have passed northwards along the old Atlantic seaboard. But it is also found at places on our eastern coast from Wicklow to Belfast, as well as across the Channel in North and South Devon, which suggests that it also followed the old river and lake valley to the east of modern Ireland.

Our comparison of the distribution of our new British Beetle with that of other animals has therefore opened up to us problems of the highest interest in the past geography of our islands, and of the neighbouring continental lands. The discontinuous range of these southern forms shows them to be of very considerable antiquity. Whether they entered our country in Pliocene or Pleistocene times, they must have preceded those members of our fauna which have come to us directly from Central Europe. The land-tracts over which these distinctly Pyrenean and Mediterranean animals had travelled to Ireland, were covered by the waters of the sea, while early races of men were still able to ramble into Britain over an isthmus where the waves of the Straits of Dover and the North Sea now roll.

[1] Cf. A. J. Jukes-Browne, *op. cit.*, Pl. xv., and R. F. Scharff, *loc.* p. 485.

PROCEEDINGS OF IRISH SOCIETIES.

Royal Zoological Society.

Recent donations comprise a Badger from W. J. Matson, Esq., and a number of fish from P. Mahony, Esq. A Golden Agouti has been purchased, and a Red Deer fawn born in the Gardens.

16,150 persons visited the Gardens in June.

Dublin Microscopical Club.

May 16th.—The Club met at Mr. F. W. Moore's.

Mr. Greenwood Pim exhibited a curious black mould which occurred on Bananas, given him by Prof. Cole, and which had been imported from the Canary Islands. Being unable to identify it, Mr. Pim sent specimens to Mr. Massee, who states it is *Glenospora Curtisii* (Berk.), and that it had not previously occurred in Great Britain.

Professor T. Johnson exhibited *Ectocarpus secundus* (Kütz.), a brown sea-weed showing two kinds of flurilocular sporangia, like those described recently in this species by Bornet, who found the plurilocular sporangia differing in size, shape, and in the size of the compartments. The contents of the larger loculi are probably female, and of the smaller male. Direct experimental evidence is required. The species (taken in Bantry Bay) is an addition to the list of Irish species.

Mr. M'Ardle exhibited *Diplophyllum minutum*, (Dicks.), which he collected recently in Lord Howth's demesne. The specimens of this rare liverwort showed the dichotomous branching of the plant, and shoots bearing in the axil of each leaf antheridia of a large size, having remarkably long pseudopodia..

June 20th.—The Club met at Mr. Greenwood Pim's, who exhibited *Ustilago Vaillantii* (Tul.), which occurred on the anthers and ovones of *Scilla bifolia* in the Trinity College Botanic Garden, forming the so-called "Black-eyed" variety of that *Scilla*. It was referred to Dr. P. Wright, who kindly identified it, and states that it is an addition to the British Mycologic Flora. It is said to occur also on *Gupa lutea*.

Mr. M'Ardle exhibited *Jungermania bicrenata* (Lindenberg), which he recently collected in Howth Demesne. This scarce plant is easily separated from the other bidentate *Jungermaniæ* by the smaller size, acute segments of its leaves, and remarkable guttulate cells, and above all the parœcious inflorescence. It is an addition to the Co. Dublin list of liverworts.

Mr. J. N. Halbert exhibited the nymph of *Cryptostemma alienum*, H.S., recently captured amongst wet gravel in the bed of the Dodder, near Tallaght. Mr. A. H. Haliday, when recording this insect from the Black Lakes, Co. Kerry (*Nat. Hist. Rev.* 1855, p. 61), mentioned the occurrence of the yellowish larvæ and pupæ with the perfect insect. The nymph, however, is further distinguished by the presence of a well-defined red colour patch on the dorsal side of the 2nd, 3rd, and 4th abdominal segments. This species, which at first gave some trouble as regards its affinities, is now placed among the *Cimicidæ* next *Ceratocombus*.

Mr. Henry J. Seymour showed a section of a Gold-bearing Quartz-Diorite, from Fort Salisbury, Matabeleland. The gold, which occurs in small fragments quite visible to the unaided eye, is almost entirely

developed in, or near, the crystals of hornblende; the latter making up about 20 per cent. of the total bulk of the rock. In the mass, the rock has a slight schistose structure, and is said to yield from 80-100 oz. of gold per ton. The mean result of several experiments gave its sp. gr. as 2·85. A few crystals of sphene, and some of titanic iron, appear in the section.

Rev. Canon Russell showed a preparation of the feathers of a duck showing the scales, to the peculiar structure of which their irridescence is evidently due. The feathers had been boiled first in caustic potash, and reduced almost to a pulp, and then put up in glycerine jelly. Their metallic lustre could be plainly seen after this treatment under reflected light. The barbs seem to be composed of a single file of cells, marked longitudinally with fine lines like those on the scales of the wings of the Lepidoptera, which bring out the colours found on all such striated surfaces.

These striæ appear to have been noticed before; but in the centre of each scale there is a well-marked oval or round figure, of which the exhibitor could get no account from any book. It was conjectured that they might be the nuclei of epithelial cells. If this be so, the only way of accounting for their absence in the scales of butterflies and beetles, is that on these latter the scales are simply inserted in sockets, and are not organically connected with the membrane on which they are set. The cells of the barbs seem to grow out of the substance of the feather, and cannot be detached from it. The feathers examined were those of the Peacock, the Teal, and an Argentine Duck; in all the same structure is to be found.

Belfast Naturalists' Field Club.

June 15.—A party of twenty-five proceeded by the Northern Counties Railway to Limavady and the valley of the Roe. On arrival at the prosperous clean town of Limavady, a start was made for the Glen, a distance of a couple of miles. The first halt was made at O'Cahan's Rock, where the party spent a pleasant hour botanizing, lunching, and photographing, the splendid crag forming a feature hard to surpass.

Mrs. Leebody, the well-known Derry botanist, joined here, and her local knowledge proved useful throughout the day. A steep climb from the river-bed brought all to the top of the precipitous rock, from which the view of the Roe Valley was very beautiful. The Dog's Leap was then made for, where the curious pot-holes below the bridge came in for a share of observation, and where those members interested in engineering (among whom Mr. W. A. Traill, of Bushmills, was prominent) enjoyed an inspection of the electric light station and sawmill owned and worked by Mr. J. E. Ritter, J.P., to whom the Club were indebted for this pleasure. The dynamos are driven by a turbine, the mill by an ordinary wheel, and a new pit is in process of formation for an additional turbine. After enjoying the cool water of the well, the return journey was begun, passing down the other side of the river through woods where the most delightful views of water and mountains were obtained. Here the botanists were pleased to find a great profusion of *Lastræa æmula*, a fern which is locally uncommon. Mr. Ritter's house at Roe Park was soon reached, and by his courtesy was thrown open to those of the party who cared to inspect a most perfectly appointed amateur's workshop.

On leaving the house, a mile and a half or so brought the party to the Alexander Arms, where an excellent tea was provided. After tea, Mr. W. H. Patterson thanked Mr. W. Gray in the name of the Club for the trouble he had taken in acting as guide to this most interesting, but little known district. A short business meeting was then held, and the following were elected members:—Dr. Lorraine Smith, Mr. J. M M'Ilroy, Mr. John Bain, Mr. S. K. Kirker, C.E., of the Board of Works, Major-General Bland, Mr. John Savage, and Mr. James M. Fall. The 6·5 train was then taken, reaching Belfast shortly after nine. The geology of the district is mainly of rocks either Silurian or older, being mainly mica schists, with bands of primary limestone interstratified, as Mr. Gray pointed out near the Dog's Leap. During a short wait at Limavady Junction, Mr. W. H. Patterson obtained samples of the very rich estuarine clay which covers the whole neighbourhood, and on the return journey several of the microscopists took lumps to wash down for foraminifera. The very numerous shells were in excellent condition, although the stay was not long enough to secure any rarities. The botanists had the advantage of both Mr. S. A. Stewart's and Mrs. Leebody's presence. During the day the botanists found the following plants which may be worth mentioning:—*Lamium album*, *Arenaria trinervis*, *Geum intermedium*, *Listera Nidus-avis*, *Carex lævigata*, and *Lastraea æmula* (Bree's fern). It may also be worth noting the very great abundance of the larger variety of the Cow-wheat (*Melampyrum pratense*), the flowers being large and fine. The weather being so dry, land shells were few, and none of them out of the common. Altogether the day was a most enjoyable one, the party being the right size for good work, and the weather being everything that could be desired.

JUNE 18th.—The Geological Section met at the Museum in the rooms recently acquired by the Club to be fitted up as a library and laboratory, where all collections formed by the Club can be preserved. Erratics from northern boulder clay were contributed by Messrs, R. Bell, J. Moore, J. St. J. Phillips, and A. G. Wilson, and details arranged about the collections previously accumulated.

JUNE 22nd.—The Geological Section visited Islandmagee, proceeding from Magheramorne station across the ferry, and along the shore to Barney's Point, to explore the beds of Lower Lias which occur at that place, underlying the Greensand and Chalk which fringe the western coast of Islandmagee. The afternoon was spent in collecting fossils, including two specimens of the rare *Ceromya gibbosa*, the original specimen having been first discovered by Mr. W. Gray in this locality many years ago. *Nautilus*, *Pecten*, *Pinna*, *Lima*, and other liassic fossils were also obtained by the naturalists, who determined to revisit the shore later in the season.

DUBLIN NATURALISTS' FIELD CLUB.

JUNE 22nd.—A highly successful excursion was held, when a party of 60 members visited Glenasmole. Leaving Earlsfort-terrace at 1.30, in brakes, the dusty roads were soon left behind, and when the steep hill at Bohernabreena was surmounted, the beauty and pleasure of the scene were fully appreciated. The deep glen with the reservoir shimmering in the sunlight, the high brown mountain beyond, the hedges filled with wild roses and Honeysuckle, and the meadows blazing with flowers, formed indeed delightful contrasts to the hot and dusty streets of the city. The party drove straight to the head of the glen, where the members scattered for a couple of hours. To the botanists fell the

principal spoils of the day. The sloping pastures capping the great drift banks along the eastern side of the glen below the old churchyard of St. Anne's rivalled a Swiss Alp in the number, variety, and brilliancy of their flowers. Orchids were specially numerous here. The spotted Orchis (*O. maculata*), the Tway-Blade (*Listera ovata*), the Frog Orchis (*Habenaria viridis*), the Fragrant Orchis (*H. conopsea*), the Butterfly Orchis (*H. chlorantha*), and the Green-winged Orchis (*O. Morio*) (this latter now past flowering), were all gathered in abundance, while one of the botanists, the Rev. C. F. D'Arcy, was fortunate enough to discover here a considerable quantity of the Marsh Helleborine (*Epipactis palustris*), a species very rare in the County Dublin, and not yet recorded for this station. Here, too, Dr. M'Weeney pointed out some finely developed plants of the Adder's Tongue (*Ophioglossum vulgatum*) and the Moonwort (*Botrychium lunaria*). The common Guelder Rose (*Viburnum opulus*), truly native here, was seen flowering by the rills, the Mountain Trefoil (*Trifolium medium*), rather rare in the county, showed its heads of vivid crimson in abundance, and the handsome Downy-leaved Rose was in full bloom on the banks of the Reservoir.

At the opposite side of the glen some of the botanists ascended Leecawn Mountain to the only known station for the Beech-Fern (*Polypodium phegopteris*) in County Dublin, and were pleased to find the plant growing there quite as vigorously as when first discovered by the Rev. C. F. D'Arcy in 1883. On the way down to the rendezvous at the head of the glen two other rare County Dublin species were noted, the Sweet Mountain Fern (*Lastrea Oreopteris*) abundant on the rock-strewn slopes between 700 and 900 feet, and the Common Club-moss (*Lycopodium clavatum*) spreading its curious network of green stems over the ground in the shade of the Bracken. In a marsh on the main arm of the Dodder above the Lodge, some fine clumps of another rare County Dublin plant, the Panicled Sedge (*Carex paniculata*) were discovered by the Secretary.

Among the insects, Mr. Farrell found the large mountain ground-beetle (*Carabus glabratus*). Other beetles taken were *Hydroporus septentrionalis*, *Byrrhus pilula*, and *Malthinus punctatus*. The plant-bug *Calocoris striatellus*, and a crane-fly of the mountain genus *Amalopis* were also noteworthy.

All assembled at 6 o'clock, when Miss Gardiner had an ample repast ready, which, by kind permission of Mrs. Power, was spread on the lawn adjoining the pretty shooting-lodge at the top of the glen. After tea a short business meeting was held, at which J. A. Jackson and Mrs. Long were elected members of the Club, and the President (Mr. G. H. Carpenter) expressed the indebtedness of the members to Mrs. Power for her kindness. Shortly afterwards the return journey was commenced, and the city was reached at 10 o'clock.

NOTES.

ZOOLOGY.

POLYZOA.

Plumatella repens, L. in Ireland.—This pretty freshwater polyzoan, which was first discovered in Ireland by Prof. Allman, has recently been found by Mr. Greenwood Pim in a small pond in his garden at Monkstown. Mr. Pim noticed it adhering to the underside of the leaves of the white-water Lily (*Nymphaea alba*), and correctly identified the interesting species as *Plumatella repens*.

R. F. Scharff, Dublin.

INSECTS.

Spring Lepidoptera at Armagh.—Owing to the long-continued severity of the weather outdoor work was useless till April. However I had dug some pupæ in the autumn, and these being indoors emerged at pretty much their usual time. A very beautiful *Phigalia pedaria* emerged on February 8. It is very much suffused with yellow, and Mr. C. G. Barrett, to whom I submitted it for inspection, tells me that it is the most yellow form he has seen. On February 18th *Hybernia marginaria* emerged, the pupa had been dug up in the Palace Demesne. The *Tæniocampæ* now began to appear, the first being *T. incerta*, which emerged on March 2nd. On March 30th one of my pupils brought me a specimen of *Anisopteryx æscularia* which he had caught in his house.

The sallows had suffered severely from the frost, and the bloom was late and not abundant. However, on April 16th I and my friend, Mr. J. H. Johnston, determined to see what we could get, and succeeded in capturing *Tæniocampa stabilis, T. incerta, T. gothica, T. gracilis*, and a solitary *Xylocampa areola* with *Anticlea badiata* taken on the wing. On the following evening I was fortunate enough to take a nice specimen of *T. opima*, and a pretty form of *Peronea hastiana*. On the 19th we (Mr. Johnston and myself) were joined in our nocturnal rambles by Rev. H. Harpur. This proved a record night for numbers of moths. It was rather damp and pitch dark, and consequently exactly suited for our fell purposes. We took several *T. gracilis*, one *T. opima*, which fell to Mr. Harpur's lot, and numbers of *T. incerta*, &c. *T. gothica* was present simply in crowds. One curious thing happened :—we were working a large tree, and Mr. Johnston, who was beating, not being able to reach the higher branches, shook the tree violently, in the hopes that some at least would fall into the sheet. Some certainly did, but immediately afterwards the lantern was besieged by frantic moths which we proceeded with all our hands to box. A fine *Selenia bilunaria* also flew to the lantern and fell a victim to its misplaced confidence. *T. gothica* was far the most numerous, far outnumbering all the others together. It varied somewhat in colour, some being much darker and others rather lighter in hue than ordinary. In size, however, they were very constant, also in markings. *Hadena thalassina* emerged on May 2nd, and on the following evening I captured *Selenia bilunaria* while out for a stroll. Butterflies now began to appear, including battered *Vanessa urticæ*, *Pararge egeria*, with plenty of the pretty *Euchloe cardamines*. Evening rambles produced *Cidaria suffumata*, *Coremia*

unidentaria, C. ferrugata, Cabera pusaria, Eupithecia vulgata, and a nice specimen of *Anticlea nigrofasciaria.* In my pupa case emerged *Spilosoma menthastri, Phragmatobia fuliginosa,* and *Acronycta psi.* I tried sugar many times, but always without success. On May 25th I drove to Lough Neagh, and at Churchill took a few *Thecla rubi* and *Fidonia atomaria*; but being in a hurry to reach the lake, I only spent a few minutes on the bog, and hence the scantiness of my captures.—W. F. JOHNSON, Armagh.

Dyschirius obscurus, Gyll. at Lough Neagh.—This rare beetle was taken by the late A. H. Haliday on the sandy shore of Lough Neagh more than 40 years ago. Since his time no record of its capture has been given. In the *E. M. M.* for 1893, Mr. G. C. Champion mentions that he has found three specimens without locality in the collection of the late Dr. Syme, who collected chiefly in Scotland. I have made several unsuccessful attempts to obtain it at Lough Neagh. In 1893 I took a single specimen, and last year two, but this year I and Mrs. Johnson managed to capture quite a respectable number. Mr. Carpenter kindly compared these with Haliday's specimens in the Science and Art Museum, and also forwarded it to Herr Reitter. It agrees with Haliday's insect, and Herr Reitter pronounces it to be undoubtedly *D. obscurus,* Gyll.

W. F. JOHNSON, Armagh.

The Stridulation of Corixa.—I have again had opportunity of hearing a *Corixa* sing. The note increased in volume during the week I had him. One evening a dozen people were listening; I caught the insect twice and put it in a bottle alone, but in both cases there was silence until I restored it to its companions. Because of this I could not examine it as I wished, but everyone agreed as to the motion made, which was generally referred to as "combing its whiskers."

M. THOMPSON, Cork.

BIRDS.

Little Bittern in Co. Carlow.—Mr. Clarence Cary writes to *Land and Water* for June 1st that a Little Bittern was shot on the Barrow at Carlow on May 19th.

MAMMALS.

Introduction of English Hares into Ireland.—Having been asked more than once by correspondents if I could give them any information on the introduction of English Hares into Ireland, I propose to publish in the *Irish Naturalist* a list of such introductions as have come under my notice. Before doing so I should be much obliged to any readers of this Journal who would kindly give me any notes on this subject, such as might add to those I already possess.

G. E. H. BARRETT-HAMILTON, Kilmannock, New Ross.

Occurrence of the Marten in the County Waterford.—Two specimens of the Marten (male and female), *Martes sylvatica,* were taken here last month. They were both caught in rabbit traps, the female on the 6th, the male on the 7th June. Length of the female 27¾ inches; that of the male 30½ inches. They were both caught in a large rabbit burrow in Curraghmore. The colour of the spots on the chest, in both specimens, is yellow.

WILLIAM W. FLEMYNG, Coolfin, Portlaw, Co. Waterford.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BALLYNAHINCH RIVER AND BEN LETTERY. [*R. Welch, Photo.*

The Irish Naturalist.

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IRISH FIELD CLUB UNION.

REPORT OF THE CONFERENCE AND EXCURSION HELD AT GALWAY, JULY 11TH TO 17TH, 1895.

I.—GENERAL ACCOUNT.

BY R. LLOYD PRAEGER, B.E.,
Secretary Irish Field Club Union.

It may be desirable to preface the present account of the Galway Field Club Conference with a note on the history and objects of the Irish Field Club Union, under the auspices of which the Conference was held. In July, 1894, a three-day joint excursion of the Dublin, Cork, and Limerick Field Clubs was carried out, Fermoy being the headquarters of the party. At a conference held on the evening of the second day, for the discussion of Field Club matters, emphasis was laid on the isolation of the southern Field Clubs, and on the desirability of bringing all the Irish Field Clubs into closer contact. The suggestions made on this occasion, and in subsequent discussions among the Secretaries of the Clubs represented, were not lost sight of, and after some correspondence, the following memorandum was submitted to the Committees of the Belfast, Dublin, Cork, and Limerick Field Clubs:—

MEMORANDUM.

In the carrying out of the duties connected with their offices, the Secretaries of the four Irish Naturalists' Field Clubs have for some time felt the want of closer connection between the Clubs, by which more frequent meetings might be arranged, and by which the Clubs might assist each other by the occasional interchange of lecturers, and by the loan of papers, specimens, lantern slides, &c. At present the Clubs have but a slight knowledge of each other, and of each others' resources, and such aids to their work as the above-mentioned can now only be carried out after much enquiry and correspondence. With a view to facilitate these and kindred objects, the Secretaries suggest that a joint committee be formed, consisting of the President and Secretary of each Club, and that these officers be empowered by the Committee of each Club to represent them on this joint committee, their actions being in all cases subject to the approval of the committee of their Club. The Secretaries suggest that this organization be called the Irish Field Club Union, and they feel convinced that such a bond between the Clubs will strengthen each, and greatly assist the cause of Field Club work in Ireland.

(Signed), FRANCIS JOSEPH BIGGER, Sec. B.N.F.C.
R. LLOYD PRAEGER, Sec. D.N.F.C.
JOHN L. COPEMAN, Sec. C.N.F.C.
FRANCIS NEALE, Sec. L.N.F.C.

Dublin, 23. 11. 94.

The following resolution was thereupon adopted by the Committee of each Club referred to:—

"Resolved: That this Committee approve of the suggestions embodied in the memorandum submitted to them by the Secretaries of the four Irish Field Clubs, and they hereby appoint the President and Secretary to represent them on the Joint Committee."

The Field Club Union Committee, then created, appointed R. Lloyd Praeger, Secretary Dublin Field Club, as their Secretary, and during the ensuing winter (1894-95) an interchange of lecturers was carried out with marked success. Mr. Joseph Wright, of Belfast, lectured at Dublin, Cork, and Limerick; Professor Haddon, of Dublin, lectured at Belfast; and Professor Cole, of Dublin, lectured at Cork and Limerick.

The excursion which is reported in the pages which follow is the second definite result of the formation of the Field Club Union, which is now fairly embarked on a life of practical usefulness and scientific advancement.

WEDNESDAY, JULY 10TH.

The members of the Belfast Club were the first to take the field. The northern party, to the number of about fifty, took the 1.45 train to Dublin, where they were met by the Secretary of the Union, and despatched to the Gresham and Hammam Hotels. At 7 o'clock they assembled at the Royal Botanic Gardens, Glasnevin, where they were received by the President and Officers of the Dublin Field Club, and a numerous company of the members of the local Society. After tea a couple of pleasant and instructive hours were spent in examining the many botanical treasures of the Gardens under the guidance of Mr. F. W. Moore, A.L.S., Curator, and his able assistant, Mr. D. M'Ardle.

THURSDAY, JULY 11TH.

Punctually at 9 o'clock the First Class Special Train provided by the Midland Great Western Railway Company steamed out of Broadstone Station with the members of the Belfast and Dublin Clubs, and representatives of several English Societies on board, and a very rapid journey across the Great Central Plain of Ireland was pleasantly spent in studying maps and scientific papers relating to the districts about to be visited. Shortly after noon the bogs, woods, and pastures of the Central Plain gave way to the bare limestone pavements so characteristic of Galway and Clare, and at 12.30 the train drew up at the platform at Galway. At 1 o'clock brakes were mounted, and the party drove through the pretty suburb of Salthill to Gentian Hill, a promontory of drift standing out into the sea, where lunch was served. Here the members of the Cork and Limerick Field Clubs joined their brethren of Dublin and Belfast, and when lunch was over the party scattered for their first ramble. From Gentian Hill a good idea of the geography of the district was obtained. Eastward lay Galway and the level lands of the Limestone Plain. To the southward, across Galway Bay, rose the great grey terraced limestone hills of the Burren district of County Clare. To the westward the Aran Islands could be dimly seen rising out of the

waters of the Atlantic, while northward and north-westward rose low rocky granite hills, backed by the higher metamorphic mountains of Connemara. The geologists of the party examined with much interest the grand sections formed by the steady encroachment of the ocean on the tough drift which composes this and the adjoining promontories. The botanists were delighted to find at Gentian Hill several rare mountain plants, which were growing close to sea-level, after the manner characteristic of the west coast of Ireland—such were the Spring Gentian, Mountain Dryas, Blue Moor-grass, and Dwarf Juniper; and on the muddy shore adjoining a good find was made in the Dwarf Grass-wrack, which was found growing in abundance. The entomologists searched the seaweed thrown up by the tide and were rewarded by the discovery of the local marine rove-beetle *Cafius fucicola*. Besides the small but handsome wolf-spider *Pardosa monticola*, a specimen of its large newly-discovered relation *P. purbeckensis*, F. Cb. rewarded the collector of arachnids.

At 7.30 dinner was ready at the Railway Hotel, which formed the head-quarters of the party during their stay. After dinner a number of local ladies and gentlemen arrived by invitation to meet the members of the Field Clubs. Among those who accepted the invitation were the President of Queen's College, and Mrs. Moffat; Sir Valentine Blake and Lady Blake; the High Sheriff of Galway, Mrs. Townsend, and the Misses Townsend; Colonel O'Hara, D.L., and Miss O'Hara; Marcus Lynch, D.L.; Major Wilson Lynch, D.L.; Professor Kinkead, M.D., Miss Kinkead and party; Prof. Brereton, L.R.C.S.I.; Lt.-Colonel Cochran and Officers, Depot Connaught Rangers; Rev. J. C. Clarke, B.A., Mrs. Clarke, and Miss Clarke; Rev. J. T. Berry; Rev. R. Boyd; Rev. Father Lally, P.P.; Mr. James Perry, M.E., County Surveyor, and Mrs. Perry; Mr. W. N. Binns, B.E., Borough Surveyor; Mr. and Mrs. Murray, and Miss Murray; Mr. and Mrs. Tivy; Mr. J. A. Grant, &c.

During the evening the Galway String Band performed in the hall, and musical items were contributed by Prof. Robertson and Mr. J. A. Grant. Several members showed specimens of the rarer plants and animals of the district, and explained their points of interest. The company did not disperse until a late hour.

Friday, July 12th.

Friday dawned gloriously fine, and the party, which, now reinforced by local friends, had swelled to over 100, left Galway in high spirits by special train at 9 o'clock, *en route* for the mountains of Connemara. On the way to Oughterard the new railway passes through a charmingly diversified district of wood and lake, with the wide expanse of Lough Corrib to the eastward. After passing Oughterard, the land rises, and the railway emerges on the great plain of South Connemara—miles upon miles of brown undulating bog, with flashing lakes in every hollow. As the train sped along, lovely views were continually obtained of the quartzite mountains of Maam Turk, and subsequently of the still more picturesque Twelve Bens. At Recess station the members alighted, and

the party divided into two, one section driving and walking along the Clifden road to ascend Ben Lettery, while the other section examined the bogs and lakes in the immediate vicinity. The mountain party passed along the chain of lakelets which extend throughout the course of the Ballynahinch River, and turned up the steep side of Ben Lettery (1904 feet), which overlooks the beautiful lake of Ballynahinch. From the summit a truly superb panorama was obtained. Northward, peak beyond peak, rose the mountains, and through a gap to the north-west was seen the rugged outline of Achill Island. Further southward lay Inishbofin, and the whole western coastline of Connemara, and the town of Clifden. To the southward, across a vast stretch of bog dotted with lakes innumerable, stretched the Atlantic, with long arms reaching up to Roundstone and Cashel, and many outlying islands, behind which the low ridges of the Aran Islands stood clearly up. South-eastward lay Galway Bay, backed by the grey uplands of Burren, and further eastward Lough Corrib and the Limestone Plain. On the summit, the rare mountain ground-beetle *Leistus montanus*, and the interesting little spider *Hahnia montana* were found. Photographs having been secured and natural history specimens duly put away, the descent was undertaken, and Recess station reached in time for a refreshing cup of tea before train-time. The lowland party had also a most satisfactory day. A number of rare plants had been collected, including the Pillwort, and in common with the mountain party, they had collected many of the characteristic Connemara species, such as St. Dabeoc's Heath, London Pride, and Pipewort. The large and handsome wolf-spider *Dolomedes fimbriatus* attracted the attention of many observers on the bogs; while the entomologists were agreeably surprised to find one of the most striking British Orthoptera—*Mecostethus grossus*, often considered a rare species—in positive abundance. Others of the party had visited the "Connemara Marble" quarry on Lisoughter, behind Recess Hotel, and had obtained good examples of this beautiful serpentine. It was with much regret that members found their day at an end, and took their seats in the special train that was waiting for them.

After dinner, bags, bottles, and vasculums were emptied on the tables, and until a late hour members were busily engaged in examining and noting the many captures and finds made during the day.

Saturday, July 13th.

A morning of driving mist found the naturalists embarked on board the ss. "Duras" at 9 o'clock, which in no way lightened as the steamer passed down the river and set her course for Ballyvaughan, on the southern side of Galway Bay. However, the cheerful predictions of the conductors were duly fulfilled, for as the destination was approached the clouds broke and the sun shone out, lighting up gloriously the strange bare slopes of the Burren mountains and the great masses of vapour that still hung over the higher summits. Advantage was taken of the leisure afforded by the passage to hold a meeting of the collectors of the party, when the work of identifying and cataloguing the various captures was distributed among the different naturalists, one

man being made responsible for the report on each group; the result of this distribution of labour is seen in the scientific reports which follow.

On landing at Ballyvaughan, the party were joined by Mr. P. B. O'Kelly, a Ballyvaughan botanist, whose local knowledge was freely placed at the disposal of members, and proved of much service. Gleninagh, on the sea, three miles north-west of Ballyvaughan, was the rendezvous, and the party slowly made their way along the road in this direction, with the sea on the right, and the great limestone hills rising steeply on the left. This was the field-day of the botanists, for the flora of the Burren is most peculiar as well as rich. It was not long before most of the characteristic plants were discovered. The Maidenhair was found ere Ballyvaughan was a mile behind. On the low grounds Mr. O'Kelly pointed out the Bee Orchis and the extremely rare Close-flowered Orchis, now in fruit, for which for many years Castle Taylor in County Galway was the only known British station. On the limestone hills above was found abundance of the Mountain Dryas, Bear-berry, Purple Helleborine, Bloody Cranesbill, Spring Gentian, and other rare plants. Lunch was served at 2 o'clock under the shadow of the old castle of Gleninagh, after which scientific occupations—shore-collecting, botanizing, insect-hunting, and geologizing—were energetically resumed. Some of the party drove to Black Head, where the Maidenhair was found in abundance, as well as other rarities. Mr. O'Kelly conducted one or two of the party to the home of the Shrubby Cinquefoil, which grows in much abundance not far from Ballyvaughan. Others, who ascended to the flat summit of Cappanawalla (1023 feet) brought back strange accounts of the vast stretches of bare grey limestone which extend on the higher grounds. At 5.30 the steamer's whistle warned stragglers to linger no longer, and when at length the last late-comer was on board, the return journey was made without loss of time. After dinner, the tables were again devoted to an exhibition of the day's spoil. These evening exhibitions of each day's work were found of much service, especially in the way of giving the less experienced members an opportunity of examining specimens at their leisure, of asking questions, and of watching demonstrations of identification and mounting of specimens. It was found that a beetle, *Miaris campanulæ*, new to the Irish list, and the local moths, *Anticlea cucullata* and *Phothedes captiuncula*, as well as the striking black spider, *Prosthesima Petiverii*, had rewarded the labours of the insect-hunters on this day.

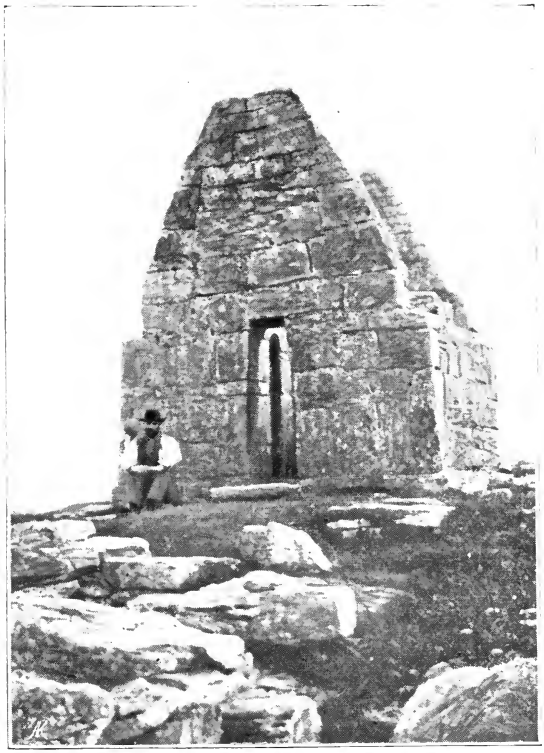
SUNDAY, JULY 14TH.

On this day, according to the Programme, members were to "make their own arrangements." A party of archæologists and conchologists made an early start for Clare-Galway Abbey, and spent a profitable day in that vicinity. The majority of the party attended service at the beautiful old Church of Saint Nicholas. After lunch two pleasant receptions awaited the members. The President of Queen's College received a numerous party at the College, and conducted them through the buildings and gardens, and entertained them to tea in his own house; while another large section of the members rowed up the River Corrib

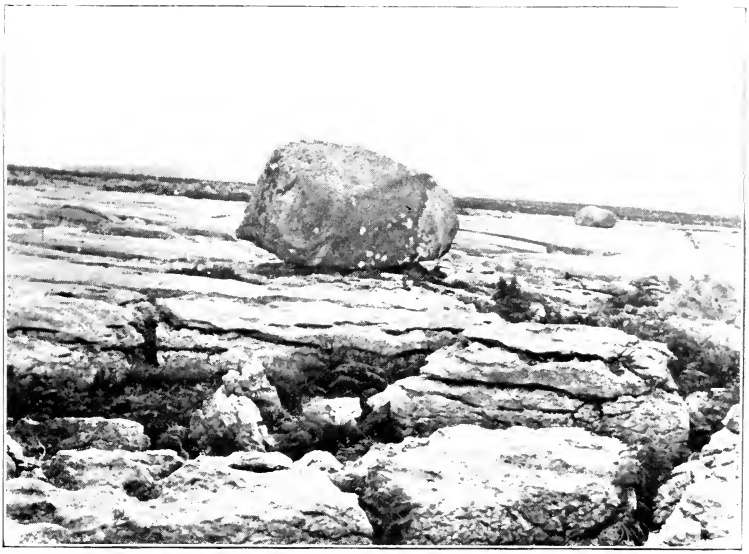
in the well-appointed boats of the Royal Galway Boat Club (most kindly placed at their disposal by the Committee) to enjoy the hospitality of Sir Valentine and Lady Blake at Menlo Castle. Along the banks of the river some good insects, including a rove-beetle, *Stenus melanopus*, new to Ireland, and plants were collected, and at Menlo the rare sedge *Carex pseudo-cyperus* was obtained. The quaint old house, said to be the oldest inhabited house in Ireland, excited great interest, and the generous hospitality of the host and hostess completed the pleasure of the visit. At 6 o'clock dinner was served, and in view of the early start next morning, most members wisely retired at an early hour.

MONDAY, JULY 16TH.

Punctually at 5.30 A.M., the Secretary's shrill whistle called members down for an early cup of tea. A prompt response was made, and at 6 o'clock sharp the ss. "Duras" cast off her moorings with the whole party on board, excepting a few who did not care to face the thirty-five-mile sail across the troubled waters of Galway Bay. Once again the Field Clubs were favoured with a fine day, in a district well-known as one of the wettest in Ireland. At 8 o'clock Miss Gardiner had breakfast prepared with the despatch and neatness that characterized her somewhat arduous duties throughout the excursion, and when this important function was completed, the Aran Islands were already close at hand, and the bare grey fields, the whitewashed cottages, and innumerable stone walls furnished a quaint and characteristic scene. A heaving tide-run off the shore of Aranmore proved disastrous to some of the naturalists, but they speedily recovered as the steamer dropped anchor at Portmurvy, and was immediately surrounded with a crowd of stalwart islanders in their strange canvas curraghs. The disembarkation was promptly effected in the ship's boats, while some preferred the novel experience of the curragh. The Secretary now announced alternative routes, those who were prepared for a long walk to go west to Dun Aengus and thence to Kilronan, while those who wished less exertion would proceed to Kilronan by a more direct route. The members who visited Dun Aengus—the larger portion of the party—were amply repaid for their exertion. This splendid example of pre-historic architecture—the finest structure of its kind in Europe—perched on the edge of an overhanging cliff, 300 feet in height, was examined with the keenest interest and wonder. Floating on the Atlantic swell far below, a keen-eyed member descried a fine specimen of the Great Sun-fish, which considerately remained in full view for a length of time. On the vegetation here and elsewhere many observers noted the great abundance of the handsome rose-beetle (*Cetonia aurata*). The presence of this species—so rare on the Irish mainland—was a great surprise to the entomologists. A small flower-beetle (*Meligethes rufipes*) new to Ireland, was found, as well as a minute spider (*Micariosomia festivum*), also apparently new to the Irish list. A striking feature was the great abundance of the springtail *Machilis polypoda*, which occurred in multitudes under every stone. The party made their way along the edge of the cliff, which was fringed with



TEAMPUL BENAN, ARANMORE. [*F. A. Dixon, Photo.*



AN ARAN FIELD. [*F. A. Dixon, Photo.*

Samphire and Sea Lavender, to where an islander sat fishing. By his side was a basket well filled with fine Bream. He sat on the overhanging edge of the cliff, his feet dangling over the abyss, and his line descending vertically into the ocean some 200 feet below. Fishing of this kind is carried on along the whole western side of the island. The "Worm Hole" was next visited, a large square natural tank in the rock at some distance from the sea, with which it is connected by a large underground passage, as shown by the prompt response of its waters to the ocean swell outside. Near the hamlet of Gortnacopple the Maidenhair was seen in very great abundance and luxuriance, growing as usual in the vertical fissures of the limestone; it is abundantly distributed throughout the island. Another well-known plant of Aran that was seen here abundantly was the large leek, *Allium Babingtonii*. The main road being reached, the party followed the first section to Kilronan, visiting on the way some of the best of the many antiquities of Aran, including the ancient church of St. Kieran, and the adjoining holed stone and early crosses, and viewing with interest the curious wayside monuments. The geologists of the party were much interested in the extensive exposures of bare jointed limestone, and its curious weathering, and in the numerous erratics from Connemara scattered over its surface, while the entomologists literally "left no stone unturned" in their search for rarities.

On the beach at Kilronan, Miss Gardiner had a sumptuous tea prepared, to which the members did ample justice; after which, undeterred by frequent showers which now began to fall, a numerous party started southward to visit the primitive church of St. Eany with its many accompanying antiquities, Teampul Benan, &c., and to attempt further discoveries among the fauna and flora. The botanists were well pleased to find, at the last moment, that very rare Irish grass, the Wood Rush, in one of the two Aran stations given by Mr. H. C. Hart in his paper on the botany of the islands; and in the fading light a hasty return was made to the steamer, which left at 8 o'clock punctually, and the hotel in Galway was once more reached at 11.0.

During this day's excursion, which was in every way successful, the members derived much local information and assistance from the parish priest, Rev. P. Colgan, and his curate, and from Mr. P. O'F. Johnson, the local magistrate, all of whom did their best to assist the party in every way.

Tuesday, July 16th.

At 9 o'clock a special train conveyed the members and local friends to Oughterard, where Mr. Dominick Burke had brakes and cars in readiness, and an immediate start was made northward along the shores of Lough Corrib, a party of geologists remaining behind for an hour to examine the sections exposed in adjacent new railway cuttings under the guidance of Mr. R. J. Kirwan, B.E. The route lay through hilly ground, with alternating patches of bog, wood, and cultivation. Eastward stretched the vast lake of Corrib, diversified with islands great and small; westward rose the Maam Turk mountains, still clothed

in dark vapour, and sending an occasional splash of rain over the plain below. Presently the ground grew rougher, till it blazed with purple heather, among which hung abundantly the large bells of St. Dabeoc's Heath. Passing through a pine wood the vehicles halted beside a mountain stream, whose banks were fringed with Royal Fern growing six feet high. This was the rendezvous for the day. To the left the lake narrowed among steep wooded hills, and a glorious valley stretched away for miles, overhung by high mountains on each side. Behind rose the purple slopes of Carn Seefin, and in front lay the shining waters of the lake. It was an ideal spot for naturalists, and in a few minutes the party was scattered far and wide in eager search. The botanists rejoiced to find here the characteristic flora of Connemara—London Pride, Pipe-wort, Lobelia, St. Dabeoc's Heath, &c. The rare Bog Orchis was found sparingly. The geologists found congenial ground in the spoil-bank of an old copper mine on the hill-side. A new Irish beetle, *Chilocrus bipustulatus*, and the rare northern ground-beetles *Pelophila borealis* and *Carabus clathratus* delighted the entomologists; while under the stones on the margin of the lake were found numerous examples of a rare southern jumping spider, *Attus floricola*.

Lunch occasioned but a short lull in the business of exploration, which was continued energetically until the repeated blasts of the Secretary's whistle recalled the wanderers, and the return was effected in time to catch the special train at 6 o'clock for Galway.

After dinner a formal Conference on Field Club work was held. The chair was occupied by G. H. CARPENTER, B.Sc., President, Dublin Naturalists' Field Club.

The CHAIRMAN said that the duty of taking the chair that evening devolved on him since the President of the senior Club (Belfast) was not present. He referred to the origin of the Field Club Union, an outcome of the formation of which they saw in the present successful excursion, and pointed out the great desirability and usefulness of such an organization, and the good work which during its short existence it had already accomplished. This evening representatives of all the Irish Field Clubs and of several similar English Societies met together in friendly conference, and he called for remarks and suggestions on matters relating to Field Club interests.

WM. GRAY, M.R.I.A., as an old member and ex-President of the Belfast Club, referred to the benefits resulting from an interchange of ideas in the field, as was accomplished on an expedition such as this. He congratulated the Clubs on the number of lady members present, and on the presence of representatives of science from England. The formation of the Irish Field Club Union was already justified by its results.

PROF. T. JOHNSON, D.Sc., Treasurer, Dublin Naturalists' Field Club, said that at a meeting of this kind the members reaped benefits of the same nature as accrued to the meetings of the British Association. They learned that there was a brotherhood in science, and that assistance and encouragement were ready on every hand. He thought that if possible a meeting of this kind should be arranged annually.

J. J. WOLFE, as representing the Cork Naturalists' Field Club, regretted that so few members of his Society had been able to avail themselves of the Galway excursion; he thought the Cork Club was already deriving substantial benefit from the formation of the Union.

FRANCIS NEALE, Secretary, Limerick Naturalists' Field Club, also referred to the advantages which the smaller Clubs were reaping from the operations of the Union. He hoped that on the next Galway excursion they would assemble on the invitation of a future Galway Field Club. He recommended the consideration of some more systematic means of recording scientific "finds" made by Field Club members.

H. E. BROTHERS, member of Committee North Staffordshire Naturalists' Field Club, desired to thank the Irish Clubs on behalf of his members for their invitation to join in the present excursion. He was glad that a number of the members of his Club had availed themselves of the invitation, and thought that they would carry home with them many useful hints from this meeting of the Irish Clubs. He also spoke of the duty that rested with Field Clubs everywhere to check by every means in their power the unnecessary destruction of animal and vegetable life.

R. STANDEN, Curator of the Conchological Society of Great Britain and Ireland, mentioned some of the more interesting points noted on the excursion in connection with his own particular group—the land and fresh-water mollusca.

PROF. J. W. CARR, M.A., F.L.S., President, Nottingham Naturalists' Society, expressed his warm congratulations on the success of this first general meeting of the Irish Field Clubs, and on the zeal and energy displayed by the members in scientific research. He doubted if such an active week's field work could have been organized and carried out by any English Scientific Society. After speaking of the aims of Natural History Societies, Professor Carr expressed the hope that the ultimate result of such combined effort would be the production of a series of monographs on Irish Natural history.

WILLIAM GRAY interposed to give his hearty support to the remarks of Mr. Brothers in regard to the destruction of animals and plants. The Field Clubs could do good work by discountenancing the sale of fern roots, &c., and the wearing of birds' feathers.

PROFESSOR G. F. FITZGERALD, D.Sc., F.R.S. (Dublin University), wished to know if a resolution recommending botany as a subject of study for boys under the Intermediate Education Scheme would be in order at the present meeting.

The CHAIRMAN said that such a resolution would certainly be in order; zoology also might well be included in the resolution.

PROFESSOR JOHNSON stated that he would with pleasure support any such resolution.

MANN HARBISON (Belfast) suggested that the subject of geology should be included in the motion.

While Professor Fitzgerald was preparing his resolution

HON. R. E. DILLON (Galway) referred to the local interest which the visit of the Field Clubs to Galway had excited, and which he trusted would have a lasting effect in the way of stimulating scientific research in that part of the country. On behalf of those of the party who were not members of any of the Clubs, but were there as visitors, he wished to express the great pleasure and interest which they had derived from the excursion.

PROF. FITZGERALD then moved:—That the United Naturalists' Field Clubs of Ireland press upon the Board of Intermediate Education in Ireland the importance to education and to the country of introducing Natural Science as a subject to be encouraged in Intermediate Schools in Ireland.

PROF. E. J. M'WEENEY, M.D., (Dublin), had pleasure in seconding the resolution, and referred to the advantages which the teaching of natural science would give. Before sitting down, he referred to the very great kindness shown to the party during their visit by many inhabitants of Galway. Especially were the thanks of the party due to the President of Queen's College, to Sir Valentine Blake, to Captain Henley, to Mr. P. O'F. Johnston, J.P., to the Hon. R. E. Dillon, to Mr. R. J. Kirwan, B.E., to the Committee of the Royal Galway Boat Club, and to the officials of the Midland Great Western Railway, and of the Galway Bay Steamboat Company. He would like to move a vote of thanks to these gentlemen.

The CHAIRMAN put Professor Fitzgerald's resolution to the meeting, and it was passed unanimously.

ADAM SPEERS, B.Sc., (Belfast), seconded the vote of thanks to those who had so cordially assisted the success of the excursion. Referring for a moment to the resolution which had just been passed, he wished as the head of an Intermediate School, to express his gratification that such a resolution had met with the unanimous favour of this meeting of practical scientists.

HON. R. E. DILLON responded on behalf of those named in Dr. M'Weeney's resolution. He assured the members that the visit of the Field Clubs had been a most welcome event in Galway.

F. J. BIGGER, M.R.I.A., Secretary, Belfast Naturalists' Field Club, wished to express the deep obligation of the members to Miss Gardiner, of Leinster-street, Dublin, for the remarkably prompt and able manner in which she had managed the catering on the daily expeditions—a very important matter on these long and fatiguing excursions (hear, hear). Speaking of the Field Club Union, he predicted how its increasing strength would more and more bind the Clubs together, so that at length they would have in Ireland one Field Club, with a common membership for all, and one official mouth-piece—the *Irish Naturalist*.

PROF. JOHNSON remarked that the conference would not be complete without some remarks from the organizer of the excursion.

R. LLOYD PRAEGER, B.E., Secretary Field Club Union and Dublin Naturalists' Field Club, in reply said he had only to repeat the thanks that he had expressed that evening after dinner for the unfailing promptness

with which members had carried out the requests of the conductor throughout the excursion, and the great assistance they had given. The unqualified success of this, the most elaborate Field Club excursion ever carried out in Ireland, was in itself the best thanks that the organizer could have.

The CHAIRMAN reminded members that specialists had been appointed to prepare reports on each group of the fauna and flora, and requested that all notes and specimens should be shown to them. Having referred to the advisability of having Irish finds recorded in Ireland, and drawn attention to the wonderful mixture of characteristic northern and southern forms of life which the naturalists had observed in this western district, he declared the conference concluded.

WEDNESDAY, JULY 17TH, &c.

On this morning the party broke up. While the majority of members left for home, others proceeded to extend the investigations commenced on the excursion. R. Standen, E. Collier and R. Welch spent two days in collecting recent and subfossil shells and foraminifera at Roundstone. Miss Knowles botanized at Oughterard. J. A. Audley and R. Lloyd Praeger had a day at Roundstone, where they collected *Erica Mackaii* and *Naias flexilis* in their recorded stations; the latter then sailed to Aranmore, where three days were spent in botanizing with the assistance of Prof. Fitzgerald, the return being made in his company, *via* Lisdoonvarna and Ballyvaughan. The work done on these further days being a direct continuation of that accomplished on the excursion, the results obtained are embodied in the reports which follow.

II.—GEOLOGY.

BY MISS SYDNEY M. THOMPSON.

THE magnificent scenery of the district comprised between Galway Bay, the Atlantic, and Lough Corrib demonstrates what metamorphism can do in the way of earth-building. The grand quartzite group of the Twelve Bens, with their bare scarred peaks rising abruptly from the vast flat plain that stretches westward to the Atlantic, display earth-folding on a magnificent scale. The age of these quartzites and the schists that occur with them is somewhat obscure; the latter were at one time supposed to be metamorphosed sedimentary rocks, but modern investigations have changed these opinions, and they are now considered to be altered igneous rocks.[1] A very interesting section through these schists was visited on the railway near Oughterard under the guidance of Mr. Kirwan, whose able paper in the *Irish Naturalist*[2] shows an illustration

[1] See Report of the Director-General of the Geol. Survey, 40*th Report Dept. of Science and Art* (1893), p. 266, and 41*st Report* (1894), p. 270.

[2] June, 1895, vol. iv., p. 151.

of this section, in which quartzites, hornblende schists, and intrusive granites occurring in veins, dykes, and in mass are seen, with Carboniferous limestone which has been subsequently laid down, and which is undisturbed. This cutting is quite near to the station, and forms an interesting and instructive diagram of faults, contortions, and intrusions. Many specimens were obtained, including some of quartzite and white quartz with beautiful cross-veins of red intrusive granite. Some concretions of calcite, prettily stained with orange and black, were found amongst the fragments on the line. On the day when Ben Lettery was ascended, very fine crystals of quartz were obtained from crevices on the summit of Ben Gower, and from weathered blocks.

Some lead and copper mines near Carn Seefin, above the north-western shores of Lough Corrib, were subsequently visited. Although not worked at present, some samples were obtained from the "tip." One block contained galena, copper pyrites, iron pyrites, calcite, felspar, and quartz as concretions in the hornblende schists in which the mineral lodes occur. Pure massive epidote and fluorspar were also obtained, and specimens of an intrusive rock in this neighbourhood almost entirely formed of sheared pinkish-brown garnets were obtained with difficulty, owing to its extreme hardness.

The celebrated Connemara "marble" at Recess is now being worked in only one quarry by about a dozen men, employed by an American, who is at present executing an order for twenty pillars, each to consist of five blocks measuring about four feet by three in diameter. To gauge the quality of the stone a long section has been made in the side of the quarry by a wire saw. This section well displays the contorted green bands with grey layers at either side. The so-called "marble" is a serpentine formed by the alteration of olivine introduced in the crystalline bands of primitive limestone by igneous action. Similar results occur in limestones around Mount Vesuvius. These serpentine bands do not average more than two feet in thickness, and have been much sheared and contorted, showing the "eozoonal" structure. This was formerly believed to be a gigantic foraminifer when discovered in the Laurentian rocks of Canada, and named *Eozoon Canadense*, but its organic nature is now practically disproved by the recent discovery of a similar substance in limestone blocks ejected from Vesuvius.[1]

But few fossils were obtained from the Carboniferous limestone so fully developed in the district, the rock being so hard as to preclude the extraction of its organic remains in the limited time available for the geologists on a mixed excursion. The usual characteristic fossils were observed in abundance, and some specimens obtained in Ballyvaughan from the Burren Limestone, and in the Aran Islands. The shale-beds in Aran would probably repay a fuller examination than was possible on the excursion. Blow holes and the "Worm Hole," a curious natural tank are amongst the curiosities of the Aran limestones.

[1] Johnston-Lavis and Gregory—"Eozoonal Structure of the ejected Blocks of Monte Somma." *Sci. Trans. R.D.S.* (2) vol. v., 1894.

DERRYCLARE LAKE AND MOUNTAIN. [*R. Welch, Photo.*
Ice-moulded islets in the foreground. Quartzite hill (Twelve Bens range) behind.

The marble quarries at Menlough were also visited, where an excellent jet-black marble is obtained, ornamented with white sections of *Productus* and corals. It seems a pity that this marble and the serpentine are not more fully worked, as facilities for transport are all that can be desired.

On the shores of the lake near Clare-Galway Abbey the limestone is curiously bored by holes, varying from half to one-and-a-half inches in diameter, and sometimes extending downwards for six or eight inches. Their origin is as yet uncertain, the alternative suggestions being either the action of carbonic acid from vegetation, etc., or the burrowing of land snails or of marine animals such as *Pholas*. Travellers on the line to Clifden will see, on the right hand side, soon after leaving Galway, some of the curious "mushroom" rocks, produced by softer inferior layers weathering away more rapidly than harder superior layers.

The glacial geology of the district is very interesting, the hard, white quartzite of the Bens being splendidly glaciated; and capital ice-worn surfaces were seen close to Recess station, and also on the way to Ben Lettery, the rock being finely smoothed and polished, with deep ice-groovings. The drift sections at Gentian Hill yielded many erratics. The grey clay is excessively hard and compact, forming a cliff a quarter of a mile long and about thirty feet high, with large and small erratics projecting from the surface, the retentiveness of the matrix being evidenced by the great masses that stand out in all directions; similar sections occur on islands and on the coast about this locality. Many boulders are of black Carboniferous limestone with bands of white *Productus* about three inches deep, the whole surface being exquisitely polished and striated, others are Connemara granites, including the typical Galway variety, remarkable for the scarcity of mica, and the handsome crystals of pink orthoclase felspar, recalling the famous Shap granite; specimens of serpentine also occur as erratics.

On the Aran Islands, in Galway Bay, many of these rocks occur as erratics. Also there are found specimens of a fine-grained red quartzite said not to occur now anywhere *in situ*. It would be impossible to conclude without a reference to the remarkable cliff-scenery of these islands, where the slightly-dipping limestones have been undercut by the sea into mighty shelves, over which the Atlantic waves play ceaselessly, whilst upper terraces are tenanted by myriads of sea-birds, and the top of the cliffs between 50 and 100 feet above the sea are swept bare at the edges, huge piles of stones forming a rampart many yards inland, demonstrating what the force of the surges must be, when their spray can do such mighty work. Here and there, in the face of these grand cliffs, a bed of shale gives rise to a water-spring, falling in delicate veils of spray into the ocean, an exquisite rainbow perpetually spanning the abyss. The causes that result in such beautiful effects are full of geological interest, and the whole excursion was replete with such opportunities for the geologists of the party.

III.—BOTANY.

FUNGI.

BY E. J. M'WEENEY, M.A., M.D.

HYMENOMYCETES.

THIS Order, which comprises the most highly organized and largest Fungi was but sparsely represented, owing no doubt partly to the dryness of the early summer season, but chiefly to the fact that a great deal of the ground traversed—stony and boggy, mountainous and maritime regions—is of a character notoriously unfavourable to the growth of agarics and their allies. Besides, their season of fructification had as yet hardly commenced. In the patches of wood (chiefly fir) by the lake sides at Recess on the 12th July, and Lough Corrib on the 16th, the ordinary species of *Boletus* generally met with in such places, were taken together with a few of the manure-frequenting agarics belonging to the genera *Panæolus*, *Stropharia* and *Coprinus*. We also found a very fine *Mycena filopes*, and one *Marasmius androsaceus*, an uncommon species in my experience. The heaths at Recess yielded a large mouse-coloured pink-spored Agaric (*Entoloma helodes*, Fr.), in abundance, and large forms of *Galera hypnorum* and its var. *Sphagnorum*, were met with in the swamps at Lough Corrib. The only form at all peculiar or unusual was a pale-yellow-capped white-gilled *Cantharellus* (*albidus*) which we came across in some abundance on the heath-covered slopes at Recess and also near Lough Corrib. No agaric save the Common Mushroom seems to have been collected on Aran.

Agaricus (Mycena) filopes, Bull.—Wood at Lough Corrib.

A. (M.) stylobates, Pers.—Lake-side near Recess.

A. (Entoloma) helodes, Fr.—Abundant on heaths, Recess, &c.

A. (Galera) hypnorum, Batsch.—Frequent in the bogs, Recess, &c.
var. **Sphagnorum**, Fr.—Swamps by Lough Corrib.

A. (Psalliota) campestris Linn. (the Common Mushroom).—Frequent in nearly every suitable locality, including Aran.

A. (Stropharia) semiglobatus, Batsch—Lough Corrib and Recess, frequent.

Anellaria fimiputris, Karsten—Lough Corrib.

Panœolus phalænarum, Fr.—Lough Corrib.

Coprinus ephemerus, Fr.—Lough Corrib.

Cantharellus albidus, Fr.—On heaths at Recess and L. Corrib.

Marasmius androsaceus, Fr.—Lough Corrib.

Boletus luteus, Linn.—Lough Corrib.

B. flavus, With.—Lough Corrib.

B. laricinus, Berk.—Recess Wood, and Lough Corrib.

Fomes variegatus, Secr.—Burren.

Tremella mesenterica, Retz.—Lough Corrib.

DISCOMYCETES.

The only *Peziza* of any size—a fawn coloured species (probably *P. pleurota*, Phil.), collected by Mr. M'Ardle, and placed in a tube—was unfortunately lost, together with the tube and its remaining contents, which comprised a *Saprolegnia* or *Achlya* sp. on a dead fly, and Dr. FitzGerald's specimen of *Claviceps* on grass. Another specimen which I took on a superficial inspection to be a discomycete parasitic on some frondose hepatic proved to be a Lichen, *Solorina saccata*, L., stated to be rather rare, but already recorded from Brandon in Kerry, and Ben Bulben in Sligo by Mr. J. T. Mackay, and from Cushendall, Co. Antrim, by Dr. Moore. I had confined my examination to the apothecia, and had therefore become acquainted only with the fungal element in the compound organism of the Lichen. Each ascus contains four uniseptate brown spores. Struck by these peculiarities, I thought I should have no difficulty in identifying the specimen; but here I was disappointed, and not being able to find a place for it, I sent it to Mr. Phillips of Shrewsbury, the well-known authority on Discomycetes, and to his kindness I am indebted for the establishment of the true nature of this specimen. Moral—always examine the *substratum!* The poverty of this region in Discomycetes is very remarkable.

Lachnea stercorea, Gill. } On cowdung, Lough Corrib.
Humaria granulata, Sacc. }
Dasyscypha virginea, Fekl.—Frequent, Recess, Lough Corrib, &c.
Phialea virgultorum, Sacc.—Recess, lake-side.
Mollisia cinerea, Karst.—Lough Corrib.
M. melaleuca, Sacc.—Lough Corrib.

SPHÆRIACEI.

The most important species found was *Claviceps purpurea* (Ergot), taken at Burren by Dr. FitzGerald on some grass not now certainly recognizable. Only a few fruits were ergotized.

Claviceps purpurea, Fr.—On grass, Burren (Prof. FitzGerald).
Epichloe typhina, Pers.—On *Dactylis glomerata*, Gentian Hill wood.
Polystigma rubrum, Pers.—Burren, on Black-thorn.
Cladosporium herbarum, L. R.—(The conidial stage of some Pyrenomycete) on Quaking-grass, Aran, Prof. FitzGerald.
Hypocopra fimicola (Rob.), Sacc.—On rabbit-dung, Lough Corrib.

UREDINEI AND *USTILAGINEI.*

When industriously sought for, members of the first-named class are fairly abundant in the region examined. The only smut we found was *Ustilago segetum* on oats, Aran (Dr. FitzGerald). I was much struck with the slight degree of development attained by these parasitic forms on

that island. *Puccinia pulverulenta*, Grev., formed a striking exception. It grew most luxuriantly on a patch of Willow-herb near Mr. Johnson's house at Kilmurvy, the entire under-surface of some of the leaves being covered with the cluster-cups, whilst large confluent sori of teleutospores occurred on neighbouring plants. This partial separation of the two stages—dicœcism—is worthy of note. The commonest wild Umbellifer, *Angelica sylvestris*, was infested with a rust, *P. pimpinellæ*, Strauss, whilst the only specimen I saw of the local *Pimpinella magna* was covered with the *Uredo*-spots of a somewhat larger-spored rust which may possibly prove distinct. The only other species worthy of remark are the *Phragmidium* on the Lesser Burnet, and the rust on clover, both found on Aran, and neither frequent, so far as my experience goes, on the east side of Ireland.

Puccinia primulæ, DC.—Wood near base of Gentian Hill.
P. centaureæ, Mart.—Gentian Hill.
P. violæ, Schum.—Gentian Hill.
P. pulverulenta, Grev.—On *Epilobium hirsutum*, Aran.
P. variabilis, Grev.—Gentian Hill.
P. taraxaci, Plow.—Gentian Hill.
P. hieracii, Schum.—*Uredo* on *Carduus lanceolatus*, Aran.
P. pimpinellæ, Strauss.—On *Angelica sylvestris* and *Pimpinella magna*, Aran.
Uromyces anthyllidis, Grev.—On *A. vulneraria*, Aran.
U. trifolii, Alb. and Schw.—On *T. pratense*, Aran.
Triphragmium ulmariæ, Schum.—*Uredo* only, near Gentian Hill.
Phragmidium fragariastri, DC.—Aran.
P. sanguisorbæ, DC.—On *Poterium Sanguisorba*, Aran.
P. violaceum, Schultz.—On *Rubus fruticosus*, Aran and elsewhere.
P. subcorticatum, Schrank.—On *Rosa spinosissima*, Aran and elsewhere.
Melampsora lini, Pers.—Abundant on Aran and elsewhere.
M. farinosa, Pers.—Heaths near Recess.
M. hypericorum, DC.—On Tutsan at L. Corrib.
Coleosporium senecionis, Pers.—Aran. Prof. FitzGerald.
C. euphrasiæ, Schum.—Aran and elsewhere, on *Rhinanthus*.
Ustilago segetum, Bull.—Aran, Prof. FitzGerald.
Urocystis violæ, Sow.—Near Gentian Hill.

In conclusion I have to express my deep sense of obligation to Prof. G. F. FitzGerald, F.R.S., to whose quick observation and skill in collecting I owe many of the most interesting fungal specimens taken during this enjoyable excursion.

ALGÆ.

BY PROF. T. JOHNSON, D.Sc., AND MISS HENSMAN.

THE Galway excursion afforded several excellent opportunities for shore-collecting. It is to be regretted that so few took advantage of them. I would suggest that, on our next Field Club Union excursion members, on joining the meeting, be invited to act as collectors in some special group of plants or animals. On the first day, during the preparation of lunch on Gentian Hill, one of us searched the somewhat muddy shore on the western side of the hill, gathered a number of shells attacked by the perforating algæ, and found *Zostera nana*, which is referred to elsewhere. Sea-weeds were collected at Gleninagh, Co. Clare, the low rocky shore affording some good rock-pools, the coralline *Lithothamnion polymorphum* lining some of them. Here was found the common green *Codium tomentosum* infested by the brown alga *Streblonema simplex*, hitherto only once recorded for Ireland, by one of us; another species, *S. fasciculatum*, growing on *Mesoglœa vermiculata*, is new to Ireland. *Sporochnus pedunculatus* was found washed ashore. It would be out of place to give here a full list of the species noticed or gathered. It may be of interest to state that Holmes and Batters make a preliminary attempt to indicate the distribution of sea-weeds in their "Revised List of the British Marine Algæ" (*Annals of Botany*, vol. v., 1890). For this purpose the coast of the United Kingdom is divided into fourteen districts, in which Ireland is represented by districts 10–14, Galway Bay being included in district 11 (Slyne Head to Crow Head). It would be comparatively easy for us to make out a list of species found, not recorded in the above-mentioned list for district 11. Such a proceeding would be out of place, as there are many species, in collections made by earlier workers, known to us, not recorded. The following are some of the interesting finds:—

Delesseria, all (6) species except *D. angustissima*.

Phyllophora rubens, infested with *Actinococcus*.

Champia parvula, with cystocarps.

Ceramium tenuissimum.

Rhodophyllis bifida, with cystocarps.

Dudresnaia coccinea, with antheridia, procarps and cystocarps. This beautiful and rare red alga is one in which one act of fertilisation results in the formation of a number of cystocarp fruits.

Corallina rubens.

C. squamata.

Choreonema Thureti.

Melobesia corticiformis.

Ascocyclus orbicularis, on *Zostera*, new to Ireland.

Castagnea zosteræ.

Species of **Cystoseira, Cladostephus, Ectocarpus, Urospora, Monostroma, Euteromorpha, Cladophora.**

Hyella cæspitosa.

Mastigocoleus testarum.
Plectonema terebrans.
Gomontia polyrhiza.
Conchocelis rosea, new to West of Ireland.
Tellamia?

ARANMORE.—Low water was caught at Killeany Bay (Kilronan) on the east side of the Island, and in addition some scraps of sea-weeds were gathered on the west side, a little east of the fort Dun Aengus. Ordinary shore-collecting is almost impossible on the west side, owing to the precipitous cliffs, and ocean swell, even on a comparatively calm day. Several interesting weeds were obtained on the west side, indicative of a rich harvest after a westerly gale or by dredging. Killeany Bay proved a splendid locality for the perforating algæ (all the species recorded in Miss Hensman's recent paper in the *Irish Naturalist* being found here), and for the *Squamariaceæ*, a group of red sea-weeds, coating stones, &c., and of which *Petrocelis* and *Peyssonnelia* are examples. This group is at its best in the winter. In the quiet pools, with the abundant disintegrating mollusc shells, and the stone-coating *Squamariaceæ*, were found quantities of *Stilophora rhizodes*, and several species of *Cystoseira*, including the iridescent *C. ericoides* infested with *Myriactis pulvinata*. The meeting of the southern and northern types, noticed in the fauna of the district was illustrated in several ways; thus *Plumaria elegans*, a southern form, and *Ptilota plumosa*, a northern closely allied form, were both found; *Pycnophycus tuberculatus*, a brown alga which is erroneously supposed to reach its northern limits in Galway Bay, was also found.

Of the less-known forms may be mentioned—

Gonimophyllum Buffhami on *Nitophyllum laceratum*; new to Ireland.

Dermocarpa prasina } Latter new to, and former not recorded
D. Schousbæi } for Ireland.

Growing on a rock exposed at half-tide was a form of *Codium*, not unlike the *Codium amphibium* of Harvey's "Phycologia Britannica." Some time must elapse before all the material collected has been examined, many of the rarest weeds being microscopic and time-absorbing in their determination. Our thanks are due to Miss Sydney Thompson of Belfast for a collection of attacked shells, to Miss Kelsall for some Kilronan weeds, and to Mr. R. J. Mitchell, whose health has prevented him from taking part in the determination of the weeds he helped to collect.

MOSSES AND LIVERWORTS.

BY D. M'ARDLE.

THE appended lists of these plants which were collected by me on the Galway excursion are provisional only. It will be observed that the list of mosses is very short, 17 species only, excluding a few species not yet determined. The entire district we visited in Aran was very scanty in moss vegetation; even the commonest rock moss, *Ptychomitrium*, which clothes such formations in almost every county in Ireland, was not met with, and very few grow on or amongst the bare rocks. The summit of the mountain from Cappanawalla to Ballyvaughan, where I went in search of rare flowering plants, produced very few mosses; it is one vast "stone field" as far as the eye can reach. We met with no mountain stream; on the banks and rotting timber in such places mosses luxuriate in the shade, heat, and moisture. On the lower slopes of the Burren, as at Ballyvaughan, and on Carn Seefin a good representative list of mosses could be made would time permit.

The total number of liverworts collected is forty-seven. Of these twenty-three are not reported from the counties we visited in Dr. D. Moore's work on the Irish Hepaticæ, and two are additional species to the list in that important publication. Out of fourteen species of *Lejeunea* known to grow in Ireland I collected eight; four of these are additions to the Galway list. The rare *Lejeunea Mackaii* occurs sparingly on the north island of Aran on damp rocks. It is remarkable amongst *Lejeuneæ* in having large undivided obcordate folioles or stipules by which it is easily known from all others. It is the Irish representative of four species included by Dr. Spruce in the genus *Homalo-Lejeunea*, natives of the Peruvian Andes and Brazil. *Scapania aspera*, Mull., was first detected by me in the Co. Cavan in 1893, and now it has turned up in both Clare and Galway; it may lurk in herbaria under the name of *Scapania nemorosa*; its place is between that species and *S. æquiloba*; possibly it belongs to the latter.

Plagiochila interrupta I have not found before. I am not aware that it has been published as Irish, and may have been overlooked for *Saccogyna* or *Chiloscyphus*, which it resembles; the plants collected by me are identical with those gathered by Dr. Carrington in Bolton Woods, Yorkshire, specimens of which are included in the excellent *Fasc. Hepaticæ*, No, 86, of Carrington and Pearson, kindly placed at my disposal by Mr. F. W. Moore, A.L.S.

MUSCI.

Campylopus setifolius, Wils.—Carn Seefin.
Tortula tortuosa, Hedwig.—Kilronan.
Tortula ruralis, Linn.—Rocks, Kilronan.
Tortula fallax, Hedwig.—Aran.
Tortula muralis, Timm.—Aran, Gentian Hill.
Orthotrichum affine, Schrad.—Ballyvaughan.

Enthostodon Templetoni, Schwaegr.—Side of a stream, Carn Seefin.

Splachnum ampullaceum, Linn. — Cappanawalla Mountain (Professor T. Johnson). Amongst *Sphagnum*, shore of Lough Corrib (Professor Fitzgerald).

Bryum capillare, Hedwig.—On walls, Ballyvaughan.

Leucodon sciuroides, Schwaegr.—Ballyvaughan, Mr. O'Kelly.

Neckera crispa, Dill.—Gentian Hill, Ballyvaughan, Island of Aran.

Hypnum commutatum, Dill., var.—Aran.

Hypnum purum, Linn.—Gentian Hill, Aran, common.

Hypnum uncinatum, Hedw.—Near Kilronan.

Hypnum loreum, Dill.—Ballyvaughan.

Homalothecium sericeum, Linn.—Near Kilronan.

Fissidens adiantoides, Hedwig.—Ballyvaughan. Amongst rocks, Aran.

HEPATICÆ.

* Denotes a species not previously reported from the County.

Frullania dilatata, (L.) Dum.—On the trunks of trees, side of a stream, Carn Seefin; Gleninagh, and Ballyvaughan.

Frullania tamarisci, (L.) Dum.—Gentian Hill, Carn Seefin, Cappanawalla Mountain, common

***Frullania germana,** Taylor.—Carn Seefin, rare.

***Lejeunea minutissima,** Smith. — On trees at Gentian Hill; Gleninagh, Co. Clare.

***Lejunea microscopica,** Tayl.—On *Plagiochila*, Carn Seefin, rare.

***Lejunea hamatifolia,** (Hook.) Dum.—*Gleninagh; Carn Seefin; a rare species.

***Lejeunea ovata,** (Tayl.) Dicks.—On moss and decayed wood, side of a stream, Carn Seefin, plentiful; a rare species.

Lejeunea serpyllifolia, Dicks.—On the trunks of trees, shores of Lough Corrib near Carn Seefin.

***Lejeunea flava,** var.—Carn Seefin; a rare species.

***Lejeunea patens,** Lindberg.—On *Frullania*, Carn Seefin; Gentian Hill.

***Lejeunea Mackaii,** (Hooker) Dum.—On rocks on the North Island of Aran (Kilmurvy), rare.

Radula complanata, (L.) Dum.—On rocks, Gentian Hill.

***Porella platyphylla,** (L.) Lindberg.—Island of Aran.

Pleurozia cochleariformis.—Gentian Hill.

Kantia trichomanes, Dicks.—Gentian Hill, Carn Seefin, common.

***Kantia arguta,** Nees.—On a damp bank, Carn Seefin (Professor T. Johnson). Side of a stream near the shore of Lough Corrib; a very rare species.

Lepidozia setacea, Web.—Carn Seefin, frequent.

***Cephalozia catenulata,** Huben.—On damp peat, Carn Seefin; *Ballyvaughan, very fine; a rare species.

Cephalozia bicuspidata, Linn.—Carn Seefin.

Cephalozia Lammersiana, Hub.—Carn Seefin.

Cephalozia sphagni, Dicks (Spruce).—Carn Seefin.

***Cephalozia divaricata**, Sm.—Carn Seefin.

***Cephalozia divaricata**, var. **Starkii**, Spruce—Ballyvaughan; Carn Seefin; a rare species.

***Scapania æquiloba**, (Schw.), Dum.—Cappanawalla Mountain.

***Scapania nemorosa**, (L.) Dum.—Carn Seefin, *Ballyvaughan.

***Scapania aspera**, Müll.—Salthill, near Galway; Ballyvaughan, very fine on Cappanawalla Mountain; new to these districts.

Diplophyllum albicans, (L.) Dum.—Carn Seefin, Gentian Hill, Gleninagh, and Ballyvaughan.

Plagiochila asplenioides, (L.) Dum.—Carn Seefin.

***Plagiochila interrupta**, (N.) Dum.—Ballyvaughan. Not previously published as Irish.†

Plagiochila spinulosa, (Dicks.), Dum.—Carn Seefin, shore of Lough Corrib.

***Jungermania (Aplozia) riparia**, (Tayl.), Dum.—Moist bank near Kilronan.

Jungermania ventricosa, Dicks.—Side of a stream, shore of Lough Corrib.

Saccogyna viticulosa, L.—Carn Seefin.

Nardia emarginata, Ehrh.—Gentian Hill; on moist rocks, Carn Seefin; common.

Nardia scalaris, (Schr.) Gr.—Carn Seefin; shores of Lough Corrib; common.

Nardia crenulata, (Smith), Lindberg.—Ballyvaughan, Gentian Hill.

***Nardia obovata**, Nees.—Carn Seefin.

Pellia epiphylla, Linn.—Moist places, Carn Seefin; near Kilronan.

***Pellia calycina**, Nees.—Damp bank side of a stream, Carn Seefin; a rare species.

Metzgeria furcata, Linn.—On trees, Gentian Hill; Gleninagh; shores of Lough Corrib.

***Metzgeria conjugata**, Lindberg.—Carn Seefin; rare.

Riccardia multifida, (Dill.), Linn.—Carn Seefin.

Riccardia pinguis, (L.) B.Gr.—Damp, boggy place, Carn Seefin.

Marchantia polymorpha, Linn.—Ballyvaughan.

***Reboulia hemisphærica**, Raddi.—In the crevices of moist rocks, Kilronan.

Fagatella conica, (L.) Corda.—Moist bank near Kilronan.

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† This may be the type of the plant described by Dr. Moore under the name of *Fedinophyllum pyrenaicum*, Spruce. *R. I. A. Proc.* (2) vol. ii., p. 629.

PHANEROGAMS, FERNS, &c.

BY R. LLOYD PRAEGER, B.E., AND PROF. J. W. CARR, M.A., F.L.S.

THE remarkable flora of the districts lying around Galway has long been famous, and has by this time been tolerably well worked out. Connemara, with its interesting southern species, has attracted many botanists, whose observations are brought together in *Cybele Hibernica*; and since the appearance of that work, further contributions to our knowledge of that flora have been made, the most important paper being that of H. C. Hart.[1] The limestone district of Burren has likewise been well examined, as is witnessed by the papers of F. J. Foot,[2] T. H. Corry,[3] H. C. Levinge,[4] and others. The interesting flora of the Aran Islands (which are botanically a part of Clare, not of Galway) has also been carefully investigated. So that, while close and systematic search would, no doubt, yield a number of additions to the floras of these districts, but little in this direction could result from the necessarily hurried and superficial work of the Field Club excursion; and indeed, the time of members was devoted to securing examples of well-known botanical treasures, rather than to working out the distribution of less interesting species, or the determination of critical plants. But that the excursion was by no means barren of results as regards the flowering plants, the records which are appended will show.

Our notes can be conveniently arranged in three geographical groups:—I. West Galway (District 8 of *Cybele Hibernica*); II. East Galway and Clare (District 6 of *Cybele*); III. Aran Islands (District 6 of *Cybele*).

I. WEST GALWAY (District 8).—Plants were collected chiefly in three places—Gentian Hill, Carn Seefin on Lough Corrib, and about Recess. Gentian Hill, a promontory of drift on the shore three miles west of Galway, is interesting as yielding a group of limestone plants not found elsewhere in West Galway; this drift has come from the east or south, and is largely composed of limestone. Here, within 50 feet of sea-level, were gathered *Dryas octopetala*, *Asperula cynanchica*, *Chlora perfoliata*, *Gentiana verna*, *Orchis pyramidalis*, *Sesleria cærulea*.

At Carn Seefin and Recess the typical Connemara flora reigns supreme. In both localities grew abundance of *Drosera anglica*, *D. intermedia*, *Hypericum elodes*, *Saxifraga umbrosa*, *Lobelia Dortmanna*, *Dabeocia polifolia*, *Utricularia intermedia*, *Eriocaulon septangulare*, *Rhynchospora alba*, *Osmunda regalis*.

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[1] H. C. Hart.—Notes on the Flora of the Mayo and Galway Mountains, *Proc. R.I.A.*, Ser. II., Vol. 3, No. 10, 1883.

[2] F. J. Foot.—On the Distribution of Plants in Burren, Clare. *Trans. R.I.A.*, Vol. 24, 1862.

[3] T. H. Corry.—Notes on a Botanical Ramble in the County of Clare. *Proc. Belfast Nat. Hist. and Phil. Soc.*, 1879-80.

[4] H. C. Levinge.—*Neotinea intacta* in County Clare. *Journ. Bot.*, vol. 30, p. 194. 1892.

The following notes are selected for publication :—[1]

Thalictrum collinum, Wallr.—Lakeshore below Carn Seefin.

Subularia aquatica, L.—Glendalough Lake.

Lotus pilosus, Beeke.—Oughterard, Miss Knowles.

Dryas octopetala, L.—Lisoughter Hill behind Recess, Carr.

Saxifraga oppositifolia, L.—Lisoughter Hill, Carr.

Myriophyllum verticillatum, L.—Lake-shore below Carn Seefin.

Œnanthe Lachenalii, Gmel.—Gentian Hill.

Carduus pratensis, Huds.—Oughterard, Miss Knowles; Carn Seefin.

Hieracium anglicum, Fr.—Lisoughter above Recess, Carr.

Arctostaphylos Uva-ursi, Spr.—Near summit of Ben Lettery.

Melampyrum pratense, L. var. **montanum,** Johnst.—Carn Seefin.

Scrophularia aquatica, L.—Gentian Hill; Oughterard.

Scutellaria minor, L.—Gentian Hill; base of Carn Seefin.

Pinguicula lusitanica, L.—Carn Seefin, Miss Knowles.

Habenaria chlorantha, Bab.—Carn Seefin, J. A. Audley.

Malaxis paludosa, Sw.—Base of Carn Seefin, J. A. Audley.

Sparganium simplex, Huds.—Oughterard, Miss Knowles.

S. minimum, Fr.—Oughterard, Miss Knowles.

Zostera nana, Roth.—Prof. Johnson supplies the following interesting note:—While waiting for lunch on the day of our arrival, Miss Hensman and I collected *Algæ* on the muddy shore on the west side of Gentian Hill, and found several beds of *Zostera nana* in fruit. The only Irish record for this plant hitherto published (*vide Cybele Hibernica*) is a station near Baldoyle (Co. Dublin), discovered by the late A. G. More. When recently looking through Mr. H. C. Hart's collections in the Herbarium of the Science and Art Museum, Dublin, specimens of *Z. nana*, gathered by this botanist in Co. Donegal several years ago, were noticed. The publication of the record awaits Mr. Hart's general "Flora of Donegal." Hence the Galway locality is the third in Ireland for *Zostera nana*.

Cladium Mariscus, R. Br.—Galway, Oughterard, Recess, abundant.

Rhynchospora fusca, Sm.—Abundant in several places between Oughterard and Carn Seefin.

Eleocharis multicaulis, Sm.—Carn Seefin, Praeger.

Scirpus Tabernæmontani, Gm.—Near Gentian Hill.

Carex disticha, Huds.—Gentian Hill, Miss Knowles; River Corrib above Galway.

C. stricta, Good.—River Corrib above Galway, Praeger.

C. pallescens, L.—Carn Seefin.

C. limosa, L.—Abundant about Recess.

C. extensa, Good.—Near Gentian Hill.

C. filiformis, L.—Oughterard, Miss Knowles; River Corrib above Galway.

Lastrea Oreopteris, Presl.—Carn Seefin.

L. æmula, Brack.—Near the summit of Ben Lettery.

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[1] In the following notes, the finder's name is added wherever a plant was reported by one member only; when found by more than one member, names are omitted.

Asplenium viride, Huds.—Lisoughter Hill behind Recess, Carr.

Hymenophyllum Wilsoni, Hook.—Ben Lettery.

H. tunbridgense, Sm.—Damp crevice near summit of Ben Lettery, Praeger.

Isoetes lacustris, L.—Glendalough Lake.

Pilularia globulifera, L.—Gathered abundantly in the station (west end of Glendalough Lake), recorded by Praeger in *I.N.*, 1895.

II. East Galway and Clare (District 6).—In boggy ground at Menlo' Castle near Galway were gathered *Myriophyllum verticillatum, Cladium Mariscus, Carex Pseudo-cyperus, Osmunda regalis.*

In the day spent at Ballyvaughan and Gleninagh, the peculiar Burren flora was seen to full advantage. On the shelves and crevices on the limestone hills grew in profusion *Arabis hirsuta, Arenaria verna, Cerastium arvense, Geranium sanguineum, G. lucidum, Poterium Sanguisorba, Dryas octopetala, Rubus saxatilis, Asperula cynanchica, Galium sylvestre, Rubia peregrina, Carlina vulgaris, Arctostaphylos Uva-ursi, Gentiana verna, Epipactis atrorubens, Sesleria cærulea, Polystichum aculeatum, Cystopteris fragilis.*

Under the guidance of Mr. O'Kelly, *Rhamnus catharticus* and *Potentilla fruticosa* were seen in the stations given in Mr. Foot's paper; *Ophrys apifera* and *Botrychium Lunaria* were pointed out near Ballyvaughan, and *Pyrola media* high up on the mountain above Gleninagh. Some members who drove to Black Head brought back *Thalictrum collinum, Saxifraga Sternbergii,* and *Adiantum Capillus-Veneris* : these have been recorded from here in Mr. Levinge's paper.

Papaver Rhæas, L.
P. hybridum, L.
P. dubium, L.
} Fields at Gleninagh.

Fumaria pallidiflora, Jord.—Gleninagh.

Sinapis alba, L.—Fields near Gleninagh.

S. nigra, L.—Gleninagh, Miss Knowles.

Hypericum dubium, Leers.—Common about Gleninagh.

Geranium rotundifolium, L.
G. columbinum, L.
} Pointed out by Mr. O'Kelly to Prof. Fitzgerald and Praeger growing in stony limestone ground near Ballyvaughan. *G. rotundifolium* is an extremely rare plant in Ireland.

Scandix Pecten-Veneris, L.—Gleninagh, J. A. Audley.

Centaurea Cyanus, L.—Among oats, Gleninagh.

Verbena officinalis, L.—Ballyvaughan, D. M'Ardle.

Neotinea intacta, Reich.—Pointed out in fruit near Ballyvaughan by Mr. O'Kelly, and subsequently observed in many fields in that neighbourhood by Prof. Fitzgerald and Praeger.

Carex pallescens, L.—Gleninagh.

Adiantum Capillus-Veneris, L.—Found a mile north-west of Ballyvaughan, by Mrs. Fitt.

III. Great Island of Aran (District 6).—The Aran Islands have been so thoroughly explored by botanists that it was not to be expected that the few hours spent by the members on the North Island would yield much in the way of novelty, though they teemed with interest; and indeed, the only find reported that merits publication (though it is

not a novelty) is the rediscovery of that rarest of Irish grasses, *Calamagrostis Epigejos*, in one of the stations (Killeany) assigned to it by Mr. Hart. The members were, however, quite satisfied with finding, often in abundance, the plants, in many cases rare elsewhere, which characterize the Aran flora, such as *Arenaria verna, Cerastium arvense, Geranium sanguineum, Rubus saxatilis, R. cæsius, Poterium Sanguisorba, Sedum Rhodiola, Saxifraga Sternbergii, Pimpinella magna, Crithmum maritimum, Cornus sanguinea, Rubia peregrina, Asperula cynanchica, Galium sylvestre, Carlina vulgaris, Centaurea Scabiosa, Senecio Jacobæa* var. *flosculosus, Gentiana verna, Statice occidentalis, Allium Babingtonii, Adiantum Capillus-Veneris.* The three days subsequently spent on the island by Praeger, afforded time for systematic work, and yielded satisfactory results; he sends in the following notes as the result of his observations:—

NOTES ON THE FLORA OF ARANMORE.

BY R. LLOYD PRAEGER.

THE flora of the Aran Islands has already been carefully investigated. The first attempt at a complete list of plants was that of Dr. E. P. Wright[1], whose paper notices 159 species as growing on the islands. In 1875 Mr. H. C. Hart followed with a much more elaborate paper[2], embodying the results of a fortnight's botanizing in August, 1869, and the additional observations of previous botanical visitors. He gives the flora of the group as 372, of which 348 are definitely assigned a place in the flora of the North Island. In the *Journal of Botany* for June, 1892, Messrs. Nowers and Wells published a list of plants additional to Mr. Hart's list, found by them during a fortnight's visit in June, 1890. They add 41 species to the flora of the group, of which 40 were found on the North Island, thus bringing up the flora of Aranmore to 388. The one day spent on the island by the Field Club party gave of course little opportunity for detailed examination, though most of the characteristic species were observed; but the three days which I spent there during the ensuing week yielded some additions to the flora, and some new localities for rarer Aran species. Especially on the third day of my visit, I was much assisted by Prof. G. F. Fitzgerald, the keenness of whose eye made me regret that botany was not his chosen profession. In the appended notes, A signifies an addition to the flora of the Aran Islands; *a* an addition to the flora of the North Island.

Crambe maritima, L.—In the greatest abundance on the beach below the Seven Churches. Not found, though well searched for, in Mr. Hart's only station, "shore near Kilronan," and apparently extinct there.

Thlaspi arvense, L.—Field by roadside a mile east of Portmurvy.

Arabis ciliata, R. Br.—Dry banks near the roadside half a mile from Portmurvy pier towards the Seven Churches. One of the rarest of Irish plants. Found by Mr. Hart on sandhills near Killeany, six miles to the eastward.

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[1] *Proceedings Dub. Nat. Hist. Soc.*, Dec. 6, 1866.

[2] A List of Plants found in the Islands of Aran, Galway Bay. Dublin: Hodges, Foster, and Co., 1875.

Arabis hirsuta, R. Br.—South-west of the old lighthouse.

a. **Barbarea vulgaris,** R.Br.—Between Kilronan and Kilmurvy; recorded by Mr. Hart from the South Island.

Senebiera didyma, Pers.—Abundant everywhere, as noted by Messrs. Nowers and Wells.

a. **Alliaria officinalis,** Andrzj.—A little south of the old lighthouse, and in the rectory grounds at Kilronan (Prof. Fitzgerald); recorded by Mr. Hart from the Middle Island.

Sinapis alba, L.—Kilronan, Portmurvy, and at the Seven Churches.

A. **Sinapis arvensis,** L.—Fields west of Kilronan, and elsewhere.

Reseda lutea, L.—Field at Portmurvy.

Viola hirta, L.—South of the old lighthouse, near Oghill, and near the Seven Churches.

A. **Viola arvensis,** Murr.—Near Kilronan and Kilmurvy.

A. **Cerastium tetrandrum,** Curt.—On the cliffs behind Killeany, and at Dun Aengus.

A. **Lepigonum salinum,** Kindb.—On the cliffs near Dun Aengus.

Malva rotundifolia, L.—Kilmurvy, Seven Churches, and thence to Bungowla.

Geranium Robertianum, L.—With white flowers at the Seven Churches.

Ulex Gallii, Planch.—Seen in two places near the centre of the island. Apparently not found since noted by Prof. Balfour in 1852.

A. **Ulex europæus,** L.—Thicket on the edge of a field between Portmurvy and the Seven Churches.

Medicago sativa, L.—Abundant in cultivated land east of Killeany, evidently sown.

Astragalus Hypoglottis, L.—Dry bank on the edge of the cliff west of Dun Aengus.

A. **Potentilla fragariastrum,** Ehrh.—Near Oghill.

A. **Epilobium obscurum,** Schreb.—Common. I saw no trace of *E. tetragonum*, given in Mr. Hart's list as occurring on all the islands.

Hippuris vulgaris, L.—Still in the marsh at Lough Atalia, though not found there by Messrs. Nowers and Wells.

Myriophyllum, sp.—Still grows in Lough Atalia, though not seen by Messrs. Nowers and Wells. Out of flower at the time of my visit.

Saxifraga tridactylites, L.—On the ruins of the Seven Churches, and on rocks further westward. Apparently only previously observed by D. Oliver in 1850.

Æthusa Cynapium, L.—Seven Churches.

Viburnum Opulus, L.—Lough Atalia.

A. **Scabiosa arvensis,** L.—Near Kilronan and Kilmurvy.

Carduus tenuiflorus, Curt.—Kilronan.

Senecio Jacobæa, L.—The normal form is not now so rare as stated by Mr. Hart, though the rayless form (var. *flosculosus*, Jord.) is the prevailing one.

A. **Thrincia hirta,** DC.—Sandy fields north of Kilronan, and pastures between Kilronan and Killeany.

A. **Cichorium Intybus,** L.—Field east of Killeany.

Menyanthes trifoliata, L.—Recorded by Mr. Hart from Lough Atalia. Messrs. Nowers and Wells say it was certainly not there at the time of their visit. It has re-appeared there now.

Cuscuta Epithymum, Murr.—Still abundant on sandy fields east of Killeany and at Portmurvy, where the stems colour the pasture with brilliant patches of dark red, pink, and straw yellow.

Lithospermum officinale, L.—Near Kilronan, and at the Seven Churches.

a. **Pedicularis palustris**, L.—In several spots on the North Island; noted with doubt in Mr. Hart's list.

A. **Veronica Buxbaumii**, Ten.—Near Killeany, west of Kilronan, &c.

A. **Veronica polita**, Fr.—Roadsides between Kilronan and Portmurvy.

Calamintha officinalis, Moench.—Abundant about the Seven Churches, and thence to Bungowla.

a. **Marrubium vulgare**, L.—Abundant about the Seven Churches; recorded by Mr. Hart from the Middle Island only.

A. **Chenopodium rubrum**, L.—In great abundance on the muddy margins of the brackish lake at Port Cowrugh. A very rare plant in Ireland, and usually near houses or on disturbed ground, so that it is of interest to find a station where it is abundant and evidently native. So far as I am aware, it has not been found in the West of Ireland before.

A. **Atriplex hastata**, L.—Shores in several places.

A. **Rumex crispus**, L.—In several places.

A. **Rumex sanguineus**, L. var. **viridis** (Sibth).—Roadsides in several parts of the island.

Salix repens, L.—Portmurvy. Var. *argentea* was gathered by Prof. Fitzgerald between Portmurvy and the Seven Churches.

Juniperus nana, Willd.—In several places. The Aran Juniper is certainly *J. nana* (which was recorded by Prof. Balfour in 1852) and not *J. communis*.

a. **Iris Pseud-acorus**, L.—Seen in several places; Mr. Hart gives Middle Island only.

a. **Juncus effusus**, L.—In several places; previously recorded from Middle Island only.

A. **Luzula multiflora**, Lej.—West of Kilronan.

Potamogeton polygonifolius, Pourr.—At Lough Atalia. I could not find there *P. natans*, given by Mr. Hart.

A. **Eleocharis palustris**, R. Br.—Brackish lake on the shore at Port Cowrugh.

Carex glauca, Scop.—Grows remarkably tall on Aran. The leaves are commonly 2 to 3 feet high, and the stems 3 to 4 feet.

a. **Carex flava**, L.—Near Oghill.

A. **Briza media**, L.—Rocks east of Portmurvy.

a. **Phragmites communis**, Trin.—Marked in my list as observed, but locality not noted, as I only subsequently noticed that it is recorded from the South Island only.

Calamagrostis Epigejos, Roth.—This rare grass, elsewhere in Ireland known in Co. Derry only, was discovered by Mr. Hart near Killeany, and on the "inland" side of the road near Oghill. It was not seen on the island by Messrs. Nowers and Wells, and Miss Knowles' re-discovery of it in Mr. Hart's first station is therefore satisfactory. During my stay I was well pleased to meet with it in several places near the sea not far from Port Cowrugh, and to find that it grows in some abundance among rocks near the sea a little north of Portmurvy Pier, and thence at frequent intervals all the way to the Seven Churches.

A. **Festuca elatior,** L.—Lakelet west of Bungowla.

A. **Equisetum arvense,** L.—Near Lough Atalia.

A. **Equisetum variegatum,** Schleich, var. **majus,** Syme.—Among stones at Lough Atalia. This is the plant recorded doubtfully by Mr. Hart as *E. hyemale.*

a. **Polystichum angulare,** Newm.—Fine specimens about Oghill; Mr. Hart quotes Middle Island only.

Lastrea Filix-mas, Presl.—In a number of places.

A number of rarer Aran plants were seen growing in the stations already recorded for them by Mr. Hart—such were *Sinapis nigra, Helianthemum canum* (abundant in many places) *Rhamnus catharticus, Orobanche Hederæ* (several places), *Stachys arvensis,* &c. The rarest Aran plants *not* seen were *Matthiola sinuata, Carduus nutans,* and *Ajuga pyramidalis,* but time did not permit of a visit to Straw Island, the former home of the first-named,

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In conclusion, we have to express our obligations to the various botanists of the party who favoured us with notes and specimens, and to Messrs. Arthur Bennett, H. and J. Groves, and Rev. E. F. Linton, for kindly naming some critical plants.

IV.—ZOOLOGY.

FORAMINIFERA.

BY JOSEPH WRIGHT, F.G.S.

THE following list of Foraminifera must not be looked as complete. From several packets of shore-sand taken from the vicinity of Dog's Bay near Roundstone, and given to me by my friend Mr. Robert Welch of Belfast, I regret to say that from want of time only a portion of one of them has been examined, with the result given below. I hope at an early date to go through the remainder of the stuff. It is interesting to note that the shore-sand at this locality is almost entirely made up of small shells and Foraminifera. *Miliolina secans* and *Truncatulina lobatula* occur in the greatest profusion, whilst *Discorbina globularis, Miliolina subrotunda* and *M. circularis* are also in great numbers.

Biloculina irregularis, d'Orb.—Rather rare, specimens very small.

B. depressa, d'Orb.—Rather rare.

Miliolina oblonga (Mont.)—Rather rare.

M. seminulum (Linn.)—Frequent.

M. auberiana (d'Orb.)—Rare.

M. subrotunda (Mont.)—Very common.

Miliolina circularis (Born.)—Very common.
M. seminuda, Rss.—Common.
M. secans (d'Orb.)—Most abundant, specimens large.
var. **obliquistriata** (Halkyard)—Very rare.
M. Ferussacii (d'Orb.)—Rather rare.
M. bicornis (W. & J.)—Frequent.

Haplophragmium canariense (d'Orb.)—Very rare.

Textularia gramen, d'Orb.—Frequent.
T. concava (Kar.)—Frequent.

Bulimina fusiformis, Will.—Very rare.
B. marginata, d'Orb.—Rather rare.

Bolivina punctata, d'Orb.—Very rare.

Cassidulina lævigata, d'Orb.—Rather rare.

Lagena globosa (Mont.)—Rare.
L. lævis var. **clavata,** d'Orb.—Rare.
L. lineata (Will.)—Rare.
L. sulcata (W. & J.)—Common.
L. Williamsoni (Alcock)—Common.
L. costata (Will.)—Very rare.
L. semistriata, Will.—Rare.
L. squamosa (Mont.)—Common.
L. hexagona (Will.)—Frequent.
L. orbignyana (Seg.)—Frequent.
L. quadricostulata, Rss.—Rare.

Nodosaria (Glandulina) rotundata, Rss.—Rare.

Cristellaria rotulata (Lamk.)—One very small specimen.
C. crepidula (F. & M.)—Rare, specimens large.

Polymorphina lactea (W. & J.)—Common.
var. **oblonga,** Will.—Rare.
P. compressa, d'Orb.—Common.
P. problema, d'Orb.—Common.
P. sororia, Rss.—Very rare.
P. rotundata (Born).—Rare.
P. myristiformis, Will.—Rare.

Uvigerina angulosa, Will.—Rather rare.

Globigerina bulloides, d'Orb.—Common.
G. inflata, d'Orb.—Rather rare, specimens very small.

Orbulina universa, d'Orb.—Frequent.

Discorbina globularis (d'Orb.)—Very common.
D. orbicularis (Terq.)—Rare.
D. nitida (Will.)—Very rare.

Planorbulina Mediterranensis, (d'Orb.)—Frequent.

Truncatulina lobatula (W. & J.)—Most abundant.
var. **variabilis,** d'Orb.—Frequent.

Pulvinulina auricula (F. & M.)—Common.

Gypsina inhærens (Sch.)—Rare.

Nonionina depressula (W. & J.)—Rare.

Polystomella crispa (Linn.)—Frequent.
P. striato-punctata (F. & M.)—Rather rare.

ARACHNIDA.

(Collected for the R.I.A. Flora and Fauna Committee).

BY GEORGE H CARPENTER, B.SC.

ARANEIDA.

THE district visited by the Field Club Conference was almost virgin soil as regards Arachnids. Mr. T. Workman's valuable list of Irish Spiders[1] deals mainly with northern localities. Mr. D. W. Freeman has collected industriously for several years in the Dublin district, and a large number of specimens from various parts of Ireland have been kindly sent to me by various correspondents, so that material is accumulating for a new list which I hope to issue before long. The summer is not the time of year when one finds the small *Theridiidæ* which form the bulk of our spider fauna, adult; but our collecting in the Galway district was rewarded by several *Lycosidæ* and *Attidæ* of great interest. Of the forty-four species of spiders enumerated below, eleven do not appear in Mr. Workman's list. My best thanks are due to several members of the party who kindly helped me in collecting spiders as well as insects.

The most remarkable finds were *Lycosa leopardus* on Lough Corrib shore, *Pardosa purbeckensis* (a species only described this year) at Gentian Hill, *Hahnia montana* on Ben Lettery, and the four species of *Attidæ* which conclude the list. The spiders of this family are very scarce in Ireland; I have as yet noted only seven species. The discovery of such a rare species as *Attus floricola* was, therefore, very welcome, while the presence of no less than three attids on Aranmore is a remarkable feature in the fauna of that island.

Dysdera crocota, C. Koch—Mr. R. Welch found an immature male *Dysdera* on M'Dara's Island, Roundstone, which must in all probability be referred to this species. Local in the south of England, this spider is generally distributed and not scarce in Ireland; its presence in this remote western isle is of some interest.

Segestria senoculata, L.—Immature specimens observed in most of the localities visited, including Aranmore.

Drassus cupreus, Bl.—From an examination of Irish *Drassi*, kindly made by Rev. F. O. P. Cambridge, this species appears to be far more plentiful in Ireland than the nearly allied *D. lapidosus*, Wlck. Adult females with colonies of young just hatched, were found at Ballyvaughan, on Lough Corrib shore, and on Aranmore.

Prosthesima Petiverii, Scop. (Cb.)—Ballyvaughan and Aranmore. The nearly allied *P. Latreillei*, which is not rare in the south and east of Ireland, was not observed.

P. nigrita, Fab.—I did not find this species, but Dr. Scharff took it on Aranmore in September, 1891.

Micariosoma festivum, C. Koch—An immature male on Aranmore. Not previously recorded as Irish.

Clubiona phragmitis, C. Koch—Lough Corrib shore, under stones.

C. reclusa, Cb.—Recess; Ballyvaughan; Lough Corrib shore in the wood, female with nest beneath frond of *Polypodium*. This seems the commonest of the Irish *Clubionæ*.

Dictyna arundinacea, Cl.—Immature males and females on L. Corrib shore.

[1] *Entomologist*, vol. xiii., 1880, p. 125.

Textrix denticulata, Oliv.—Everywhere under stones, including Aranmore.

Agelena labyrinthica, Cl.—Mr. Wolfe found two females of this fine spider at Ballyvaughan. It is common in the south-west of Ireland, but unknown or very scarce in the east.

Hahnia montana, Bl.—Adults on the summit of Ben Lettery. This is its first record as an Irish species. Rev. W. F. Johnson took a specimen at Portrush last year.

Theridion lineatum, Cl.—Abundant in most places. Not observed on Aranmore, but Mr. Welch took it on M'Dara's Island and on Inchangoil.

Pedanostethus lividus, Bl.—On the slope of Ben Lettery.

Linyphia triangularis, Cl.—Observed in most localities; not on Aranmore.

Leptyphantes tenuis, Bl.—Gentian Hill, L. Corrib shore, in the wood.

Erigone atra, Bl.—Gentian Hill.

E. longipalpis, Sund.—Shore of Galway Bay, among seaweed at tide-mark.

Maso Sundevalli, Westr.—A single female in the wood on L. Corrib shore with egg-cocoon beneath a dried oak leaf.

Pachygnatha Degeerii, Sund.—In most localities. M'Dara's Island, but not observed on Aranmore.

Tetragnatha extensa, L.—Recess; L. Corrib shore.

Meta segmentata, Cl.—Immature individuals everywhere on the mainland; but not observed on Aranmore or M'Dara's Island.

M. merianæ, Scop.—Recess.

Zilla x-notata, Cl.—In most localities. Abundant on Aranmore, making its web in the clefts of the limestone rocks.

Z. atrica, C. Koch.—Recess.

Epeira diademata, Cl.—Everywhere, common. Males and females were already adult; rather an early date for this species. The colour of specimens varied from bright red to blackish brown.

E. cornuta, Cl.—Recess; L. Corrib shore; M'Dara's Island. Like the last species, showing great colour variation.

Xysticus cristatus, Cl.—Observed in most localities, but not on Aranmore.

Oxyptila trux, Bl.—Aranmore.—This species is not in Mr. Workman's list; I have examples from several Irish localities.

Dolomedes fimbriatus, Wlck.—Recess; Lough Corrib shore. This fine spider, perhaps our largest British species, has been found at various points in western Ireland from Co. Roscommon to Killarney. We observed adult females carrying their egg-bags and young in nearly all stages of growth, from the newly-hatched colonies, dwelling in the web spun (according to Blackwell) by the mother spider, over plants of *Myrica Gale.*

Lycosa picta, Hahn.—Aranmore, on sand-hills.

L. leopardus, Sund.—Lough Corrib shore, including Inchangoil. This fine spider has not been recorded as Irish, though I took it in 1893 at Castletownbere, Co. Cork.

L. terricola, Thor.—Common everywhere, including Aranmore.

L. ruricola, DG.—Lough Corrib shore; Inchangoil.

L. pulverulenta, Cl.—Slopes of Ben Lettery.

Pardosa amentata, Cl.—Ballyvaughan.
P. pullata, Cl.—Everywhere common, including Aranmore.
P. nigriceps, Thor.—Ballyvaughan ; Aranmore.
P. monticola, C. Koch.—Gentian Hill; M'Dara's Island. This spider, not previously recorded as Irish, has lately been taken by Mr. Halbert at Portmarnock, Co. Dublin. The nearly-allied *P. palustris*, L., common in eastern Ireland, was, curiously enough, not observed in this district.
P. purbeckensis, F. Cb.—A single female taken at Gentian Hill must be referred to this species, lately described[1] by Rev. F. O. P. Cambridge from the Isle of Purbeck and the shores of the Solway. An interesting addition to our fauna.
Euophrys erraticus, Walck.—Dr. Scharff found this spider on Aranmore, September, 1891, but it has not been recorded as Irish before.
E. frontalis, Walck.—Aranmore. Immature females under stones. This species (which Mr. H. L. Jameson has brought me from Co. Sligo) has not been recorded as Irish.
Heliophanus cupreus, Wlck.—Aranmore; immature males abundant under stones. Probably a widely-distributed spider in Ireland.
Attus floricola, C. Koch—This interesting species, whose only recorded British locality is Brighton, Sussex, was abundant under stones on the margin of L. Corrib. Adults of both sexes and immature individuals were obtained. The nest, of beautiful white silk, was found in a cavity of the stone.

PHALANGIDA.

None of the four species recorded below are worthy of special remark.

Liobunum rotundum, Latr.
Phalangium opilio, L.
Oligolophus morio, Fb.
} Everywhere, including Aranmore and M'Dara's Island.

O. tridens, C. Koch.—L. Corrib shore.

MYRIAPODA.

(Collected for the R.I.A. Flora and Fauna Committee.)

BY GEORGE H. CARPENTER, B.SC.

THE few Myriapods which I was able to collect add but little to our knowledge of the Irish species as set forth by Mr. Pocock (*I.N.*, 1893, p. 309). *Lithopius variegatus* was common almost everywhere. *L. melanops* and *Linotænia maritima* were found at Ballyvaughan. At the same place I took *Iulus luscus*, which Mr. Welch found on M'Dara's Island. I did not observe any Myriapod on Aranmore.

At Gentian Hill I found *Scolopendrella immaculata*, Leach, an obscure white creature, which belongs to the interesting group Symphyla, and is not included in Mr. Pocock's list. I have taken this species at several localities around Dublin, and it is probably generally distributed in the country.

[1] *Ann. Mag. N. H.* (6) vol. xv., 1895, p. 32.

INSECTA.

(Collected for the R.I.A. Flora and Fauna Committee.)

COLLEMBOLA AND *THYSANURA.*

BY GEORGE H. CARPENTER, B.SC.

THE first volume of the *Trans. Ent. Soc., Lond.* (1836) contains a paper by Templeton on the Irish species of these lowly but most interesting insects. I have, for some time, been collecting material for a revision of this list, and I obtained a fair number of species around Galway.

COLLEMBOLA.

Smynthurus fuscus, L.—Oughterard.

Tomocerus plumbeus, L. (*longicornis*, Mull.).—Galway; Oughterard. This species is apparently common in Ireland, though not mentioned by Templeton.

T. tridentiferus, Tullb. (*plumbeus*, Templ., Lubb.).—Oughterard.

Orchesella cincta, L.—Oughterard.

Anurida maritima, Guer.—Aran, at Kilronan between tide-marks. Not in Templeton's list, but recorded as from Kinsale by Lubbock, and probably common all round the coast.

THYSANURA.

Machilis polypoda, L.—Everywhere, including Aranmore and M'Dara's Island. According to Templeton this is a very common species in Ireland, an observation which I can abundantly confirm. From Lubbock's statement it seems to be quite a rarity in the south-east of England. On Aranmore it occurs in myriads, every stone one overturns disclosing a large colony. The insects agree closely with the stone in colour and markings.

M. maritima, Leach.—Gentian Hill.

Campodea staphylinus, Westw.—Ballyvaughan. This obscure, but probably common, insect was described subsequently to Templeton's paper. Dr. Scharff has taken it near Dublin.

HYMENOPTERA, ORTHOPTERA, AND *NEUROPTERA.*

BY GEORGE H. CARPENTER, B.SC.

THE only family of Hymenoptera to which we were able to pay attention were the Ants, of which the following species were taken:

Lasius niger, L.—Oughterard; Ballyvaughan.

L. flavus, D.G.—Gentian Hill.

Leptothorax acervorum, Fb.—A small colony in a felled fir-trunk in the wood above L. Corrib shore. This species has only been recorded as Irish from Carlingford (Rev. W. F. Johnson).

Myrmica rubra, L. (races *ruginodis* and *scabrinodis*)—Oughterard.

Such Orthoptera as came in our way were noted or collected. The following five species only were found, but one of these (*Mecostethus grossus*) was one of the best insects taken on the excursion.

Forficula auricularia, L.—Common everywhere, including Aranmore.

Mecostethus grossus, L.—Abundant near Oughterard, at Recess, and on the slopes of Ben Lettery. This fine grasshopper attracted much attention. According to Mr. E. Shaw (*Ent. Mo. Mag.* vol. xxv., 1889, p. 412) there are but two recent British captures of the species on record, one in the fens of Norfolk and one in Co. Kerry. Mr. Miller (*Entom.* vol. xxii., 1889, p. 196) expresses a doubt if it is really a native insect. Stephens remarked that in his time it was not rare in marshes, and there are several Irish specimens in the Haliday collection. Dr. Scharff has taken it at Killarney. It is a northern and central European species.

Stenobothrus viridulus, L.—Common everywhere except on Aranmore, where no grasshopper was seen.

S. bicolor, Sharp.—Oughterard and Recess.

Acridium bipunctatum, L.—Gentian Hill; Oughterard. Mr. Kane has taken this species at Kenmare, and Mr. F. Neale has found it at Limerick as well as *A. subulatum*, L.

The only Neuroptera observed were *Leptetrum quadrimaculatum* and *Orthetrum cærulescens* at Recess, and *Calopteryx virgo* at Oughterard.

HEMIPTERA.

BY J. N. HALBERT.

The following species of Heteroptera were collected. None are rare, so they do not call for special remark.

Scolopostethus neglectus, Edw.—Ballyvaughan.

Piesma quadrata, Fieb.—Ballyvaughan, under stones on shore.

Dictyonota crassicornis, Fall.—Ballyvaughan under stones on shore; also common on Aranmore, in a sandy place near Kilronan.

Derephysia foliacea, Fall.—Aranmore, one specimen near Kilronan.

Velia currens, Fab.—Common.

Nabis flavomarginatus, Scholtz.—Recess, etc., frequent by sweeping.

Salda littoralis, Linn.—Lake shores, common.

Temnostethus pusillus, H. Schff.—Oughterard, sweeping.

Anthocoris sylvestris, Linn.—Abundant.

Pithanus mærkeli, H.S.—Frequent.

Megalocerœa ruficornis, Fall.—Common near Galway.

Leptopterna ferrugata, Fall.
Calocoris roseomaculatus, De G.
C. bipunctatus, Fab.
Lygus pabulinus, Linn.
} Common.

Campyloneura virgula, H. Schf.—Oughterard.

Archotylus marginalis, Reut.—Common.

Phylus coryli, Linn.—Oughterard.

Psallas varians, H. Schff.

Plagiognathus arbustorum, Fab.
P. viridulus, Fall.
Asciodema obsoletum, D. & S.
} Common.

COLEOPTERA.

BY J. N. HALBERT.

THE facilities offered on the recent Field Club trip for visiting promising and in most cases unworked districts were so exceptional, that I gladly availed myself of the opportunity to collect on that occasion. The results prove to be very satisfactory considering the time of the year (not the best for beetles), and the difficulty of making the most of a few hours when in a strange locality. In the spring of 1880 Mr. J. J. Walker, R.N., made some valuable captures in the neighbourhood of Galway, and with this exception I cannot find that the district has been examined by any coleopterist. This fact will excuse the inclusion of so many common species in the following list, and it must be remembered, that it is more satisfactory to have the records of such when a general list comes to be compiled than the conjecture that they *probably* occur there as elsewhere in Ireland.

Of the species collected at least four are new records for Ireland, and some others are rare or of interest in their distribution. I must acknowledge my indebtedness to those members who so kindly assisted me in collecting, and may mention that Mr. G. H. Carpenter was not so deeply engrossed over spider-hunting as to allow the rare *Leistus montanus* to escape when working Ben Lettery. Mr. Frank Neale also became a coleopterist specially for the occasion, and by his exertions considerably extended the list.

Cicindela campestris, L.—Recess, and locally common.

Carabus catenulatus, Scop.—A few examples at inland localities.

C. clathratus, L.—Slopes of Carn Seefin; no living specimens were found, but numerous wing cases proved its existence. A northern species which occurs throughout Scotland, and is widely distributed in Ireland.

C. granulatus, L.
Notiophilus biguttatus, F. } Frequent.
N. aquaticus, L.

Leistus montanus, Steph.—Top of Ben Lettery. This northern and mountain species is new to the Co. Galway, but has been recorded from Croagh Patrick and Mangerton, and there is an example in Mr. Haliday's collection from Lugnaquilla, it probably occurs on most of our high mountains.

Nebria brevicollis, F.—Common.

Pelophila borealis, Payk.—Shore of Lough Corrib near Oughterard. One of our most interesting beetles, an inhabitant of high continental latitudes, its British distribution being the Orkney Islands and Ireland, where it occurs as far south as Killarney. It is perhaps the most remarkable instance of the southern extension in Ireland of a characteristically arctic animal.

Elaphrus cupreus, Daft.
Loricera pilicornis, F. } Lake shores, common.
Clivina fossor, L.

Dyschirius æneus, Dy.—Banks of River Corrib near Galway.

D. globosus, Herbst.—Common.

Broscus cephalotes, L.—Shore at Gentian Hill; also on sandy beach near Kilmurvy, Aranmore.

Badister bipustulatus, F.
Harpalus æneus, F.
H. latus, L.
H. ruficornis, F.
Dichirotrichus pubescens, Payk.
} Common on sea-shore under stones, etc.

Pterostichus madidus, F.
P. vulgaris, L.
P. nigrita, F.
P. strenuus, Panz.
P. vernalis, Gyll.
P. striola, F.
} Common. *P. madidus*, F., occurred on Aranmore.

Calathus cisteloides, Panz.—Shore at Gentian Hill. Aranmore.

C. melanocephalus, L.—Common, also on Aranmore. Some examples clearly referable to the type have the thorax slightly infuscate, approaching the var. *nubigena*, Hal. The latter form was taken on Aranmore by Mr. J. M. Browne.

Taphria nivalis, Panz.—Shore at Ballyvaughan.

Anchomenus albipes, F.
A. marginatus, L.
} Common; also on Aranmore.

A. parumpunctatus, F.
A. viduus, Panz.
} Lough Corrib shore near Oughterard.

Bembidium minimum, F.—Ballyvaughan, under stones on the shore. Previously recorded from Belfast, but there is no recent record from any Irish locality.

B. lampros, Herbst.—Common; also on Aranmore.

B. femoratum, Sturm.
B. littorale, Ol.
} Common on shore at Gentian Hill.

Trechus minutus, F., var. **obtusus**, Er.—Common; also on Aranmore.

Pogonus chalceus, Marsh.—Shore near Gentian Hill.

Dromius quadrinotatus, Panz.—Recess, beaten from oaks.

Hydroporus obscurus, Sturm.
Agabus bipustulatus, L.
} Lough Corrib, etc., common.

Orectochilus villosus, Mull.—Lough Corrib, in small colonies under stones along shore.

Anacæna globulus, Payk.—Local. Ballyvaughan, etc.

Philydrus maritimus, Thoms.—Aranmore. Abundant in a small salt-marsh near Kilronan.

Chætarthria seminulum, Herbst.—River Corrib, near Galway.

Helophorus æneipennis, Thoms.—Glendalough near Recess.

H. brevipalpis, Bedel.—Common.

Cercyon littoralis, Gyll.—Gentian Hill; also on Aranmore, near Kilmurvy.

Aleochara lanuginosa, Grav.—Common everywhere.

A. mœsta, Grav.—Oughterard, on lake shore.

A. obscurella, Er.—Aranmore sandy beach near Kilmurvy. This species has hitherto been recorded from the Dublin coast and the Great Blasket Island.

Astilbus canaliculatus, F.—Common.

Homalota volans, Scrib.—Common on lake shores, etc.

H. vestita, Grav. } Abundant under seaweed, etc., near Gentian
H. trinotata, Kr. } Hill.

Tachyporus obtusus, L., var. **nitidicollis**, Steph.—Locally common, by sweeping.

Quedius fuliginosus, Grav. }
Q. tristis, Grav. } Gentian Hill, common on sea shore under stones, etc.; the var.
Q. molochinus, Grav. } of *molochinus* with dark elytræ
Q. rufipes, Grav. } was fairly numerous.

Creophilus maxillosus, L.—Aranmore.

Staphylinus cæsarius, Cider.—Recess, etc., frequent.

Ocypus olens, Müll. }
O. cupreus, Rossi. } Common.

O. ater, Grav.—Abundant along shore near Gentian Hill.

O. morio, Grav.—Frequent; also on Aranmore.

Philonthus æneus, Rossi.—Sea shore at Gentian Hill.

P. sordidus, Grav.—Ballyvaughan, under stones on sea shore.

P. quisquiliarius, Gyll.—River Corrib bank between Galway and Menlough. A southern species in Britain, not recorded from north of Cambridgeshire.

Cafius fucicola, Curt.—This local species occurred abundantly under sea weed on the shore near Gentian Hill. Previously recorded from Greenore.

C. xantholoma, Grav.—Common in same situation as former. A larva which appears to belong to this beetle was found at the same place.

Xantholinus punctulatus, Payk.—Recess, etc., common.

X. tricolor, F.—Frequent both inland and on the coast; also on Aranmore.

Lathrobium longulum, Grav.—Lough Corrib shore, near Oughterard.

Stenus buphthalmus, Grav. } River Corrib bank, near Galway. The
S. melanopus, Marsh. } latter has not been previously recorded as Irish.

S. declaratus, Er.—Recess, &c., sweeping.

S. brunnipes, Steph. }
S. impressus, Germ. } Common, by sweeping.
S. similis, Herbst. }

S. pubescens, Steph.—River Corrib, several off sedges.

S. tarsalis, Lynn.—Recess, sweeping herbage.

Silpha atrata, L., var. **subrotundata**, Steph.—Common in most places.

Coccinella hieroglyphica, L.—Recess, sweeping amongst Heath.

Halyzia xvi-guttata, L. }
H. conglobata, L. } Near Oughterard, beaten from Alder.

Chilocoris bipustulatus, Ill.—Near Oughterard, off Birch. Does not seem to have been previously recorded from Ireland.

Rhizobius litura, F.—Found on the shore near Ballyvaughan. The occurrence of certain species (usually taken by sweeping their food plants) under stones on the coast, seems to be pretty frequent in the west, amongst others I have taken *Gastroidea polygoni*, L., in this way.

Meligethes rufipes, Gyll.—Aranmore, one specimen by sweeping. Does not seem to have been previously recorded from Ireland.

Byturus tomentosus, F.—Ballyvaughan, several by sweeping.

Byrrhus pilula, L.—Ballyvaughan, under stones.

Parnus prolifericornis, F.—Common on lake shores.

Aphodius lapponum, Gyll.—On Ben Lettery. A northern species; probably occurs in all our upland districts.

Geotrupes stercorarius, L.—Common; also on Aranmore.

G. sylvaticus, Panz.—Common.

Serica brunnea, L.—Gentian Hill, etc., off bushes.

Phyllopertha horticola, L.—Coast near Galway.

Cetonia aurata, L.—Aranmore, common on the flowers of *Rubus*, *Galium*, *Senecio*, etc. The occurrence of the Rose-beetle in such abundance on Aran was unexpected, as it is rare or local on the mainland. Has been only definitely recorded from near Belfast. Mr. W. F. de V. Kane has observed it locally on the Cork littoral and in the Glengariff district, and I have lately seen specimens taken by Mr. A. Neale at Tramore, near Waterford. It is a common insect in the south of England, and seems a striking example of the tendency of southern insects to have a western range in Ireland.

Lacon murinus, L.—Aranmore, under stones near Kilronan.

Cyphon nitidulus, Thoms.
C. variabilis, Thumb.
Telephorus bicolor, F.
T. thoracicus, M.
Rhagonycha fulva, Scap.
} Frequent, by sweeping.

Chrysomela staphylea, L.
Gastroidea polygoni, L.
} Near Galway, sweeping.

Lochmæa suturalis, Thoms.—Recess, etc., common on heath.

Longitarsus holsaticus, L.—Near Galway, sweeping.

L. luridus, Scop.—A slightly immature specimen taken near Recess, is probably referable to this species.

L. pellucidus, Foudr.—Ballyvaughan and Oughterard. A few examples of this local and southern species occurred by sweeping. Has been recorded from Bundoran.

L. Jacobææ, Wat.—Common.

Cassida nobilis, L.—Ballyvaughan, in numbers on shore clinging to stones amongst a growth of *Honckeneya peploides*, on which plant it was observed by the Rev. W. F. Johnson at Greenore.

Apion carduorum, Kirby.—Near Galway, common.

Otiorrhynchus blandus, Gyll.—Gentian Hill, under stones on coast; also on Aranmore. Sub-alpine, and common in Scotland, but has not occurred in England.

O. ligneus, Ol.—Ballyvaughan and Gentian Hill, frequent on shore.

O. picipes, Fb.
O. sulcatus, F.
} Common.

O. rugifrons, Gyll.—Gentian Hill and Ballyvaughan; also in Aranmore. Seems to be much more common on the west than on the east coast.

Barynotus Schönherri, Lett.—Gentian Hill.

Orchestes fagi, L.—Common.

O. salicis, L.—Recess, swept off Willow.

Miaris campanulæ, L.—Ballyvaughan. Several on the hill-side in the flowers of *Campanula rotundifolia*, L.—Not previously recorded from Ireland.

Cœliodes quercus, F.—Recess, beaten from Oak.

Ceuthorrhynchus ericæ, Gyll.—Common everywhere on Heath.

C. erysimi, F.—Aranmore, sweeping near Kilmurvy.

DIPTERA.

BY GEORGE H. CARPENTER, B.SC.

OPPORTUNITY was taken to secure some specimens of this order of insects, which since Haliday's time have been almost neglected in Ireland. Their distribution over the country is so little known, that I make no apology for giving a list of all the species which I have been able to identify, though most of them appear to be common and widespread.

Tipula maculipennis, Mg.—Lough Corrib.

Hæmatopa pluvialis, L.—Recess; Lough Corrib.

Chrysopa relictus, Mg.—Recess.

Theriopiectes tropicus, L.—Recess.

Microchrysa polita, L.—Recess.

Nemotelus pantherinus, L.—Gentian Hill.

Leptis lineola, Fb.—Recess.

Empis stercorea, L.—Recess, Lough Corrib.

Hybos grossipes, L.
Dolichopus signatus, Mg. } Lough Corrib.

Sericomyia lappona, L.—Summit of Ben Lettery.

Pyrophæna ocymi, Fb.—Galway, Aranmore.

Sphærophoria nitidicollis, Zett.—Lough Corrib.

Echinomyia fera, L.
E. grossa, L.
Olivieria lateralis, Fb. } Lough Corrib.

Hylemyia variata, Fall.—Galway.

Hyetodesia flaveola, Fb.—Gentian Hill.

Mydæa urbana, Mg.—Lough Corrib.

Orygma luctuorum, Mg.
Fucomyia frigida, Fb. } On seashore at Gentian Hill on *Fucus*, at tide-mark.

Tephritis leontodontis, D.G.—Gentian Hill; Lough Corrib.

Urophora solstitialis, L.
Tetanocera punctulata, Scop. } Ballyvaughan.

Lauxania ænea, Fall.—Lough Corrib.

LEPIDOPTERA.

BY W. F. DE V. KANE, M.A., F.E.S.

ON the excursion to RECESS the captures most worthy of note were as follows. I took a large number of larvæ of *Acronycta menyanthidis* feeding on *Myrica gale* and one on *Menyanthes trifoliata*, some of them within a fortnight of pupation. Larvæ of *Hadena pisi* were also very numerous on various food plants. An imago of *Agrotis lucernea* was taken by the party who ascended Ben Lettery, an interesting locality for this coast-loving species. Mr. Wolfe of Skibbereen was fortunate in securing a nice specimen of the rare and local *Selidosema ericetaria*. I collected some very striking forms of *Camptogramma bilineata* on the heather very similar to some in my cabinet from the Killeries.

The following lepidoptera also were in evidence—*Satyrus semele* and *Epinephile hyperanthes* abundantly, a specimen also of *Argynnis aglaia* and *Tanagra atrata.*

At BALLYVAUGHAN, Co. Clare, the stony district traversed was not such as to reward a flying visit in search of lepidoptera. A few *Argynnis aglaia* and *Satyrus semele* were noticed. Larvæ of *Dianthœcia cucubali* and probably some of *D. capsophila* were found in *Silene maritima* and *S. inflata.* A few very pale *Larentia cæsiata* were observed conformable to the tint of the grey limestone, and one *Gnophos obscuraria* too worn to distinguish its character; *Herbula cespitalis* abounded in the short herbage, and a few *Anaitis plagiata.* The most interesting species taken were one *Anticlea cucullata* by myself on the wall of Gleninagh Castle, where the party gathered for lunch, an insect almost unrecorded hitherto in Ireland; and one of *Phothedes captiuncula* by Mr. Carpenter, which was remarkable for its dark and strongly marked delineation, differing thus from the English form, but not so brightly coloured as those occurring near the town, and elsewhere in the County of Galway.

At INISHMORE (Island of Aran) a pupa of *Dianthœcia capsophila* was found. *Satyrus semele* and *Argynnis aglaia* turned up abundantly, as well as *Camptogramma bilineata,* which is here of a very pale and inconspicuous type, a protective character already noted in the *Larentia cæsiata* of Ballyvaughan.

At OUGHTERARD, Mr. Wolfe found larvæ of *Thecla rubi* feeding on *Erica Tetralix,* an unusual food-plant for the species.

MOLLUSCA.

BY R. STANDEN,

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

MARINE MOLLUSCA.

THE subjoined catalogue of 112 marine species collected by Messrs. A. R. Nichols, R. Welch, Fred. Bigger, E. Collier, Miss Kelsall, and myself, embraces the usual common littoral forms found living everywhere in the district, together with a number of scarcer species from shore drift at Dog's Bay, Connemara. This drift, of which Mr. Welch and I brought home a large quantity, has proved most prolific, and we are indebted to Dr. Chaster, of Southport, for much valuable aid in sorting material, and in determination of minute species. It contains, in addition to adult examples, a vast number of embryonic specimens in beautiful condition. *Cæcum glabrum* with spiral attached is common, and separate spirals are plentiful. *Patella vulgata, Helcion pellucidum,* and *Tectura virginea* with embryo spiral cap are all common. Most of the bivalves are represented only by valves, but the univalves are, as a whole, in good condition and abundant in individuals—*Pleurotoma* and *Rissoa* especially so.

The most important record from Dog's Bay is undoubtedly the occurrence of *Lepton Sykesii*, Chaster, in the shore drift. For original description see *Ann. and Mag. Nat. Hist.* for March, 1895, p. 248; and *Journal of Malacology*, June, 1895, p. 36, for further notes by J. T. Marshall. Both record it only from Guernsey.

Mr. Nichols took *Modiolaria marmorata*, *Cardium norvegicum*, *Venus casina*, and *Chiton marginatus* at Gleninagh—the latter species being also found by Miss Kelsall at Aranmore. I found *Rissoa violacea* and *R. parva* in abundance near Kilronan, and under stones at low water near Killeany, *B. undatum* var. *littoralis* occurred—a pretty little form exactly agreeing with West of Scotland examples.

The late Dr. Alcock gives a list of about fifty species from Dog's Bay in *Trans. Lit. and Phil. Soc. Manchester*, 1866, including several species not taken by us, but the following catalogue contains many additional species, and amply indicates the rich field which exists here for some systematic dredging with modern appliances.

Anomia ephippium, L.
Ostrea edulis, L.
Pecten varius, L.
P. maximus, L.
Lima subauriculata, Mont.
L. hians, Gm.
Mytilus edulis, L.
Modiolaria marmorata, Forb.
Pectunculus glycimeris, L.
Arca tetragona, Poli.
Lepton nitidum, Turt.
L. Clarkiæ, Cl.
L. Sykesii, Chaster.
Montacuta bidentata, Mont.
M. ferruginosa, Mont.
Lasæa rubra, Mont.
Cyamium minimum, Fab.
Cardium echinatum, L.
C. edule, L.
C. norvegicum, Speng.
Venus lincta, Pult.
V. casina, L.
V. gallina, L.
Tapes decussatus, L.
Tellina balthica, L.
T. tenuis, Da C.
T. donacina, L.
Donax vittatus, Da C.
Mactra solida, L.
Lutraria elliptica, Lam.
Scrobicularia alba, Wood.
Ceratisolen legumen, L.
Solen ensis, L.
S. siliqua, L.
S. vagina, L.
Corbula gibba, Oliv.
Saxicava rugosa, L.
Teredo norvegica, Speng.
Dentalium entalis, L.
Chiton marginatus, Penn.
Patella vulgata, L.
Helcion pellucidum, L.
Tectura virginea, Müll.
Trochus helicinus, Fab.
T. magus, L.
T. cinerarius, L.
T. umbilicatus, Mont.
T. lineatus, Da C.
T. exasperatus, Penn.
T. zizyphinus, L.
Phasianella pulla, L.
Lacuna divaricata, Fab.
L. puteolus, Turt.
L. pallidula, Da C.
Littorina obtusata, L.
L. neritoides, L.
L. rudis, Maton.
L. littorea, L.
Rissoa punctura, Mont.
R. costata, Ad.
R. parva, Da C.
R. membranacea, Ad.
R. violacea, Deshn.
R. striata, Ad.
R. fulgida, Ad.
R. soluta, Phil.
R. cingillus, Mont.
Hydrobia ulvæ, Penn.
Barleeia rubra, Cl.
Skenea planorbis, Fab.
Homalogyra atomus, Jeff.
H. rota, F. & H.
Cæcum glabrum, Mont.
Turritella terebra, L.
Scalaria communis, Lam.
S. Trevelyana, Leach.
S. clathratula, Ad.
Aclis unica, Mont.
Odostomia minima, Jeff.
O. nivosa, Mont.
O. rissoides, Han.
O. turrita, Han.
O. diaphana, Jeff.
O. lactea, L.
O. nitidissima, Mont.
Ianthina rotundata, Leach.
Eulima distorta, Desh.
Natica Alderi, Forbes.
Lamellaria perspicua, L.
Aporrhais pes-pelicani, L.
Cerithium reticulatum, Da C.
C. perversum, L.
Cerithiopsis tubercularis, Mont.
Purpura lapillus, L.
Buccinum undatum, L.
Trophon truncatus, Str.
Fusus antiquus, L.
Nassa reticulata, L.
N. incrassata, Str.
Defrancia linearis, Mont.
D. purpurea, Mont.
Pleurotoma costata, Don.
P. nebula, Mont.
P. lævigata, Phil.
P. rufa, Mont.
P. turricula, Mont.
Cyprœa europœa, Mont.
Cylichna cylindracea, Penn.
Utriculus truncatulus, Brug.
Philine punctata, Cl.
Aplysia punctata, Cuv.
Spirialis retroversus, Flem.

Land and Freshwater Mollusca.

The number of members particularly interested in the investigation of the land and freshwater mollusca of the district covered by the excursion was practically limited to myself, and Messrs. Welch and Collier, but several others so far interested themselves as to pick up such specimens as they came across whilst engaged in their own special pursuits, and handed them to me. In this way much valuable assistance was rendered, for which I would here take the opportunity of thanking one and all.

From the diversified character of the ground over which our researches extended, a good list was hoped for, but, with the exception of Lough Corrib, the various sheets of water proved rather unproductive. The failure to find the rare *Vertigo Moulinsiana* was a grievous disappointment, but circumstances prohibited any lengthy search in its recorded localities, to which moreover we had no precise clue.

On the occasion of our trip to Oughterard the courtesy of a local gentleman, Mr. Henry Hodgson, J.P., of Currarevagh, in kindly placing a couple of boats at our disposal, enabled Messrs. F. J. Bigger, R. Welch, E. Collier, and myself to cross over to Inchangoil, and he otherwise extended his hospitality. This visit was especially interesting, both from the historic associations connected with the place and from the fact that it was very probably the first time a conchologist had ever set foot on this beautiful islet, which proved a good collecting ground.

On the breaking up of the party, eight of us spent a few days at Roundstone, and whilst some visited Inis MacDara, and other places, the rest investigated the shores and sandhills of Dog's Bay. (For particulars of the interesting deposit of semi-fossil land shells found there see note at end of list.) On the return journey a break was made at Athlone, where the night was spent, and next day the party visited Clonmacnois. The many interesting finds made during this "extension trip" are included in the subjoined list—in which I have chiefly followed the nomenclature and classification used by Dr. Scharff in his "List of Irish Mollusca." In all cases where a particular species was only taken by *one* individual his name follows in brackets.

Vitrina pellucida, Müll.—Gentian Hill, near Galway; Aran; Inchangoil; and Inis McDara. As is generally the case during the summer months only dead specimens were obtained.

Hyalinia cellaria, Müll.—Common everywhere.

Hy. draparnaldi, Beck.—Very fine near Kilronan, Aran; and Clare-Galway Abbey.

Hy. alliaria, Miller.—Clare-Galway Abbey; Inis McDara; and near Athlone. Uncommon.

Hy. nitidula, Drap.—Common at Clare-Galway; Inchangoil; Innis McDara; and Clonmacnois.

Hy. pura, Alder.—On Inchangoil, the only locality noted, the brown variety is fairly plentiful under moss-covered stones in the graveyard.

Hy. radiatula, Alder.—Several fine specimens under stones on shore of Lough Corrib, between the Abbey and Castle at Annaghdown.

Hy. crystallina, Müll.—A small compact form at Gentian Hill; Ballyvaughan; and Inchangoil. Not plentiful.

Hy. fulva, Müll.—Very large under stones on shore of Lough Corrib, at Annaghdown; and several of a smaller type amongst moss on Inchangoil.

Hy. nitida, Müll.—At Annaghdown, and on Inchangoil this local species occurs in considerable numbers, close to the water's edge.

Hy. excavata, Bean.—One specimen at Gentian Hill (Kane). Probably not uncommon there, as, although a local species, it is generally plentiful where it occurs.

Arion ater, L.—Abundant everywhere, and variable in colour; var. *brunnea*, Rbk., was noted at Gentian Hill; var. *bicolor*, Rbk., under old coffin boards in Clare-Galway Abbey; and var. *albolateralis*, Rbk., at Aran.

A. subfuscus, Drap.—Common in Clare-Galway Abbey, along with its variety, *aurantiaca*, Loc.

A. hortensis, Fér.—Not uncommon at Gentian Hill, and Clonmacnois, where var. *nigra*, Moq., was the prevalent form.

A. circumscriptus, Johnst.—Two specimens at Clonmacnois, and one near Roundstone.

Limax maximus, L.—One specimen of var. *cinerea*, Moq., at Ballyvaughan.

L. marginatus, Müll. (=*L. arboreum*, B.-Ch.).—Gentian Hill; Ballyvaughan; and woods in Mr. Hodgson's demesne on shore of Lough Corrib. Not uncommon.

Agriolimax agrestis, L.—Common. At Clare-Galway most of the specimens seen were the creamy-white var. *albida*, Pic. On Aranmore a very dark form is common—probably var. *nigra*, Morelet.

Amalia gagates, Drap.—One specimen of the dark lead-coloured var. *plumbea*, Moq., taken at Inis McDara by Mr. R. Welch.

A. Sowerbyi, Fér.—Several in graveyard at Clare-Galway Abbey.

Helix pygmæa, Drap.—Several amongst moss at Inchangoil; and in rejectamenta of River Shannon at Athlone.

H. rotundata, Müll.—Common everywhere, except in the Ballyvaughan district, where it is remarkably scarce. The var. *Turtoni*, Flem., occurs in Clare-Galway Abbey.

H. rupestris, Müll.—Plentiful on rocks and walls at Ballyvaughan and Aranmore. On the roadside limestone walls between Athlone and Clonmacnois it swarms, and is there unusually large.

H. aculeata, Müll.—Some pretty light-coloured examples under dead branches at Inchangoil (Standen).

H. pulchella, Müll.—Fairly plentiful at Annaghdown; Inchangoil; and in rejectamenta of River Shannon at Athlone. None of the ribbed variety (*H. costata*, Müll.) were observed.

H. hispida, L.—Type, and var. *concinna*, Jeff., are common everywhere.

H. rufescens, Penn.—Common at Clare-Galway; near Athlone; and at Clonmacnois, where a small compact form of var. *rubens*, Moq., is plentiful along with the type.

H. virgata, Da Costa.—Very abundant on Aranmore. Mostly typical in colour and markings; var. *subalbida*, Poir., and var. *albicans*, Grat., being the only variations noticed.

H. ericetorum, Müll.—Common in nearly every locality visited. It is especially plentiful at Ballyvaughan, in and around the small hayfields, and is extremely fine and variable. Specimens of var. *instabilis*, Zgl., are plentiful near Gleninagh. On Aranmore a small dark form of var. *leucozona*, Moq., is abundant; and some from Inis Mc Dara are almost black; others from Roundstone are the var. *hyalozonata*, Chll., and every conceivable intermediate form between the type and above-named varieties may be collected.

H. acuta, Müll.—Abundant, along with var. *strigata*, Menke., and var. *articulata*, Lam., on Aranmore, between Kilronan and Killeany. Occurs sparingly on the sandhills at Dog's Bay, and on the fortifications at Athlone.

H. nemoralis, Müll.—The extreme beauty in colour and variability of banding exhibited by this common species deservedly make it a prime favourite with collectors, and nowhere in the United Kingdom can such lovely examples be obtained as in the West of Ireland. At Gentian Hill, numerous pretty forms were secured, including vars. *alholabiata*, V. Mart., *rubella*, Moq., *castanea*, Moq., and *libellula*, Risso. At Ballyvaughan it attains to great perfection, and many fine examples were taken from the walls surrounding the small fields, but when the weather is dry they retreat far amongst the stones, and require careful search. The shells are of exceptional size and beauty in this locality, some being remarkably thin and fragile, which at first seems rather strange, considering that the district is on the limestone, and therefore a suitable habitat for snails; but nearly all the little meadows are formed by covering up the limestone pavement with boggy earth brought from a distance, and it is a well-known fact that snails do not love bogs. This may account for the thinness of the shells, but will not for their large size. The varieties obtained were *roseolabiata*, Taylor, *albolabiata*, V. Mart., *rubella*, Moq., *libellula*, Risso., *castanea*, Moq., *hyalozonata*, Taylor, and innumerable other intermediate forms of colour and banding. A full account of all the forms obtained here during a four days' visit last year is given in a paper by Mr. Ed. Collier, in *The Journal of Conchology*, for April, 1895. The greater part of the day on Aranmore was quite unproductive, conchologically, but the heavy rain which fell towards evening caused the snails to leave their snug retreats in the fern-filled crevices of the limestone terraces, and a number of fine specimens were secured before the steamer started. In their general characteristics the Aranmore specimens do not differ greatly from those at Ballyvaughan, except in the remarkable preponderance of white and rosy-lipped forms. Some large semi-fossil specimens from a drift near the priest's house at Kilronan closely resemble those from Dog's Bay. In the ancient graveyard at Clonmacnois some pretty forms occur, notably one in which the bands are all coalescent, and, but for a minute white sutural line, the shell would be perfectly black. It occurs on Inchangoil.

H. aspersa, Müll.—Common throughout, and remarkable mainly for its extreme uniformity of marking. A few specimens of var. *undulata*, Moq., were noticed, and five good examples of the pale yellow variety *exalbida*, Menke, were taken on the terraces and walls between Kilronan and Killeany, Aranmore.

Bulimnus obscurus, Müll.—Very fine under stones on roadside between Athlone and Clonmacnois (Standen).

Cochlicopa lubrica, Müll.—Abundant, with its vars. *lubricoides*, Fér., *ovata*, Jeff., and *hyalina*, Jeff.

Pupa cylindracea, Da Costa (=*P. umbilicata*, Drap.)—Common. On Inis McDara, var. *curta*, Westl., occurs (Welch).

Pupa muscorum, Müll.—A few at Ballyvaughan; Aranmore; Inis McDara; and Roundstone.

Vertigo pygmæa, Drap.—Common under stones at Annaghdown, on shore of Lough Corrib.

V. antivertigo, Drap.—Several in rejectamenta of River Blackadder, at Ballynahinch.

Balea perversa, L.—Inis McDara (Welch).

Clausilia bidentata, Strom. (=*Cl. rugosa*, Drap.).—Common in most localities.

Succinea putris, L.—Banks of river at Clare-Galway; shore of Lough Corrib near Oughterard; and on Inchangoil. Common.

S. elegans, Risso.—Some pretty examples of var. *ochracea*, Betta, on shore of Lough Corrib, in Mr. Hodgson's demesne.

Carychium minimum, Müll.—Common at Annaghdown.

Alexia denticulata, Mont.—Common and very fine near Gentian Hill (Kane).

Limnæa stagnalis, L.—Abounds in the *Victoria regia* tank at the Botanic Gardens, Glasnevin. Common in Lough Corrib at Annaghdown. On the shore of Inchangoil a curious little obese form is very plentiful, which agrees exactly with specimens of var. *fossarina* in my cabinet from Lough Erne.

L. peregra, Müll.—Common in all the loughs and streams; variable in form, but small in size.

L. palustris, Müll.—Gentian Hill (Kane). Common in Lough Corrib, of a small obese form—var. *obesa*, Taylor. In River Shannon rejectamenta a few small specimens occurred.

L. truncatula, Müll.—River Shannon, and river at Ballynahinch; occurs in rejectamenta. Plentiful at Annaghdown.

Planorbis marginatus, Drap.—Plentiful at Annaghdown; Inchangoil; and in Lough Corrib generally.

P. spirorbis, L.—Common in swampy places in Lough Corrib.

P. contortus, L.—A few cast up on the shore at Inchangoil.

P. albus, Müll.—Plentiful at Inchangoil.

P. crista, L.—Several specimens on caddis-cases at Annaghdown.

Ancylus fluviatilis, Müll.—Plentiful in Lough Corrib, especially at Inchangoil, where the stones are thickly studded with a small form of var. *gibbosa*, Bourg. Dead shells abundant on caddis-cases in the rejectamenta of River at Ballynahinch.

A. lacustris, L.—Three specimens from dead stems of *Equisetum*, River Shannon.

Bythinia tentaculata, L.—In Ballynahinch River rejectamenta; common in Lough Corrib everywhere.

Valvata piscinalis, Müll.—Common at Annaghdown and Inchangoil.

Sphærium corneum, L.—A small form is common in all the loughs examined.

Pisidium pulchellum, Jenyns.—Lough Corrib, at Annaghdown.

P. milium, Held. (= *P. roseum*, Jeff.)—The only mollusc found in a small pond on Aranmore, about a mile from Kilmurvy (Standen).

P. pusillum, Gmel.—Common in Lough Corrib, and occurred in rejectamenta of the Shannon at Athlone.

Anodonta cygnea, L.—Probably common in some of the quiet parts of Lough Corrib. A broken valve was found at Annaghdown.

The semi-fossil land shells of Dog's Bay, Connemara, possess a peculiar interest, and the large *H. nemoralis* obtained there are well known to most conchologists. In the *Journal of Conchology* for April, 1885, Mr. R. D. Darbishire has a short paper on this remarkable shell-deposit as observed by him in 1865. He describes them as occurring in an old sward which appeared as a black band, about two inches deep in the face of a small cliff or section of sandhill closing the bay to the eastward. Our stay at Roundstone afforded an opportunity of personally investigating the deposit, of which we availed ourselves to the full. The features of the isthmus between Dog's Bay and Gorteen Bay appear to have altered

considerably since Mr. Darbishire's visit, and no "black band" answering to his description could be found. But, in several places where the wind had cut a clean section through the sand-dunes, the old land surface was exposed and showed plainly as an earthy layer about a foot deep, quite distinguishable from the blown sands above and below, and this was full of land shells in good preservation, all the species mentioned by Mr. Darbishire being obtained, together with several additional ones. The *H. nemoralis* found in this earthy layer are of ordinary character, and comparatively recent, most of them still retaining traces of colour. The large and massive specimens, which undoubtedly belong to an earlier epoch, all occur in the stratum below, which is from three to four feet deep, and composed of clean sand, foraminifera, and finely comminuted shells. As the shells from these separate layers are weather out, they are blown about the sandhills and accumulate in the hollows, where they lie by hundreds intermingled together, but specimens belonging to the two epochs may be determined at a glance by their comparative size, and by the nature of the material with which they are filled. The older shells are not only remarkable for weight and solidity, but also for their dimensions. Some specimens measure 28 mills. in breadth, by 18 mills. in height, but the elevation of spire varies considerably, some examples being very depressed. Some specimens are umbilicated, others have a thick, heavy, curiously constricted lip, folding inwards near the suture, and forming a tooth-like protuberance. Variously banded forms occur, but they are mostly bleached pure white, and as a rule are very perfect, except that in some cases a narrow triangular portion of the lip near the suture is broken out, but this is probably owing to the action of frost. The substance of these massive shells is not calcareous as in recent examples, but more of the nature of arragonite, and the deposition of the material in layers is well shown by making a section of the shell. The following is a full list of the species found in the deposit:—*Vitrina pellucida*, *Hyalinia cellaria*, *H. nitidula*, *H. pura*, *H. crystallina*, *H. fulva*, *Helix aculeata*, *H. nemoralis*, *H. rufescens*, *H. hispida*, *H. concinna*, *H. virgata*, *H. caperata*, *H. ericetorum*, *H. pygmæa*, *H. aspersa*, *H. pulchella*, *H. acuta*, *Pupa muscorum*, *Vertigo angustior*, *V. pygmæa*, *V. substriata*, *Clausilia bidentata*, *Cochlicopa lubrica*, *Carychium minimum*, *Acme lineata*. Careful search in the immediate vicinity for living examples of above only yielded *H. aspersa*, *H. acuta*, *H. ericetorum*, and *P. muscorum*. Some specimens of *H. nemoralis* of ordinary character were, however, found living on the road to Roundstone.

CHURCH OF S. NICHOLAS, GALWAY. [*R. Welch, Photo.*

V.—ARCHÆOLOGY.

BY FRANCIS JOSEPH BIGGER, M.R.I.A.
Hon. Sec. B.N.F.C.

THE following were some of the antiquities examined by the members during the excursion.

GALWAY.—The most interesting of the many objects of antiquarian study in Galway was the old Collegiate Church of S. Nicholas, now the Parish Church. Almost all the members examined this structure, which presents so many distinctive features to the ecclesiologist, carefully conserved, with none of its historic features obliterated. It presents a model of what many of our at present dilapidated churches might be made in usefulness and beauty. The Lynch and Joyce monuments are fine, whilst the old square carved font is particularly so. A fine peal of bells occupies the tower; one of them bears date 1631; whilst all around the roof there is an extensive display of the most grotesque gargoyles. In the north aisle a curious stone structure, with pillars supporting a canopy, is built against the wall; it would be a solution of a disputed point if this were found to have been a street pulpit.

Portions of the old town walls still remain, with a gateway at the quay, and portions of a tower in Francis Street. The quaint old Lynch mansion, with its square-headed windows, attracted much attention on account of the weird history connected with its mayoral occupant.

The Claddagh settlement was also visited, and the primitive homes and habits of the people, now fast assimilating with the townsfolk, duly noted.

BALLYVAUGHAN.—At Ballyvaughan a very perfect medieval castle of the O'Loghlins was made the rendezvous of a lunching party, such as had not been seen within its shade for many generations, whilst the cross-crowned holy well close by had not more visitors at a "pattern." Near at hand the little church of 13th or 14th century date still handed down some curious customs. Here, on the stone altar, and in a hollow beneath, and in the sills of windows and other places, human skulls were exposed in quite a common-place way.

ARAN ISLANDS.—The visit to these islands was certainly the big day for the antiquarians, affording more to see than could be seen in one day. Crosses, churches, and forts were visited in rapid succession, scarcely affording the photographers time to "do" them all; nevertheless little was missed, from the great cyclopean fort of Dun Aengus to the primitive little stone church of Teampull Benan, with its accommodation for about one worshipper.

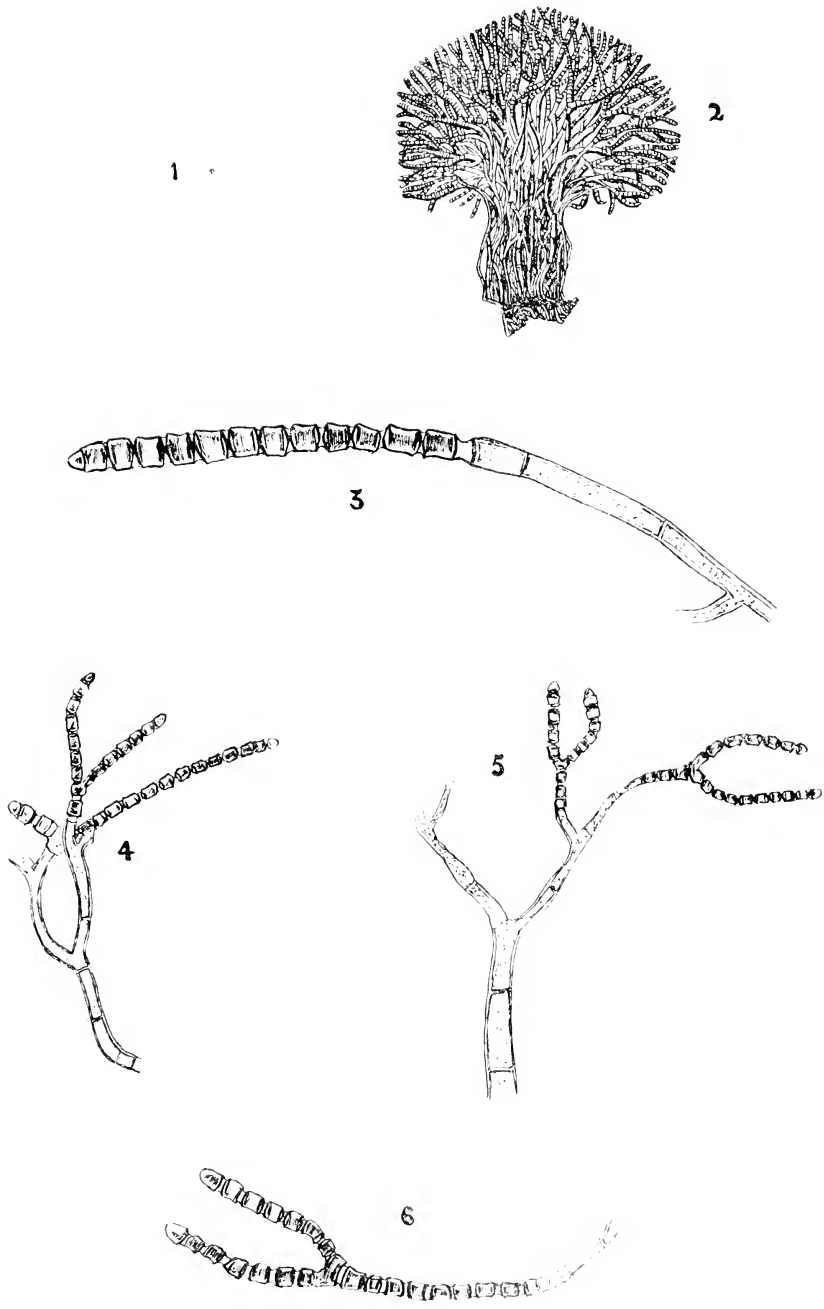
CLARE-GALWAY.—Many members visited this celebrated Franciscan Abbey, founded in 1290 by John de Cogan. The tall central tower is its most distinctive feature, springing from arches to a height far above the average of such towers. In the choir is a beautifully-carved altar tomb of a De Burgo. The lofty east window might well be restored, all the interlacing being forthcoming. On the side of the road facing the Abbey stands a Clanrickarde castle, lofty and perfect.

ANNAGHDOWN.—Beautifully situated on the shores of Lough Corrib stands the graceful Norman castle, large and almost perfect. Here was an ancient religious settlement, as attested by the many ecclesiastical ruins scattered around; one of the most beautiful Hiberno-Romanesque windows in existence is built into a modern church, whilst the corresponding door is well preserved, with other features of almost equal value.

INCHANGUOILE.—To a few were given the pleasure of visiting this most remarkable island in Lough Corrib, through the great kindness of Mr. Henry Hodgson, J.P., who lent his boats, and otherwise hospitably entertained the visitors. Here are two of the earliest churches with deeply sculptured doors, Teampul Phaidrig and Teampul-na-Neave, both carefully conserved by Lord Ardilaun. In the graveyard is a little rude cross-carved pillar, with perhaps the most ancient Christian inscription in Ireland, to the memory of Lugnaedon, son of Limenueh, the sister of S. Patrick.

INIS MAC DARA.—This little island out in the Atlantic off Roundstone (the latter a place that no one should miss visiting) is very seldom visited, so it was with great delight a small party chartered a lumbering hooker to make the voyage to the Church of Saint Sinach Mac Dara, and well were they repaid by a sight of the 6th or 7th century stone-roofed church, the crosses, and stations. This same hooker subsequently took one of the party to Aran from Roundstone. Indeed, long after the excursion was over, members were seen straggling about Connemara and the islands of the sea, quite unable to drag themselves away from the glories and mysteries of the west, ever seeking for that Hybrasil which lay in the lap of the setting sun.

Many notes and details were taken of the antiquities visited that will serve for future use in publications more suitable for that purpose than the *Irish Naturalist.*



A. Steadman, del.

STYSANUS ULMARIÆ, McWEENEY, SP. NOV.

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A NEW IRISH FUNGUS.

BY E. J. MCWEENEY, M.A., M.D.

(PLATE 5.)

WHEN investigating the bog at Braganstown, County Louth, during the excursion of the Dublin Naturalists' Field Club to Castlebellingham on August 10th last, I came across a mould-fungus which proves to be an as yet undescribed species. In the following pages I will give a short account of this organism and its affinities.

It was in that portion of the bog which lies east of the railway line, and which was visited by but few members of the party, that I observed a patch of Meadow-sweet, the tops of which presented a peculiar dark brown and shrivelled appearance. This premature decay of a plant that is wont at this season to attain its greatest luxuriance, struck me as peculiar, and led me to examine the patch more nearly. Small greyish-white stalked objects then became visible, dotted here and there over the dried-up and wrinkled stems, petioles, and leaves. The plants did not seem to have flowered. The tiny objects in question were not more than $\frac{1}{30}$ inch high, and, looked at with a strong glass, consisted of a globose head, silvery-grey in colour, and a short brown stalk, not exceeding in length the diameter of the head. The whole appearance was very similar to that of a little myxomycete or slime-fungus in its spore-bearing stage; but the fact that these little stalked bodies were not associated in clusters, but stood well apart from each other without any tendency to be gregarious, told against the possibility of its proving to be a member of that family. Besides, the habitat—portions of a living plant, that had undergone localized death and desiccation—was hardly a likely one for a myxomycete. Further knowledge on the subject was, however, not to be had without a more minute

examination than could then and there be made, so I carefully collected a quantity of the material and put it up in glass tubes for subsequent determination. A few days later, going over the contents of my collecting box, I came upon these tubes and mounted some of their contents for the microscope. Nothing could be easier than the process adopted; and as I may have some readers who, possessing microscopes, might care to take up work of this kind, I will now state how the mounts were made. A few of the little stalked bodies were removed from the matrix by the aid of a dissecting needle, and immersed in a drop of absolute alcohol on a clean slide. As soon as the alcohol had all but completely disappeared by evaporation, it was replaced by a drop of glycerine, and a clean cover-glass applied. The object of the alcohol is to get rid of any air that may be, and usually is, entangled in the mycelium, and which would greatly interfere with the transparency of the mount if it were allowed to remain. An alternative procedure is to mount in glycerine at once, and after putting on the cover-glass, heat the preparation over a spirit-lamp till ebullition just commences. This also drives out the air, but the process is rather a severe one, especially for a delicate object, and liable to cause alteration in the natural appearance. The preparations thus made proved very successful, and on placing the slide under the microscope with a moderately low power (× 150), I saw it very much as it looks in figure 2. The stalk and head can now be distinctly seen, and also the fact that the former is composed of a number of parallel hyphæ or threads. The head is also composed of threads which radiate from the stalk, and round about the edge where these threads become free and end, they may be seen to have a peculiar knobbed or headed appearance. We now turn on the high power (× 400) and see (figure 3) that the cause of this beaded appearance is the fact that the terminal portion of each hypha or thread is divided by thick partitions into a string of cubical cells, of which the end ones display a tendency to have their corners rounded off so as to become subglobose[1], or, in ordinary language, nearly round. If now, without changing the power, we move the slide so as to bring the stalk into the field, we can, by gradually working upwards, make out

[1] This is not well shown in the drawing.

the whole construction of the fungus. We find, as before stated, the stalk composed of parallel brown hyphæ with numerous partitions, or "septa" as they are technically called. Let me explain, however, the term "hyphæ" which may possibly prove a stumbling-block to some of my readers. The name "hypha" is given to the "threads" of which most fungi are constructed. These "threads" are said to constitute or make up the "mycelium." They are not, however, really threads, but only seem threadlike when insufficiently magnified. Under a fairly high power they are little pipes or tubes composed of a transparent outer wall made of cellulose or something very like it (cellulose is the material in the cell-walls of the higher, green plants), and jelly-like granular contents, which are living "protoplasm." The protoplasm contains numerous very minute bodies of another nature called *nuclei*. These also are living—in fact they constitute the centres of the life of the cell. The tubes or hyphæ are divided by cross-partitions or "septa" into long compartments. Each compartment is a "cell." Fungi are made up of strings of lengthy cells pressed or woven together so as to form variously-shaped masses.

I hope I have now made these matters of detail pretty clear, and will go on with the description of our new fungus. The hyphæ, of which the stalk is made up, are loosely compacted and interwined, and at their upper ends they open out, so to speak, into the head, dividing repeatedly into two ("forking"), so as to make up the solid mass of branches of which the head is composed. The terminal branches are much paler in colour than those from which they spring, and are divided by very thick partitions into strings of cubical cells. Such a string is seen highly magnified in figure 3, and it is these curious jointed rows of cubical or barrel-shaped cells which give the fungus its characteristic appearance. Of what significance are these cell-rows? it may fairly be asked. Are they of any use? Emphatically so, for the last, that is the oldest joint, keeps falling off, and then constitutes a spore, that is, a seed from which the whole fungus may be reproduced. Each of these chains is therefore a chain of spores.

Having now ascertained the structure of the fungus, let us enquire what place it occupies amongst those already known —let us classify it. An impression appears to prevail, even amongst botanists, especially those who confine themselves to

naked-eye work on the flowering-plants, that the classification of fungi presents features of unusual difficulty. This is not seldom true as regards the determination of the *species*, owing in many cases to the insufficient descriptions handed on by superficial observers. Up to June, 1892, there were no less than 39,662 sorts of fungi known, and a couple of thousand more at least have been added since. Let us see now what position our fungus is to take amongst so enormous a number of species. We must first decide what group or family it belongs to. It is clearly a "Hyphomycete," which means that it belongs to a group composed of minute fungi made up of threads very loosely compacted and bearing "naked" spores, that is, not enclosed in spore-bags or asci. Such fungi are usually known as "moulds" in English, and certain members of the group make their presence quite obtrusively familiar by covering damp bread, leather, paper, preserves, &c., &c., with blue or green, sometimes with pink or golden patches. Many of these moulds are not "independent" species, that is, they are really only stages in the development of a fungus that forms its spores in asci or bags. Moulds are divided into four groups—*Mucedineæ*, comprising most of the ordinary moulds well known to, and disliked by, the housekeeper; *Dematicæ*, which have dark brown threads; *Stilbeæ*, in which the lower threads are compacted to form a stalk; and *Tuberculariceæ*, in which the threads are compressed into a wart-like tuft. There is no difficulty in deciding to place our fungus in the third family, *Stilbeæ*, on account of its obvious stalk. Turning to this family we find it divided into two groups, according as the hyphæ are pale or dark. Now ,as we have seen that in our specimen the colour is dark brown, save for the terminal branches, we turn to that group, the *Phæostilbeæ*. As the individual spores in the specimen are simple and undivided into compartments, we must look in the section *Amerosporæ*, and here we have to select between a number of competing genera—*Sporocybe*, *Graphium*, *Harpographium*, *Stysanus*, and *Graphiothecium*. For reasons, into which it would occupy too long to enter, we place the specimen in *Stysanus*, but as it does not agree with any of the three British species given in Mr. Massee's excellent "British Fungus-Flora" (vol. III., p. 458), we look it up in Saccardo's great "Sylloge," and find that of the seventeen species there

described it comes nearest to a species from Ceylon called *Periconia monilifera* by Messrs. Berkeley and Broome, but removed to *Stysanus* by Saccardo. Their description, as repeated by Saccardo, is not very complete, but our specimen differs in the stalk not being rough (scabrous). To sum up, Mr. Massee, to whom I sent the specimen, and who is the leading English authority on the subject, has no hesitation in declaring the species to be new, and it has accordingly devolved on me to confer upon it a name. I have accordingly called it *S. Ulmariæ*, indicating thereby its habitat on Meadow-sweet, *Spiræa Ulmaria*, and have drawn up the following technical description :—

Stysanus Ulmariæ, McWeeney, *nov. sp.*

Stem from ·25 to 1 m.m. high, composed of loosely-compacted, septate, brown hyphæ which, passing upwards, undergo repeated dichotomous division and open out to form a globose head. Terminal branches paler, divided by rigid, thick, projecting septa into moniliform chains of cubical elements which fall off and constitute the spores. Spores pale-brown, cubical, barrel-shaped or subglobose, 5–6 μ. in diameter.

On dying Meadow-sweet (*Spiræa Ulmaria*), Braganstown Bog, Co. Louth, Ireland, August 10th, 1895.

EXPLANATION OF PLATE 5.

1. Natural size of object.
2. The same, magnified about 150 diameters (somewhat diagrammatic).
3. An isolated spore-bearing hypha, magnified 400 diameters.
4, 5, and 6 Small portions of the fructification isolated to show the different forms assumed, magnified 300 diameters.

THE RAISED BEACHES OF INISHOWEN.

BY R. LLOYD PRAEGER, B.E.

Two years ago I spent a short autumn holiday in a solitary ramble round the wild coast-line of Inishowen, the most northerly portion of Donegal and of Ireland, which the converging loughs of Foyle and Swilly almost convert into an island, as its name implies. This is a beautiful district, with rugged mountains of ancient schists and quartzites, wild moors, deep bays, and savage sea-cliffs, where the waves of the Atlantic rave and foam. The season was too far advanced for botanizing, and I spent the time in studying the post-glacial geology of the coast, especially with a view of comparing the raised beaches of this wild shore with those of the more sheltered shores of the Irish Sea, such as the well-known deposits of Larne and Greenore.

Culmore was the first point visited. Here, where the River Foyle widens out into the lough of the same name, a low point projects far out into the stream. On the eastern side the sea has eaten into this level tract, and the section above the beach shows 10 to 15 feet of horizontally stratified gravels. The material consists almost entirely of rounded flat pebbles of mica schist, with a little quartz and quartzite, in a dark brown sandy matrix, slightly current-bedded near the base, with occasional layers of sharp quartz sand. No shells were found. This deposit covers a considerable area—the whole of Culmore point, and extending one to two miles to the northward. It is apparently the creation of the river rather than of the sea, as shown by the brown matrix and the absence of shells.

Crossing by the ferry to the County Londonderry side of the Foyle, I saw two well-marked sea-terraces rising above the muddy shore near Culmore railway station, to heights of about 10 and 25 feet above high water-mark. These terraces are cut out of a thick and extensive deposit of sands and gravels,

of which a fine section is seen close by on the bank of the River Faughan. There, in descending order, we have

	feet
Bluish clay,	1
Yellowish clay,	1
Stratified gravel,	8
Very fine greyish sand	20
Water of river, at high tide level.	

This deposit is rather puzzling, but it is probably of glacial age.

Next morning I drove to Burnfoot, on the upper reaches of Lough Swilly, and visited the brick-field there, which is situated on an extensive flat of reclaimed land, slightly below high water-mark. I had hoped that the material was estuarine clay, but found it to be a fine hard pinkish clay, without fossils, but containing layers of pebbles and boulders. Thence I walked to Blanket Nook. The Geological Survey map marks a raised beach fringing the alluvial flat for some miles in this direction, but little was to be seen. According to the Memoir this deposit has an average elevation of 32 feet. On the northern shore of Blanket Nook, not far east of the railway, a gravel bank, evidently a raised beach, rises to a height of 20 feet above the muddy flat. No section was seen, but on the surface I picked up *Ostrea*, *Pecten varius*, *Mytilus edulis*, *Cardium edule*, *Tapes aureus*, *T. decussatus*, *Mactra subtruncata*, *Littorina litorea*, *L. obtusata*, *Cerithium reticulatum*. Further west is a striking deposit—a horizontally stratified bed at least 12 feet thick, consisting almost entirely of marine shells, mostly unbroken, and in good preservation—apparently a shelly bank laid down by currents at the entrance of the bay when the land stood slightly lower than now, and evidently newer than the before-mentioned raised beach, which runs along behind it and above it to the entrance of the bay. The top of the shell-bed is about 6 feet above high water-mark. The species found here were as follow:—

Anomia ephippium.
Ostrea edulis.
Pecten varius.
Mytilus edulis.
M. adriaticus.
Cardium echinatum.
C. exiguum.
C. edule.
Tapes aureus.
T. decussatus.
T. virgineus.
T. pullastra.
Venus gallina.
V. ovata.
Tellina balthica.
Mactra subtruncata.

Corbula gibba.
Trochus cinerareus.
T. magus.
Littorina litorea.
L. obtusata.
Rissoa membranacea.
Hydrobia ulvæ.
Cerithium reticulatum.
Purpura lapillus.
Nassa reticulata.
Pleurotoma turricula.

Specimens of *T. pullastra* and *C. exiguum* occurred with the valves in juxtaposition.

On the eastern shore of Lough Swilly at Fort Stewart ferry, a couple of miles further south-west, an interesting raised beach may be seen. At a ruined cottage a couple of hundred yards north of the ferry, there is a layer of shells 4 feet above high water, with shelly gravels above and below. Northward the deposit rises up on the top of a bed of blue Boulder-clay to a height of 12 feet above high tide. Southward it runs level past the public-house, where it shows out as a great bed of oyster shells, 10 feet above high water. Further south, the Boulder-clay rises up again. In this raised beach the following shells were seen, the first eleven being abundant—

Ostrea edulis.
Pecten varius.
Mytilus edulis.
Tapes aureus.
T. decussatus.
Cardium exiguum.
C. edule.
Mactra subtruncata.
Littorina obtusata.
L. litorea.
Cerithium reticulatum.
Anomia ephippium.
Tapes pullastra.
Tellina balthica.
Corbula gibba.
Patella vulgata.
Trochus cinerareus.
T. lineatus.
T. magus.
Murex erinaceus.
Purpura lapillus.
Buccinum undatum.
Nassa reticulata.

The Limpets were remarkably elevated, the height being in some cases $\frac{7}{10}$ of the greatest breadth. The occurrence of *Trochus lineatus* here is interesting, as its present range in Ireland does not extend further north than Bundoran on the west coast, and Ballywalter on the east coast. The late Canon Grainger used to tell me a curious story of some sailors who collected a number of these shells in mistake for Periwinkles at some place on the west coast, and brought them alive in their vessel to Lough Swilly, where, finding them unpalatable,

they threw them overboard in shallow water, where they were seen crawling about some time afterwards. Whether the species thus introduced into Lough Swilly still flourishes there is a nice point for inquiry; but its occurrence in the Fort Stewart raised beach shows that it formerly lived in these waters.

Going northward along the shore, Boulder-clay holds the ground till Inch is reached. Along the shore eastward of the old castle, which rises picturesquely on a high knoll of quartzose grit, are traces of low raised beaches. Westward of the castle, at Mill Bay, two sea-terraces rise, one behind the other, in the pasture near the shore, like green waves on the sward, to heights of about twelve and fifteen feet above high water, the ground falling away a little behind each. No section is exposed, but the ground is very shelly. On the north side of Inch, near the church, where raised beaches are marked on the Survey map, there are beds of sand and gravel up to eight feet above high water, but no features of interest are observable.

Next day I left the hospitable house of my host, Prof. Leebody, in the small hours of the morning, and took the 6.20 train to the favourite watering-place of Buncrana, prettily situated on the shores of Lough Swilly. A brisk walk over the sand-hills that stretch southward revealed nothing of interest, and after breakfast I tramped nine miles northward to Mamore Gap, a picturesque pass formed by an old line of fault across a rugged mountain-ridge of quartzite that stretches on both sides of the entrance of Lough Swilly. The view as one passes through the Gap is very beautiful—the sands of Lenan Bay to the right; below, a sandy and boggy flat dotted with cottages, and beyond that the huge mass of Dunaff Head; further to the eastward, the rugged outline of North Inishowen, and Malin Head; and beyond all, the illimitable ocean. A steep descent led to Lenan Bay, where the westerly winds have swept the shifting sands up the adjoining hill-side to a height of 150 feet. Down on the beach, the sand has become cemented by some natural process, and masses of it stand out in weathered torrs six to ten feet high, looking like reefs of schist. Passing over the low ground (marked raised beach on Geological Survey map) lying behind Lenan Head and Dunaff Head, I found at Rockstown Harbour a good example of what is no doubt the

50 ft. raised beach of the Geological Survey—a well-marked ridge of gravel rising abruptly to a height of 30 to 40 feet from the flat or gently-sloping plain that runs inland from the existing beach.

A little further eastward, behind Tullagh Bay, this terrace is still better developed, and forms a very striking object. There, as elsewhere on this wild coast, the present beach consists of high terraces of pebbles and rounded stones, piled up by winter gales in a steep slope to some twenty feet above ordinary high water. Behind the beach at Tullagh Bay, the ground drops slightly and then runs level in boggy or gravelly fields to this grand old terrace, which rises at a slope of about 1 to 1 to a height of thirty to forty feet. On the top of this old beach the ground again dips slightly, like the present beach, and continues almost level to where the hills rise, a quarter of a mile from the sea. As seen in a small pit, this terrace is composed of coarse stratified gravel, full of much rounded stones, just like the existing beach. No shells were to be found, but then shells are almost absent also on the present beach, where they get smashed to pieces; and the coarse and open nature of the material is unsuitable for the preservation of organic remains.

I tramped across the broad sands of Tullagh Bay, where the ocean waves boomed as they broke with rhythmical monotony. The Clonmany River was in flood, but I forded it waist deep, and climbed the rocky slope of Binnion, where another magnificent view was obtained—a vast expanse of ocean, faced by the great cliffs of Dunaff and the white sands of Tullagh, behind which rose the wild mountains of quartzite and mica schist that culminate in Slieve Snaght (2019 feet). A scramble down a precipitous gully, and a stiff climb round the most rugged of sea-cliffs hung with Rose-root brought me to Pollan Bay, where the sands stretched far into the grey sea-mist. Evening was closing in apace, so I took to the road, and six miles more brought me to Carndonagh, and to its comfortable inn.

Next morning a wild storm was raging, and sea and sky and land were all shrouded in rain and spray. But as the sun rose the clouds broke, and I took the morning mail car for Malin Head. The day before, an American mail steamer had arrived at Queenstown, and as we drove along it was

pathetic to see the anxious faces of parents and brothers and sisters gathered at each road-end and boreen, hoping for a letter from the loved ones who were seeking their fortune in that far-off land of promise. At Bree I left the road, and struck down to the northern shore. In the bay south of the coast-guard station are raised beaches six and twelve feet above storm-water level (which is about twelve feet above ordinary high tide); and behind these, marine gravels cap the rocks thirty to forty feet above the same level. As usual, no shells were to be found in any of these deposits. Among the stones of the present beach the beautiful Oyster-plant or Sea Gromwell spread its blue-grey leaves, its red and blue blossoms still abundant, in spite of the lateness of the season.

North of the coast-guard station is a flat stretch of peaty land, forty to fifty feet above high tide. A small stream cutting through it shows in its banks a couple of feet of peaty soil overlying twelve feet at least of horizontally-bedded marine gravels. These Inishowen raised beaches are all the same, consisting of coarse much rolled gravel and large pebbles of the various metamorphic and igneous rocks of the district, with a matrix of coarse sharp quartz sand, and no fossils—just like the present beaches.

On the low-lying ground south-east of the ridge which forms the extremity of the land, and on which the signal-tower stands, there are two well-marked terraces, one behind the other, composed of coarse gravel, and having elevations of I should guess thirty-five to forty, and sixty to seventy feet above high tide; I had no means of determining the heights with accuracy. The Geological Survey Memoir says that here the 25-ft., 50-ft., and 75-ft. raised beaches are well marked; these elevations are reckoned from Ordnance datum, eight feet below mean sea-level. I had a chat with Lloyds' agent, while the wind shrieked round the signal-tower, and flecks of foam dashed against the window, fully 200 feet above the sea, and then fought my way against the storm down to the rugged quartzite cliffs, the most northerly point of Ireland, and crept down as far as I dared go—about fifty feet above the waves—to watch the fearful sea that was running. At the westerly end of the Head, the cliffs were brightened by patches of Samphire and Rose-root and Scotch Lovage. The coast trended southward now. At White Strand

Bay the Keenagh River was forded, south of which there is a glorious pebble beach, dipping away down 20 feet to where the waves were rushing up and down, rattling the pebbles with a noise that could be heard a mile away. Behind the beach rises an old sea-escarpment (perhaps made by a heavy gale not long ago), cut out of an older beach, the top of which is 20 feet above the present one. Behind the old beach the ground rises in steep rocky ridges for several hundred feet. At the southern end of the bay, high cliffs close in on the strand, and soon I came to Stookanafanoga, a hugh sea-stack of dark basalt rising in front of the grey quartzites. There an ascent was necessary, and the route lay along high headlands, whence the sun was watched setting in the western ocean. In the dusk I crossed the sands which fringe the narrow and dangerous entrance to Trawbreaga Bay, and tramped in the moonlight through Malin Town, and over the sleeping country to Carndonagh.

On the following morning I went eastward, and examined for the raised beach underlying peat bog, which, according to the Geological Survey, occupies the valley of the Culdaff River, but very little was to be seen—possibly a pit would be required to show the raised beach. Passing over a band of black primitive limestone, Culdaff was left behind, and I took road to Tremorne Bay, where I did not see the raised beach marked on the Geological Survey map, though I looked for it. Then on through the primitive hamlet of Ballymagaragh, and down the Long Glen to meet the sea again at Kinnagoe Bay, which is a most picturesque spot, with a wide sandy beach, and high rocks, and steep slopes above. Here I noticed a patch of stratified gravel at about 50 feet over high water, in the bank of the road which leads down to the shore, at the west end of the bay. It was full of fragments of shells, too minute for identification, and I got also one large fragment of *Pectunculus*, but I observed that behind the adjoining beach, on which *Pectunculus* abounds, valves of this shell and sand have been blown by gales up the slope to quite as great an elevation, so possibly the *Pectunculus* fragment was not *in situ*. In the adjoining bay of Glennagiveny is a well-marked raised beach at about 10 feet above high water. In the banks of the little glen which runs into the bay are stratified gravels at about 100 feet, containing a few

decomposed shell-fragments; further up this glen are sands and gravels at 100 to 150 feet above the sea, with contorted bedding, and without shells. These deposits are probably of glacial age, and the shelly gravel in Kinnagoe Bay may belong to the same horizon. Some miles of wild heathery moors and slopes were next crossed, with the sea far below on the left, and Inishowen Head was reached. This also is a very picturesque spot; a grand cliff overhangs the bay to the north of the signal-station, and there is a very extensive view of Lough Foyle, the Londonderry and Antrim coasts, and the Scottish Islands. From the lighthouse to Greencastle there is a rather sandy flat at about 25 feet above high water, with bare projecting rocks here and there; it extends in a broad belt along the shore, the ground rising abruptly behind it, and it is evidently an old foreshore. According to the Geological Survey there is a raised beach with many shells here. I could find no sections, and the surface-fauna, which is somewhat abundant, is not to be relied on, owing to sea-weed being used as manure; but *Mytilus edulis*, *Tapes virgineus*, *T. aureus*, *Venus exoleta*, *Cardium edule*, *Patella*, *Buccinum*, and *Purpura* appeared to be *in situ*.

It was late when I passed the ruin from which Greencastle derives its name, but I stopped to examine the grand old pile, which must have been a place of immense strength in its day; and then pushed on in the twilight to Moville. Next morning the early steamer took me up Lough Foyle, past Culmore, the scene of my first ramble, and up the river to the "Maiden City."

I find that I have written the following memorandum at the end of the notes which I took in the field:—the Inishowen raised beaches differ from those of the east coast in their greater average height above the sea, their coarse and unfossiliferous nature, and their occurrence as sea-terraces rather than as bottom-accumulations; the greater rise of tide, and the greater exposure (and consequent much greater height of waves) will probably account for these differences.

MY BIRDS.

BY REV. THOMAS B. GIBSON, M.A.

PERHAPS no one ever commenced aviary-keeping for such a reason as I did, sometime in the spring of 1889. Of course as a boy, I had the usual amount of successes, and perhaps more than the usual amount of failures with bird-pets; but aviary-keeping was not my particular boyish hobby. No doubt I had reared, and educated in mischief, many jack-daws and magpies till complaisance could go no farther; and, one after another, pets of this kind were either banished or came to an untimely end. A Pigeon, whose greatest delight was in pecking at the toes of my younger brothers and sisters whenever an opportunity offered itself, was on this account exiled, to my great distress. But of all my favourites, a pair of Sparrow-hawks, which I had reared from the downy state, after an exciting contest with the parent birds, which ended in my being precipitated, together with nest and young ones, from a fir-tree, were the most valued. These I had kept for fully two years, and one of the pair was so tame that it would come out with me and hawk for sparrows, returning to me even after a successful flight. This tame one was killed by a young colt which was being weaned in the stable where I kept the birds. The other made its escape from my mother's hands whilst she was showing it to a visitor; and, though for a whole year it continually returned to the neighbourhood, it would never allow itself to be recaptured. A Song-thrush, too, for some time proved a most interesting pet, and would usually come at my call; but one day, whilst I was digging for worms to go a-bobbing for eels, I accidentally struck it with the spade, and so ended its existence. Starlings were also very easily brought up by hand, but they usually took "French leave" before the year was out, or at any rate during the following spring. Indeed why so many birds remained with me for as long as they did, in those days, is now a wonder to me, since, as a boy, I never used cages to confine the nestlings, nor was I either, as far as I can remember, a very attentive caretaker. These boyish attempts at bird-keeping, however, exercised no great influence upon me, and when I did start an aviary it came about unintentionally, in this way. One of my pupils

at King's Hospital—a most incorrigible little scamp, but good-natured in his way—had, after he left the school, gone away to sea, and, somewhere or other, had picked up a Rosy-breasted Cockatoo. This he sent to me as a present, whether with the intention of driving me out of my wits by its continuous screaming, or by its mischievous presence to remind me of some traits in the character of the donor, I know not. At any rate it was not long before its noise and the necessity of daily renewing its perches drove me upon the plan of constructing an aviary round a tree in the garden for its future residence. Everyone told me, of course, that the bird would not live outside during the winter, and it is probable that I should have taken it inside when the hard weather came; but in October I was seized with a severe attack of typhoid, the school was broken up, and all its inhabitants cleared out until the February following, and in consequence of this the Cockatoo had to take his chance though the winter was a severe one. Being well looked after by one of the men about the place, he not only survived but improved in appearance, despite the hard weather, or probably because of it. Since that time neither he nor any one of my birds has been taken inside, no matter what the weather, though the aviary is totally unheated, and yet they are infinitely superior in health and feather to birds of the same kind carefully attended to in heated aviaries. When I returned, in February, I found that the large tree, around the trunk of which I had constructed the aviary, had narrowly escaped destruction from the persevering efforts of the Cockatoo to strip it of its bark. Fortunately one strip of bark had escaped, there being no perch near it, and by at once removing the perches from the tree and encasing it in thin sheet-iron, I succeeded in saving its life. The aviary was easily made, thus: I planted eight posts around the tree and nailed short pieces in a sloping position from these posts to the tree. This cap I roofed in with wood, and then covered the wood with tarred felt. Next I nailed wire netting, narrow in mesh, all round the posts down to the ground, except between two of the posts where I left an opening about three feet high, in which I afterwards placed a door made also of netting attached to the frame. Then, as additional security, as well as for shelter, I boarded over the netting at the base and top for about nine inches. No other

protection has ever been given to my birds, and, as there are very many kinds now in the aviary, I can exercise no particular control over their food, each being at liberty to indulge his fancy from what is provided. I may here say, there is always sufficient food placed fresh in the aviary, together with clear water, at least once a day. Hemp, canary-seed, millett, rape, wheat and maize are the only seeds I use; and nothing else is given except a basinful of bread soaked in milk, fresh every morning, with, of course, occasional treats of groundsel, chickweed, plantain, and water cress. I have never taken the trouble to soak the bread in water or to squeeze out the alum, as is so often insisted upon; yet my birds are usually very healthy and exhibit excellent plumage. I notice, however, that bread soaked in milk is greatly preferred by all kinds of birds—for all kinds eat it when fresh—to bread soaked in water. I notice also that fresh water is a greater desideratum than fresh food; and birds continually alight upon the spout of the can to drink while I am pouring the water into their baths or drinking troughs. With regard to bathing some birds are inordinately fond of it, and all enjoy it whilst the water is clean. Starlings would bathe, I believe, twenty times a day if you gave them fresh baths so often; and the same might be said of Bramble-finches and Missel-thrushes, though Song-thrushes and Field-fares are not so persistent. Bull-finches and Chaffinches, too, are fond of bathing, as are also most of the Bunting family, except the Common or Corn Bunting, but I have never seen either Sparrows or Quails bathe, though both kinds delight in the sand-heap as a substitute.

Of course originally I had only intended the aviary to be the home of the Cockatoo; but, principally because it was so large, I began to introduce other kinds as well. Two Quails, both cocks, for I have never been able to obtain a hen, were purchased, and, though one killed itself against the wire the first night, one still survives looking healthier and happier than when I obtained it some six years ago. This bird, by the way, has more than once slipped out of the aviary, whilst the door was open; but it never seems to care about going away, and waits quietly outside till I finish what I am about within. It often gives the well-known Quail call; but has another kind of call, similar to the crowing of a cock, that I have

never heard described by any observer. This is the only one of the Gallinaceous tribe that I have hitherto possessed ; and I must say that it has proved a very interesting, and by no means troublesome pet.

(TO BE CONCLUDED).

CAPTURES OF COLEOPTERA IN IRELAND DURING THE SPRING OF 1895.

BY JAMES J. WALKER, R.N., F.E.S.

(*Concluded from page* 212).

Between May 18th and 21st, I took at Buncrana, Co. Derry :—

Carabus catenulatus, Scop.—Not uncommon on moorland.

Notiophilus biguttatus, F.

N. palustris, Duft.

Nebria brevicollis, F.—A small form

Elaphrus riparius, L.—One specimen.

Loricera pilicornis, F.

Clivina fossor, L.

Dyschirius impunctipennis, Daws.—Locally abundant in a sandy saline spot, on the shore of Lough Swilly, in company with *Bledius arenarius.*

Broscus cephalotes, L.—Common.

Bradycellus collaris, Payk.—One on Roosky Mountain, about 1,000 feet elevation.

Harpalus latus, L.—Not scarce.

Pterostichus vitreus, Dej.—Two specimens, under stones on a peat-bog, elevation about 500 feet.

P. nigrita, F.—Common.

Abax striola, F.—Not rare.

Amara spinipes, Auct.—Two on the beach.

A. trivialis, Gyll.—Not uncommon.

Dichirotrichus pubescens, Payk.—Common, in salt marshes.

Calathus cisteloides, Panz.

C. mollis, Marsh.—Very common on the golf-links.

C. melanocephalus, L.—Common ; one or two from the top of Roosky Mountain may be referred to the var. *nubigena,* Hal.

C. micropterus, Duft.—One specimen, on the sandhills.

Anchomenus parumpunctatus, F.—A beautiful blue-black variety, occurred rarely on a peat bog.

Oilsthopus rotundatus, Payk.—On Roosky Mountain.

Cillenus lateralis, Sam.—Running on wet sand between tide-marks; about six specimens.

Bembidium pallidipenne, Ill.—One on the sandhills.

B. littorale, Ol.—Common.

Trechus rubens, F.—One specimen on the peat-bog, under a stone

T. obtusus, Er.—With preceding, scarce and immature.

Patrobus assimilis, Chaud.—One on Roosky Mountain.

Agabus paludosus, F.—In small stream on golf-links.

Rhantus bistriatus, Berg.—One specimen on the beach.

Aleochara brevipennis, Gr.—One example
A. mœsta, Gr.
A. nitida, Gr.
A. obscurella, Er.
} All on the sandhills.

Tachyporus obtusus, var. **nitidicollis,** Steph.—A few, by sweeping.

Creophilus maxillosus, L.—Common in carcases and decaying sea-weed on the beach, with a few of the var. *cillaris*, Steph.

Staphylinus pubescens, DeG.—Two on the golf-links, walking on sand.

Philonthus laminatus, Creutz.

P. æneus, Rossi.

P. decorus, Grav.—One specimen, under a stone.

P. sanguinolentus, Grav.

P. marginatus, F.

Bledius spectabilis, Kr.; Not uncommon, in rather dry sandy mud, on the beach near the railway station.

B. arenarius, Payk.—In wet sand at the far end of the golf-links, very common, the specimens mostly rather dark in colour.

Lesteva longelytrata, Goeze.—On banks of small stream on golf-links.

Omalium læviusculum, Gyll.

Cercyon littoralis, Gyll.

C. hæmorrhous, Gyll.

Anisotoma dubia, Er.—One specimen, on the sandhills.

Silpha atrata, L.—Scarce, and rather small.

S. rugosa, L.—In carrion.

S. opaca, L.—One dead specimen.

Hister cadaverinus, Hoff.
H. neglectus, Germ.
} One of each in carrion.

Saprinus æneus, F.—In dead fish, not rare.

Ptenidium punctatum, Gyll.—Under stones at high water-mark, common.

Coccinella xi-punctata, L.—Common.

Byrrhus dorsalis, F.—One in a "bunker" on the golf-links.

Heterocerus marginatus, F.—Occurred plentifully with *Bledius spectabilis;* varying to a handsome unicolorous dark fuscous form, with the usual yellowish markings on elytra quite obsolete.

Aphodius merdarius, F.

A. depressus, Kug.

Æglalia arenaria, F.—Rather scarce, on the sand-hills.

Lacon murinus, L.—One example.

Cryptohypnus riparius, F.—A few on Roosky Mountain, &c.

Athous hæmorrhoidalis, F.—Common, some examples very large.

Corymbites cupreus, F.—A pair.

C. quercus, Gyll.—Rather scarce, by sweeping, with the var. *ochropterus*, Steph

Cyphon coarctatus, Payk.

Telephorus bicolor, F.—By beating willows.

Rhagonycha fuscicornis, Ol.—One specimen, with preceding.

R. limbata, Thoms.

Phyllodectavulgatissima, L.—Common, on young willows.

Phyllotreta nemorum, L.

Crepidodera aurata, Marsh—Rather plentiful, on young willows.

Apion Gyllenhali, Kirby—Rare, by sweeping.

Otiorrhynchus atroapterus, De G.—Most abundant, on sand-hills.

O. blandus, Gyll.—One specimen only, on sandhills.

O. rugifrous, Gyll.—Under stones on the beach, and inland on turf walls, a few examples.

O. picipes, F.

Alophus triguttatus, F—One specimen, on the beach.

Sciaphilus muricatus, F.

Phyllobius oblongus, L.—Very common, by sweeping.

P. viridiæris, Laich.

Barynotus obscurus, F.
B. Schonherri, Zett. } One or two of each, under stones.

Philopedon geminatus, F.—Abundant on bare sand on the golf-links and beach ; some of the females very large, and almost white in colour.

Sitones griseus, F.—Sparingly on sand-hills, and very large.

S. lineellus, Gyll.—One example on the sand-hills ; last November I found this species abundantly at Campbeltown, Cantire, in a similar situation, hybernating at roots of bent-grass.

S. flavescens, Marsh.

Hypera rumicis, L.

H. polygoni, L.

Orchestes saliceti, Payk.—A few, on young willows.

Dorytomus hirtipennis, Bedel.—One example. } By beating
D. pectoralis, Gyll.—Four examples. } young willows.

Ceuthorrhynchus pleurostigma, Marsh.

C. quadridens, Panz.

Phytobius iv.-tuberculatus, F.—One or two, by sweeping.

Rhinoncus pericarpius, L.

Balaninus salicivorus, Payk.—On young willows.

PROCEEDINGS OF IRISH SOCIETIES.

Royal Zoological Society.

Recent donations comprise a Collared Peccary and a land tortoise from J. Giblan, Esq., a hawk from D. Smyth, Esq., a seal from L. Powell, Esq., three Green Lizards from Sir F. Shaw, a Muscovy Duck from Miss Macbeth, a Mocking-bird from Captain Rogers, sea-anemones from Dr. C. B. Ball, a pair of Stock-doves from Rev. T. B. Gibson, a Leadbeater Cockatoo from Mrs. McDonnell, a pair of Angora Rabbits from Master Brooke, Crayfish and Sticklebacks from P. Mahony, Esq., a monkey from J. Ingoldsby, Esq., a Puffin from W. L. Scott, Esq., a Sparrow-hawk from R. L. Weldon, Esq., a Serval from Surgeon-Lieut. D. J. MacCarthy, three Canadian Ducks from C. J. Wallace, Esq., and a parrot from C. A. James, Esq. Three Puma cubs and a Llama have been born in the Gardens, and a Tricoloured Porcupine, a pair of Cheetahs, a Chimpanzee, seven monkeys, two squirrels, two fruit-bats, five Choughs, three Axolots, twelve Rock Bass, and four Siluri have been purchased.

Over 11,000 persons visited the Gardens in July, and over 15,000 in August.

Dublin Microscopical Club.

July 18th.—The Club met at Prof. T. Johnson's, who exhibited specimens of *Selaginella selaginoides*, showing the large female spores (megaspores) and the small male spores (microspores). The specimens were gathered in Connemara during the recent Field Club Union excursion. The species is not uncommon in the west though rare in the east of Ireland. It is the only representative in Britain of the several hundred species of the genus *Selaginella*, the highest of the vascular cryptogams.

Mr. M'Ardle exhibited the rare *Pilularia globulifera*, the Irish representative of the order Rhizocarpæ, which he recently gathered in the lake at Recess, Co. Galway, which is one of the few known localities. It was detected by Mr. Lloyd Praegar, a short time previously, who kindly gave all the information necessary for its rediscovery. Ballynahinch (near the Salmon Leap), a few miles further west, is an old habitat for the plant (*Wade, Rar.*) The specimens bore copious sporocarps which contain the macrospores and microspores in four cavities in the interior; the contents of one was exhibited under the microscope. On account of its grassy or sedgy appearance, the plant may be readily passed over for a species belonging to either. In the absence of the fruit, it may be easily known by the vernation of the young leaves, which is circinate like *Marsilea*, or the young frond of a fern.

Mr. G. H. Carpenter showed *Tanystylum* (*Clotenia*) *conirostre*, Dohrn, a pycnogon collected in rock pools, at Bundoran, in September, 1894, by Mr. J. E. Duerden. Not only the species (which was first found in the Gulf of Naples), but the genus is new to the British marine fauna. The occurrence of this southern form so far to the north along our western coast is of very considerable interest. A paper with figures will be published in the next number of the *Irish Naturalist*.

Mr. H. J. Seymour showed the section of an Epidote rock from Portrane. The rock, which is of a bright yellowish-green colour, occurs in patches in the vesicular ash near the southern Martello tower. Epidote, some quartz, and numerous calcite crystals are present in the rock.

Mr. R. J. Mitchell exhibited preparations of an utricle of the Bladderwort (*Utricularia intermedia*). The specimen had been collected near Recess, Co. Galway, on the recent excursion of the Field Club Union to that district. The bladder enclosed some small water animals, showing that the plant captures and digests these creatures; which gain an entrance as to an eel trap, but find it impossible to get out.

Belfast Naturalists' Field Club.

July 6th.—The fourth summer excursion was held, when a party of over fifty assembled at the Northern Counties Railway bound for Islandmagee and the Gobbins. Arriving at Ballycarry, the whole party walked across the peninsula, and then the various sections took their several ways, each intent on their particular pursuit. Several members took the steep path to the "Black Cave" in the basalt, which proved, however, less interesting than was expected, save for its historic association. The cave extends inland a distance of over 100 feet, and is washed by the tide. The remains of a wall extend across its mouth, so its uses have been, doubtless, various—legitimate and illegitimate—the latter in the "good old days" when it was quite respectable to rob the King of his dues. The most of the party walked along the shore, where the great blocks of Chalk and Greensand lying to a large extent on Lias offer a most tempting prospect. This series of sections and blocks extends for about half a mile along the coast, until the basalt once more comes down to the sea-level at the cliffs of the Gobbins. The basalt of this neighbourhood is itself of more than usual interest, as it exhibits a curious banded structure on a large scale, seen very well along the escarpment facing the sea, and in one little quarry which was passed on the way the amygdaloidal vesicles were very beautifully arranged in well-marked bands, between which was the ordinary half-rotten basalt, without amygdales. The Greensand was, however, the chief point of interest, and numerous fossils were obtained, though many more had to be left behind owing to the hardness of some of the blocks. Among the best finds was one of the secretary of the geological section, Miss S. M. Thompson, which was a perfect specimen of a fossil sponge (*Ventriculites*) of unusually large size. Several other sponges of different genera and species were secured, these being a class that are in want of working out, as very little is known of the Irish ones. Other finds were numerous, *Cidaris* spines, some small corals and bryozoa, and plenty of the ordinary Greensand fossils, such as *Rhynchonella*, *Spondylus*, &c. The Lias was in very bad order for working after the heavy rain, followed by the baking sun, and few fossils were taken. Botanists did not get anything worth speaking of, except the Adder's tongue (*Ophioglossum*), of which quite a large patch was seen. Tea at 6.30 on the cliffs at Hill's Port was the finale to a most delightful day's outing. Many thanks were due to Mr. Wise, C.E., for his kindness and courtesy to his fellow-members in making arrangements for this visit, and it was the only regret expressed that he has not as yet succeeded in his laudable efforts in making the path around the Gobbins. After tea, a pleasant walk through the fragrant bean-fields of Islandmagee brought the party to Ballycarry and home by train.

July 29th.—The sixth excursion was held to the Mourne Mountains in conjunction with the London Geologists' Association, who were visiting the North of Ireland. A party of about eighty arrived at Newcastle at 9.30, where breakfast was partaken of at Laurence's rooms at the station. Breakfast finished, the brakes and cars were mounted, and the road taken to the Trassey Bridge. Here the vehicles were left, and the party proceeded up the valley to the Hare's Gap, close to which are the Diamond Rocks. These are great masses of Mourne granite containing very numerous drusy cavities, some of them of considerable size. So often have they been visited by geologists that parts of the hillside bear quite a resemblance to a quarry. These cavities contain large and well-formed crystals of smoky quartz, orthoclase, biotite, albite, and less frequently of beryl, topaz, and microcline. Of all these many capital specimens were taken by the members, the topaz and beryl crystals being very good, and some of exceptional size were obtained.

From this point the party broke up into four divisions, one contingent walking back to the cars, another going round the flank of Commedagh to "The Castles," which consist of the usual granite whose sub-columnar structure in this part gives rise to vertical and horizontal jointing produced by shrinkage during the cooling of the mass. This jointing has been so increased and brought out by the action of wind and rain, snow, frost, and sun, that the masses now present the appearance of huge bastions and fortifications of Cyclopean masonry. A third section of the party walked up over Slieve Commedagh (2,512 feet), and a venturesome few even ascended Donard afterwards, and observed the remains of the rude stone cell where dwelt the anchorite St. Donard, after whom the mountain is called. These members brought down the report that the view was one almost unequalled, the horizon being so clear that no fewer than nine counties and the Isle of Man were plainly visible, the hills of Derry and Bray Head being both easily seen. This was the more extraordinary as the sky appeared cloudy. The last portion of the members remained at the Diamond Rocks, adding to their collections. The other three divisions met below the Windy Ridge, in the Glen Valley, noticing on the way the curious bared summit of the ridge, almost all the vegetation being blown away, leaving small patches of bog and large rounded stones and granite sand. The waterworn face of the cliff over which the river trickles is also well marked. The mountaineering members were interested in the sharp junction between the granite and the Ordovician strata at the Shanslieve spur, where the granite sends out veins into the slates. Basalt and eurite were also seen in contact here. The junction between granite and slate is also well seen above Trassey Bridge and in the Glen Valley. The botanists, though not strictly on business, noticed most of the alpine plants known to occur on these hills, and although several interesting ferns, &c., were obtained; no new find to the locality was recorded. Tea at the station was finished just in time for the 6 40 train to Belfast. Altogether the Mournes have seldom been seen to better advantage, and the English geologists expressed themselves more than pleased with the day and the pleasure they derived from a visit to the Mournes in conjunction with the members of the Belfast Naturalists' Field Club.

Dublin Naturalists' Field Club.

August 10th.—A party of fifteen members left Amiens-street station by the 9 a.m. train for Castlebellingham, where they were met by J. R. Garstin, Esq., on whose land the collecting-ground for the day was situated. Under his kind guidance the naturalists made their way along the railroad to Braganstown Bog, which proved an excellent field for research. The morning sped rapidly, and Mr. Garstin most hospitably entertained the Club at luncheon at Braganstown House, after which an inspection of the neighbouring woods was commenced. This was unfortunately cut short by heavy rain, and the naturalists were glad to again seek shelter in the house, where the kind attentions of Mr. and Mrs. Garstin and their family made the time pass most pleasantly. After tea the President briefly expressed the thanks of the members to their host, and the party returned to Dublin by the evening train.

The bog proved the home of several interesting plants. Mr. Colgan noted there two species of *Utricularia* (*vulgaris* and *minor*), *Sparganium minimum*, *Typha latifolia*, *Lycopus europæus*, *Hydrocharis Morsus-ranæ*, *Osmunda regalis*—to find the Royal Fern in profusion so near the east coast was a new experience. Along the railway the immigrant *Diplotaxis* was observed, and by the roadsides *Chelidonium majus* and *Chenopodium Bonus-Henricus*.

Dr. McWeeney searched diligently for fungi, and supplies the following list:—

The Hymenomycetes were represented by *Agaricus* (*Lepiota*) *cristatus*, Fr.; *A.* (*Tricholoma*) *terreus*, Sch.; *A.* (*Collybia*) *maculatus*, A. & S.; *A.* (*C.*) *radicatus*, Relh.; *A.* (*Mycena*) *tenerrimus*, Berk.; *A.* (*M.*) *rugosus*, Fr.; *A.* (*Entoloma*) *costatus*, Fr.; *A.* (*Crepidotus*) *chimnophilus*, B. & Br.; *A.* (*Pluteus*) *cervinus*, Schaeff; *A.* (*Mocybe*) *rimosus*, Bull.; *A.* (*Psalliota*) *campestris*, L. (a very typical series of specimens of this the common edible mushroom was collected, well illustrating the development of the veil and ring); var. *pratensis*, Viltad.; *A.* (*Hypholoma*) *fascicularis*, Huds.; *A.* (*Psilocybe*) *areolatus*, Klotzsch.; *A.* (*Ps.*) *bullatus*, Bull.; *A.* (*Pandolus*) *phalænarum*, Fr.; *Coprinus cornatus*, Fr.; *C. ephemerus*, Fr.; *Bolbitius tener*, B.; *Lactarius subdulcis*, Fr.; *Hygrophorus conicus*, Fr.; *H. psittacinus*, Schaeff; *Marasmius rotula*, Fr.; *Boletus chrysenteron*, Fr.; *B. luridus*, Schaeff (small form); *Polyporus squamosus*, Fr.; *Poria vaporaria*, Fr., var. *secernibilis*, B. & Br. The Gastromycetes comprised *Lycoperdon Bovista*, Linn. (=*giganteum*, auct. (A specimen 7 in. in diameter and 23 in. in circumference was taken by Prof. Johnson in a field near Braganstown House) *L.*; *pyriforme*, ? Sch. (specimen immature); *Phallus impudicus*, Linn. (on the "Island," Braganstown). The Uridineæ found were *Puccinia centaureæ*, Mart.; *P. prarum*, Neelsen (œcidia on *Tussilago Farfara*); *P. maveolus*, Pers. (on *Carduus arvensis*); *P. taraxaci*, Plow.; *Coleosporium sonchi*, Pers.; *Melampsora lini*, Pers.; *Triphragmium ulmariæ*, Lk. (The rare teleuto spores found abundantly on the bog at Braganstown). The only Discomycete was *Phialea virgultorum*, Karst. Hypomycetes included *Graphium Grovei*, Sacc. (on dead decorticated wood, the Island, Braganstown); *Cladosporium epiphyllum*, Mart., on *Salix* leaves, and *Stysanus ulmariæ*, McW. (nov. sp.), described and figured in the present number of the *Irish Naturalist*. This excursion will long be remembered as the occasion of the discovery of this interesting new form. *Plasmopara densa*, Schroet. (on *Euphrasia*) represented the Phycomycetes, and *Comatricha Friesiana*, de By., the Myxomycetes.

Mr. J. N. Halbert collected insects for the R.I.A. Flora and Fauna Committee. Among the Coleoptera an addition was made to the Irish records in *Phalacris caricis*, Strum., whilst *Philonthus albipes*, Grav., was taken for the first time on the east coast. The following also occurred in more or less abundance:—*Amara aulica*, *Pterostichus vernalis*, *Oxypoda longiuscula*, *Stenus ossium*, *S. pubescens*, *S. pallitarsis*, *Cercus rufilabris*, *Telmatophilus caricis*, *Atomaria basalis*, *A. pusilla*, *Donacia limbata*, Panz., *Galerucella lineola*, *G. tenella*, *Lagria hirta*, *Apion subulatum*, and *Grypidius equesiti*. The local and northern species *Anthonomus comari*, Crotch., occurred in abundance by sweeping. On the railway bank many common species abounded, including *Scymnus testaceus*, Mots., *Bruchus atomarius*, and *Ceuthorrhynchus litura*. Amongst Hemiptera the following are selected for record:—*Picromerus bidens*, *Cymnus grandicolor*, *Nabis flavomarginatus*, *Tetratocoris saundersi*, D. and S. (not previously recorded as Irish), *Calocoris roseomaculatus*, *Labops saltator*, *Cyllorrhinus caricis*, *Campyloneura virgula*, and *Psallus sanguineus*, Fab.

Mr. Carpenter found an interesting little crab-spider, *Oxyptila praticola*, Koch, new to Ireland, and among other spiders, *Bathyphantes pullatus*, *Lycosa pulverulenta*, and *Pardosa nigriceps*. Besides the more common harvestmen, *Oligolophus tridens*, and the black unspotted form of *Nemastoma lugubre* were found.

NOTES.

BOTANY.

LIVERWORTS.

Riccia glaucescens in Ireland.—This hepatic, which does not appear to have been hitherto recorded from Ireland, was sent to me in small quantity by my friend, Rev. S. A. Brenan, in July of this year, from Co. Antrim. The specimen was freshly gathered, and has since been submitted to and named as above by Messrs. Pearson and Holt. On the 14th of August I visited Cushendun, in Co. Antrim, where Mr. Brenan resides, and had the pleasure in his company of seeing two small patches of the plant growing on low rocks in the river that flows through Glendun; and, I may add, we took care not to exterminate it.

H. W. LETT (in *Journal of Botany* for September).

ZOOLOGY.

CRUSTACEANS.

Trichoniscus roseus, Koch., near Dublin.—On July 20th I took a specimen of this rare woodlouse among some stones about a foot underground near Templeogue. Dr. R. F. Scharff kindly determined the species.

E. C. FARRAN, Templeogue.

FISHES.

Bass in Donegal Bay.—It may be of interest to record a Bass (*Labrax lupus*) which was recently taken in a trawl-net in Donegal Bay. This fish is reported by Thompson from only one locality—Lough Swilly—in the north of Ireland. It was exposed for sale in the market to Donegal town, and being entirely unknown to the fishermen and fish dealers there, attracted the attention of a gentleman who sent it to me. The specimen was a little over thirty inches long.

W. SINCLAIR, Strabane.

BIRDS.

Ruff in Co. Wicklow.—Mr. E. Blake-Knox records (in *Field*, Sept. 7th) that he shot a Ruff (*Machetes pugnax*) in the Wicklow mountains on August 29th.

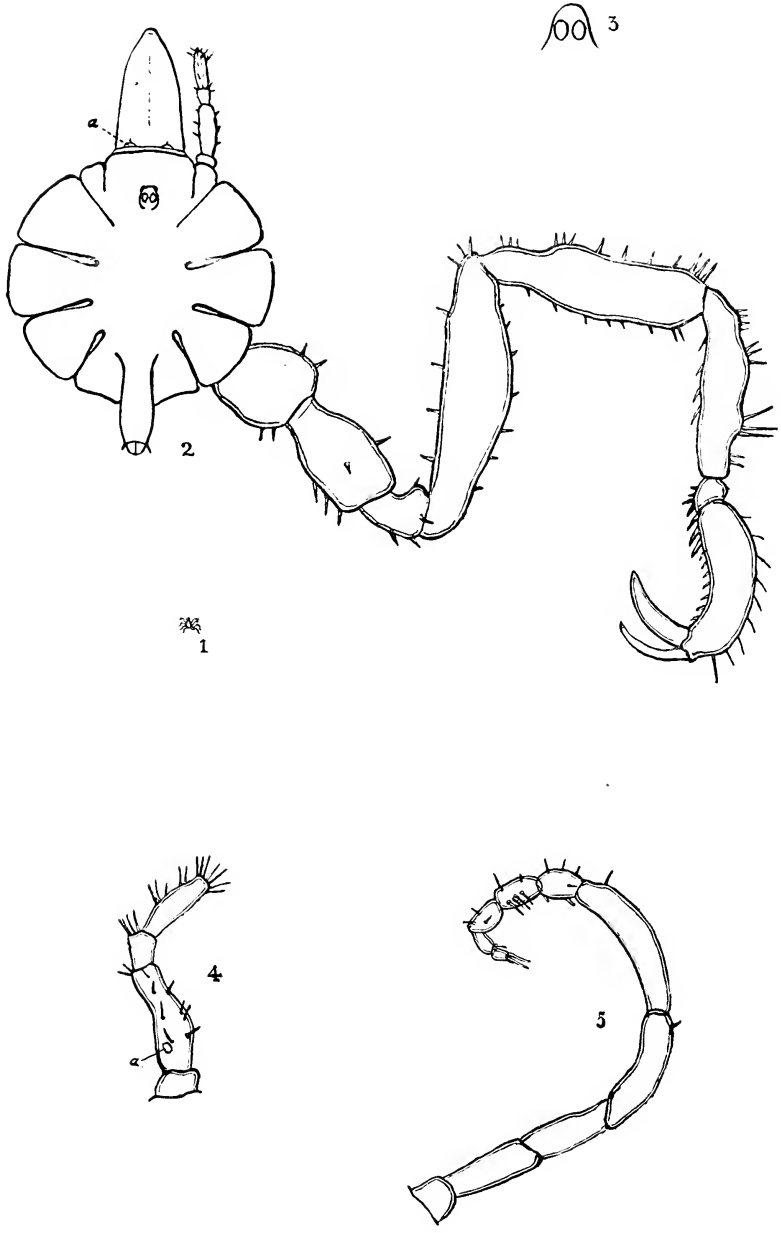
Stock Dove and Crossbill in Carlow.—Mr. J. G. Symes having reported to me the appearance of flocks of what he thought were Blue Rock Pigeons in the neighbourhood of Ballaghmoon, Co. Carlow, I asked him to send me a specimen. This he has very kindly done, and it proves to be, as I had expected, a Stock Dove. These birds, according to Mr. Symes, only made their appearance in Carlow about two years ago, and this extension of their range in Ireland is very interesting. Some little time ago Mr. Symes reported to me that Crossbills were breeding in his neighbourhood, and, in confirmation of his statement, sent me two specimens.

G. E. H. BARRETT-HAMILTON, New Ross, Co. Wexford.

MAMMALS.

Irish Mammalia.—A very fair idea of the small mammals of a district can be gained by examining the pellets cast up by owls. These pellets can be found in great numbers in and about the nests of the Long-Eared and Barn Owls; they are composed of the indigestible parts of the animals eaten, and are cast up from the crop. When dissolved many interesting bones are often found. I would be very grateful for *any number* of such pellets from any part of the country. Locality where pellets were taken, and, if possible, the name of species of owl, with name and address of sender, should accompany all specimens. I should also be glad of specimens or records of Irish mammals from all parts of the country. Specimens for identification will be returned if desired. Shrews, Field-mice, and particularly Bats, are specially desired.

H. L. JAMESON, Killincoole, Castlebellingham.



H.C.

TANYSTYLUM CONIROSTRE (DOHRN),

FROM BUNDORAN

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A NEW BRITISH PANTOPOD.

TANYSTYLUM CONIROSTRE (DOHRN).

BY GEORGE H. CARPENTER, B.SC.

[Collected (Sept., 1894), for the R.I.A. Flora and Fauna Committee, and Exhibited (July, 1895), before the Dublin Microscopical Club.]

(PLATE 6.)

READERS of the *Irish Naturalist* will, doubtless, recall Mr. J. E. Duerden's paper on the Rock-pools of Bundoran (p. 1 of the current volume), and remember that in Mr. Welch's excellent photograph which illustrates it, the most conspicuous animal is the rock-boring Purple Sea-Urchin (*Strongylocentrotus lividus*). This urchin is one of the best-known examples of a group of characteristic southern and Mediterranean forms which, in British waters, are almost or altogether confined to the western coast of Ireland, along which they often range a considerable distance northwards. The same coast also furnishes examples of northern and Scandinavian species, many of which are found as far as the extreme south-western corner. And so it comes to pass that the western shores of Ireland present to the marine zoologist a most interesting mixture of northern and southern forms of life, which cannot be found elsewhere in the British area. A similar mixture of immigrants from the north and from the south is to be observed in the land flora and fauna—the southern species often ranging northwards to Donegal and the northern forms southwards to Cork.

While Mr. Duerden's researches at Bundoran and elsewhere, during his too short residence in Ireland, were chiefly concerned with the Hydroids and Polyzoa, our knowledge of which he has done so much to advance, he was not neglectful of other marine creatures. And, knowing my interest in the Pantopods or Pycnogons—that curious group formerly classed with the Crustacea, but now regarded either as very aberrant

arachnids, or as an independent class—he was so good as to collect these animals for me whenever he met with them. At Bundoran only two individuals—one an adult male carrying eggs—of a single species rewarded his search. On examination, these proved referable to a pycnogon from the Bay of Naples described in Dr. Dohrn's great work[1] under the name of *Clotenia conirostris*. The Rev. Canon A. M. Norman, F.R.S., to whom I communicated the discovery, was so good as to confirm my impression that both genus and species were new to the British marine fauna; and this opinion was corroborated by Mr. W. T. Calman of Dundee (who, in conjunction with Prof. D'A. W. Thompson, has done much work on the British species), when, on a recent visit to Dublin, he examined the specimens. This pycnogon, then, hitherto only known from the Bay of Naples, but now recorded from Donegal Bay, will form a most interesting addition to those Mediterranean animals which range far northwards along our western coast. One can hardly doubt that future search will reveal other Irish localities further to the south.

The genus *Clotenia*, founded by Dr. Dohrn in 1881 for the single Neapolitan species *C. conirostris*, differs from the large genus *Ammothea* in its extremely compact and radially-formed body, the segments of which are fused together (Plate 6, fig. 2), and in the reduction of its chelifori (fig. 2, *a*) to minute knobs. But the character on which Dr. Dohrn chiefly relied was the presence in *Clotenia* of a genital opening on the second coxal joint of each of the male's walking-legs except those of the first pair, whereas in *Ammothea*, both the first and the second pair in the male want these openings. But in 1879, Mr. Miers[2] had described an allied pantopod from off the far southern island of Kerguelen under the name of *Tanystylum styligerum*, the genus being specially founded for this species; and in 1880, Prof. E. B. Wilson in his monograph of New England pycnogons[3] had referred to *Tanystylum* a species, *T. orbiculare*, evidently very near indeed to Dr. Dohrn's *Clotenia conirostris*.

[1] A. Dohrn. "Die Pantopoden des Golfes von Neapel." Leipzig, 1881 (pp. 160-4; pls. viii., ix.)

[2] E. J. Miers. "Zoology of Kerguelen Island—Crustacea." *Phil. Trans. R.S. Lond.*, vol. clxviii (extra vol.) p. 213-4; pl. xi., fig. 9.

[3] E. B. Wilson. "Report on the Pycnogonida of New England and adjacent Waters." *Rep. U.S. Commis. Fish and Fisheries*, 1878 (Washington, 1880), (p. 471-3; pl. iii., f. 11).

Dr. Dohrn admitted the probability that his *Clotenia* might be identical with *Tanystylum*, but, in the absence of information as to the number of genital openings, he refused to positively refer his species to the latter genus. Prof. Schimkewitsch, however, in a recent valuable paper[1] on some genera of pycnogons, states that the male genital openings in the species of *Tanystylum* correspond with those of *Clotenia*. He accordingly does not hesitate to sink the latter genus in the former. In accordance with this view, I refer to our new British form as *Tanystylum conirostre* (Dohrn).

The genus *Tanystylum*, then, now added to the British fauna, is to be recognised by its circular disciform body without evident segmentation and with fused lateral processes; its conical proboscis not doubled beneath the body; the extreme reduction of its chelifori to knob-like vestiges without a trace of jointing; the presence of palps with joints varying in number from four to seven; the possession of ten-jointed false legs with simple spines in both sexes, and the opening of the genital ducts of the male on the second coxal joints of the three hinder pairs of walking-legs. The affinities of the genus are with *Ammothea*, of which several species have long been known from our coasts, and it should be classed in the family *Ammotheidæ* with many other genera, all characterised by more or less vestigial chelifori, but possessing, in either sex, both palps and false legs. In Dr. Hoek's great work[2] on the "Challenger" pycnogonida this family is styled *Collosendeidæ*, but *Ammothea*, being the earliest described, and, perhaps, the most typical genus of the group, seems entitled to furnish the family name. Prof. Sars, in his beautiful monograph[3] of the North Atlantic pantopods, considers this group of ordinal value and divides it into three families—*Ammotheidæ*, *Pasithoidæ*, and *Eurycydidæ*. I cannot think, however, that the distinctions between these subdivisions entitle them to family rank.

All students of the pantopoda have considered the genus *Nymphon*, with its elongate clearly segmented body, fully-developed chelifori, ten-jointed palps, and ten-jointed false legs

[1] W. Schimkewitsch. "Notes sur les genres des Pantopodes. *Phoxichilus* and *Tanystylum*." *Arch. de Zool. Exp et Gen.* (2) ix., 1891, pp. 503-522.

[2] P. P. C. Hoek. "Report on the Pycnogonida." *Zoology of the Challenger*. London, 1881.

[3] G. O. Sars—"Den Norske Nordhaus Expedition. Zoologi. Pycnogonidea." Christiana, 1891.

furnished with toothed spines and present in both sexes, as the typical form of the group. All these three pairs of limbs in front of the four pairs of walking-legs are here present in their highest state of perfection. From such a prototype the other genera seem to have been produced by modification —in most cases of a degenerative tendency. In the paper already referred to, Prof. Schimkewitsch suggests how series can be formed leading on to genera showing extreme concentration of the body and nervous system, or the reduction or loss of one or more of the three front pairs of limbs. And in *Tanystylum* we find the concentration of the body carried to the farthest possible point, while the chelifori have almost vanished, and the palps have lost several of their joints. Further, the beautiful denticulate spines, which in *Nymphon* and other genera are to be found on the false legs, are here replaced by simple spines (fig. 5).

Our European species, *Tanystylum conirostre*, like the other species of the genus, is of very small size, measuring only 1 mm. in length (fig. 1). It may be distinguished by the palps possessing only four joints (fig. 4). Each of these limbs contains an excretory gland, observed by Dr. Dohrn, which opens towards the base of the second joint (fig 4, *a*). In the other species the palps are six or seven-jointed, and Dr. Dohrn states that traces of the vanished joints are sometimes to be seen in Naples specimens of *T. conirostre*. Also it seems that the degeneration of the chelifori has gone farther in *T. conirostre* than in the other species. It is interesting to note that in our Bundoran specimen these organs (fig. 2, *a*) are in an extremely vestigial state, being decidedly smaller than in examples of the species from Naples in the Dublin Museum collections. The lateral processes of the Bundoran animal lack the spines described and figured by Dr. Dohrn as occurring there in his Mediterranean specimens. Such minor differences will not, however, warrant the creation of a new specific name. In the North American species, *T. orbiculare*, Wilson, which ranges along the Atlantic coast from Martha's Vineyard as far south as Virginia, the chelifori are rather less reduced, the palps are six-jointed, and the spines on the false-legs are sometimes bifid. It will be remembered that the type of the genus, *T. styligerum*, Miers, came from the shores of Kerguelen, an island situated in latitude 49° S.,

about halfway between the Cape of Good Hope and Australia. This species also has six-jointed palps. It is considerably larger than the other *Tanystyla*, and possesses a swollen proboscis and long tail-segment. Recently, Prof. Schimkewitsch has described[1] (in addition to *T. Hoekianum* of unknown habitat) three new *Tanystyla* from the coasts of South America, collected by the Italian corvette "Vettor Pisani" on her exploring cruise. These are *T. Dohrnii* (with six-jointed palps) from Abrolhos islands off the coast of Brazil, *T. calicirostre* (with six-jointed palps and strange cup-shaped proboscis) from the Chonas islands off the coast of Chili, and *T. Cherchiæ* (with seven-jointed palps) from the Bay of Panama. I should be very much inclined to refer also to *Tanystylum* the genus *Discoarachne*, Hoek, with its single species *D. brevipes* described in the "Challenger" Report[2] from the shore near Capetown. In this pycnogon the palps are five-jointed and the chelifori are altogether wanting. When one considers how nearly these latter have disappeared in *T. conirostre*, it seems unnecessary to retain another genus for an allied form in which they have altogether vanished.

The geographical distribution of the foreign relations of our new British pantopod raises some questions of much interest. None are deep-water species, so it is probable that migration has taken place along coast-lines. We see that this Mediterranean and Irish species and the Capetown species (*Discoarachne*, Hoek) are the most modified forms in the genus, showing the furthest amount of reduction in the first two pairs of limbs. When we consider that the majority of the species are from the southern hemisphere, and (with the exception of *Discoarachne*) that these are not so far modified as the European form, we are to conclude that the original home of the group was far to the south. This view is confirmed by the fact that two species occur on both the Atlantic and Pacific coasts of the American continent, while no species have been found on the Pacific coast of Asia, such a distribution suggesting the neighbourhood of Cape Horn as the starting-point

[1] W. Schimkewitsh. "Sur les Pantopodes recueilles par M. le lieut. G. Chierchia pendant la Voyage de la Corvette 'Vettor Pisani' en 1882-5." *Atti della R. Accad. dei Lincei (Memoire d. Classe di Scienze fisiche, &c.)*, vol. vi., 1890, pp. 329-347, and plate.

[2] P. P. C. Hoek, t.c., pp. 74 6, pl. vii. fig. 8-12.

for the American species. But did our *Tanystylum conirostre*, or its less-modified ancestors come northwards along the west coast of Africa to the Mediterranean and to our shores? The general southern range of the genus strongly suggests such an explanation, as no *Tanystylum* is known from the Norwegian or other north European coast. On the other hand there can be no doubt that *T. conirostre* is very closely allied to the North American *T. orbiculare*, a consideration which renders it at least possible that the migration to Europe may have taken place eastwards along an old shore-line to the north of the North Atlantic. On such a view, we must regard the newly discovered Irish station as a mark of the path by which our pycnogon travelled to its Mediterranean home. In all these speculations, however, it must be borne in mind how incomplete our knowledge of the range of these animals still is. While such theories add zest and interest to the investigation of our fauna, new facts will surely be brought to light which will oblige us to modify them. If zoological science is to progress there must ever be an evolution in the thoughts of its students, as we believe there has been and is in the wonderful creatures which it is their pleasure to study.

EXPLANATION OF PLATE 6.

Fig. 1. *Tanystylum conirostre* (Dohrn), natural size.

,, 2. ,, ,, adult male, magnified. All limbs removed except chelifori (*a*), and the right palp and third walking leg.

,, 3. ,, ,, eye-eminence in profile magnified.

,, 4. ,, ,, palp, highly magnified; (*a*) opening of excretory gland.

,, 5. ,, ,, false leg of male, highly magnified. (In this figure, spine at tip of ninth joint should have been shown projecting beyond end of tenth joint).

INSECTS FROM ROSSCARBERY, CO. CORK.

By H. K. Gore Cuthbert.

Coleoptera.

The following beetles were taken at Rosscarbery and its neighbourhood, about the end of last August. The list is a small one, for I have much neglected this order lately, but it contains some records of interest regarding which I have appended some notes:—

Cychrus rostratus.
Carabus cancellatus.
C. granulatus.
Bradycellus distinctus.
B. verbasci.
Harpalus latus.
H. proteus.
Pterostichus cupreus.
P. minor.
P. strenuus.
Amara livida.
Taphria nivalis.
Anchomenus piceus.
A. puellus.
Bembidium decorum.
Brychius elevatus.
Haliplus lineatocollis.
Cœlambus v.-lineatus.
Hydroporus palustris.
H. septentrionalis.
Noterus sparsus.
Aleochara fuscipes.
Falagria thoracica.
Leistotrophus murinus.
Philonthus æneus.
P. sanguinolentus.
Silpha atrata var. *subrotundata* (black form only).
Necrodes littoralis.
Necrophorus ruspator.
N. vespillo.
Saprinus nitidulus.
Chilocorus bipustulatus.
Halyzia xiv.-guttata.
Onthophagus fracticornis.
Aphodius depressus.
A. punctato-sulcatus.
A. scybalarius.
Geotrupes vernalis.
Cetonia aurata.
Dolichosoma lineare.
Donacia limbata.
D. sericea.
Chrysomela marginalis.
Phaedon armoraciæ.
Lochmœa suturalis.
Galerucella nymphææ.
Cassida equestris.
Heliopathes gibbus.
Helops pallidus.
Rhinosimus planirostris.
Otiorrhynchus blandus.
O. atroapterus.
O. rugifrons.
Strophosomus retusus.
Hypera trilineata.
H. variabilis.
Orchestes fagi.
Ceuthorrhynchus ericæ.

Carabus cancellatus, Ill.—One specimen, female, at East Pouladav. This is a rather unexpected addition to the Irish as well as the British list. Its claim to admission to the latter rested hitherto on the doubtful record of Stephens: "said to have occurred in a chalk-pit at Northfleet." The beetle is widely distributed in Central and North Central Europe, and much resembles superficially the common *Carabus granulatus*, L.

Harpalus proteus, F. } Entirely black forms of these com-
Pterostichus cupreus, Dej. } mon insects, usually very brassy.

Chilocorus bipustulatus, Leach.—Lately recorded by Mr. J. N. Halbert, from the Galway district. It occurs at Rosscarbery on the Dog-rose.

Geotrupes vernalis, L.—At Castlefreke, on the sandhills. Apparently widely distributed, but not common, in Ireland.

Cetonia aurata, L.—In great abundance on Ragwort near Glandore.

Chrysomela marginalis, Duft.—First Irish record for this species. Swept from underwood in an alder plantation at Benduff.

Otiorrhynchus blandus, Gyll.—Under stones on the shore at Tralong and Ownahinchy. This mountain species appears to be widely distributed on the south and west coasts.

Hemiptera.

The following species of bugs were taken, for the identification of which, as also of many of the beetles, I am indebted to Mr. J. N. Halbert.

Eurygaster maura.
Pentatoma baccarum.
Picromerus bidens.
Syromastes marginatus.
Macrodema micropterum.
Stenocephalus agilis.
Nabis lativentris.
N. rugosus.
Stygnus pedestris.
S. arenarius.
Phytocoris varipes.

Eurygaster maura, L.
Stenocephalus agilis, Scot.
These are very interesting additions to the list of Irish Hemiptera. They are rather widely distributed species in the southern counties of England, and also in S. Wales.

Syromastes marginatus, L.—Is probably frequent in the south-west having been taken at Berehaven by Mr. G. H. Carpenter; the British distribution is similar to that of the two preceding species.

Hymenoptera Aculeata.

The following were captured in Ross district during the latter part of August. As regards them I have to express my indebtedness, as on previous occasions in the matter of identification, to Mr. Edward Saunders, F.L.S.

Formica fusca.
Lasius flavus.
L. niger.
Myrmica rubra (races *ruginodis* and *scabrinodis*).
Pompilus gibbus.
P. fuscus.
P. niger.
P. plumbeus.
Ceropales maculatus.
Oxybelus uniglumis.
Mellinus arvensis.
Odynerus parietinus.
O. trimarginatus.
Colletes daviesana.
C. succincta.
Sphecodes affinis.
S. pilifrons.
S. subquadratus.
Halictus cylindricus.
H. morio.
H. nitidiusculus.
H. rubicundus.
H. villosulus.
Andrena albicrus.
A. denticulata.
A. gwynana.
A. nana.
Megachile centuncularis.
Coelioxys elongata.
Nomada ochrostoma.
Psithyrus barbutellus.
P. campestris.
P. rupestris.
Bombus cognatus.
B. hortorum.
B. lapidarius.
B. latreillellus.
B. muscorum.
B. sylvarum.
B. schrimshiranus.
B. terrestris (vars. *virginalis* and *lucorum*).

Oxybelus uniglumis, L.—In great abundance on flowers of *Cnicus arvensis,* at Castlefreke.

Odynerus trimarginatus, Zett.—Not uncommon on heath (*Erica*) at Ownahinchy and Tralong. All these specimens belong to a variety with spotted tibiæ.

Sphecodes subquadratus, Sm.—New to Ireland. Taken at Downeen, about burrows of *Halictus rubicundus.*

Andrena nana, Kirb.
A. denticulata, Kirb.
These are also new Irish records. The latter pretty and fragrant insect abounds in the district and is a welcome addition to our lists.

Psithyrus barbutellus, Kirb.
Bombus schrimshiranus, Kirb. — These I believe are the first Irish records, but the former was previously taken, though not recorded, by Mr. Freke, at Dundrum, Co. Dublin, and the latter at Carrickmines, in the same county. I have a specimen of *B. barbutellus* from Portmarnock, taken last June. Both species were common, with others of the same genera on heath at Castlefreke.

The *Andrenæ* in the above list are few, as might be expected in the case of a spring-flying genus. The Fossores are also poorly represented although the locality seems specially suitable for them. The absence of social Wasps was remarkable, while the social Bees were unusually abundant.

IRISH KNOTWEEDS.

BY REV. C. H. WADDELL, B.D.

THE following notes upon some species of the genus *Polygonum* may be useful, as the Irish Knotweeds do not seem to have received any special attention from Irish botanists. Mr. A. Bennett of Croydon has kindly named the critical species and varieties for me which are mentioned in this paper.

Polygonum Convolvulus, Linn., var. **subalatum**, V. Hall—Saintfield, Co. Down, growing as a garden weed, 1893. Crossgar, Magheralin, Co. Down.—This variety has long been known in England, where it was named *pseudo-dumetorum* by Mr. H. C. Watson, because it was so often mistaken for *P. dumetorum*, but does not seem to have been recorded for Ireland. It is interesting as being an intermediate variety between that species and *P. Convolvulus*, the common Black Bindweed of cornfields, from which it may be easily distinguished by the winged segments of the perianths. I have found it at the localities mentioned, but cannot meet with the type, and my friend Mr. S. A. Stewart tells me he has also found the variety this season at Donaghadee. Is the typical plant common in other districts in Ireland? When growing as a weed in rich soil the variety is a very beautiful plant, and climbs several feet high.

Polygonum aviculare, Linn., ¡var. **agrestinum** (Jord.)—Dundrum, Co. Down.

var. **vulgatum**, Syme—Shore, Killough, Co. Down.

var. **arenastrum** (Bor.)—Saintfield. A well-defined variety, growing commonly in the channels by roadsides in compact cushions.

var. **rurivagum** (Jord.)—Fields by shore, Killough, Co. Down. This is also a well-defined variety. It has long narrow leaves and wiry stems, and grows very long among the herbage in cornfields.

P. Hydropiper, Linn.—This species is very common in this district (Co. Down), in marshes, along roadsides, and in fields and gardens in places where water lies. A fine vigorous form of it appears every year as a weed in a wet spot in my garden at Saintfield, which Mr. Bennett says is the var. *densiflorum* of Braun. It has much larger flowers than the typical plant, clustered in remarkably dense bunches at intervals along the flowering branch or stem, and in the axils also, the racemes broader and interrupted, not filiform, and sometimes erect; and varies from *P. Hydropiper*, I suppose, in somewhat the same manner as the var. *elatum*, Gren., does from *P. Persicaria*, though it has not received varietal rank from British botanists. I quote Braun's description (*Flora Bot. Zeit.*, 1824, p. 108):—"β. *densiflorum* mihi, elatum, spica terminali cylindrica densa, floribusxil alaribus confertis. Distinguished by its higher stem with numerous spreading branches, broad leaves, and very dense, green, pendent perianths. It grows in ditches and sometimes in marshy woods."

P. maculatum, Trim. and Dyer.—I found this in 1894 growing in marshy fields north of Dundrum, Co. Down, along with *P. lapathifolium*. It is a difficult plant to distinguish, and has no doubt been confused with *P. Persicaria* or *P. lapathifolium*, its two nearest allies. It is said to be common on the outskirts of London, and in many parts of England. It is a smaller plant than *P. lapathifolium*, its leaves are white and woolly beneath, not so broad in the middle and attenuated at either end; its racemes longer, slender, and forming a more compact spike of flowers.

P. amphibium, Linn.—When growing on dry land the beautiful floating leaves and whole habit become so changed that it might be considered a different species. This is I suppose the var. *terrestre*, Leers. I have seen it in flower on the banks of the Closet river, Co. Armagh. It furnishes an interesting example of a plant adapting itself to a different environment, the floating leaves changing to upright ones, and taking upon them a hairy coat when they leave the water. Since the terrestrial form is not permanent in its characters, it has, strictly speaking, no title to be called a variety, but is only a form.

P. Bistorta, Linn.—Shrubbery, Saintfield; Graveyard, Knock, Co. Down. I have never seen the Snakeweed truly wild, either in Co. Down or in Westmoreland, where I have gathered it in similar localities. It seems to have a penchant for graveyards and other rich ground near human habitations. At Kendal it is called *Easter ledges*, as its succulent leaves appear above ground at that season, and, boiled with oatmeal and other ingredients, are made into herb puddings.

MY BIRDS.

BY REV. THOMAS B. GIBSON, M.A.

(*Continued from page* 289.)

Of the Crow family I have three kinds, viz., the Starling, the Jackdaw, and the Jay. There are about a dozen Starlings at present in my aviary; though I certainly would not keep so many were it not that I fear to lose one which I have had for about five years, if I released or gave any away, not being able to distinguish my favourite from the others in any way but by his voice, which is superior to anything I had ever imagined in a Starling—superior I might say almost to any other bird's voice I know—for he imitates everything in the aviary and chuckles over his imitations when he has finished. This bird, with three others, I obtained from a nest near my aviary, having taken them while unfledged and placed them in a cage which I then hung over the entrance to the nest. The old birds attended to them for about a month, when I placed them in the aviary, where they have remained ever since. Two or three others have since been obtained, in the same manner; but the greater number were placed in the aviary last winter to save their lives, they having been caught by my pupils during the severe frost. I may here say that the Starling is a delicate bird I believe, though only one has ever died with me; and, last winter, for several mornings in succession, I found dead Starlings lying upon the heaps of crumbs I had placed for them. The want of water was, I believe, felt by them even more than the want of food; and, when I placed a basin full of water near the crumbs, the Starlings would at once crowd around it to drink, neglecting the food till they had slaked their thirst. It is very singular that my Starlings have never bred in the aviary though some of them may be said to have been almost reared in it; and I have been careful to provide nesting material plentifully for them. But, indeed, I may say that birds usually despise anything that is done for them that way, in an aviary at least, and will pitch upon the most unlikely places to nest, though you may have arranged everything most beautifully for them only a few inches away. Why, for many days, I have removed portion of a nest from the lid of my seed-box, and in the end

been obliged to give up the contest by the quiet persistency of the birds.

My Jackdaw—I have but one—was also reared by its mother in my aviary. It had fallen from the nest apparently, as it was still unfledged when brought to me by one of my pupils, the old bird still hovering around and making uncomplimentary remarks. I placed it in the aviary and took no further trouble about it, but the old birds continually attended to it—indeed even when it could shift for itself. This bird is not, however, nearly so tame as those of its kind that I possessed in my boyish days, and does not appear to be much of an acquisition.

My Jay was a purchase which came from England. There were two others in the nest, but these were fed liberally with small pebbles by the Registrar's sons, and the diet did not agree with them, it appears; though, when young, they certainly are always ready and eager for any kind of food. My Jay is not much of a mimic, nor indeed does he concern himself much about his companions; but he is a beautiful bird, and quicker in his movements than any other with which I am acquainted. I feared that the smaller birds would have no chance of breeding in the same aviary with him, and so built another aviary for them in a sunnier spot, which has been very successful. He does not however seem to have any desire for eggs, and the Doves and Thrushes have not, so far as I know, suffered from his attentions. Very lately, I obtained a Magpie, which is not so harmless, as, in the very first night of its residence, it killed two Thrushes and a Sparrow. I have had to separate it from the others, removing also the Jay at the same time.

The Blackbirds I had to remove into the smaller birds' aviary as a feud arose between one of them and the Missel-thrush which threatened to be life-long, and to the detriment of the former. I can hardly blame the Missel-thrush, however, for he was perfectly peaceable till the Blackbird drove him into anger by continuous bullying. This Blackbird, which I have now had for five years, was caught by myself in a trap, during the frost, together with two or three Thrushes. Four other Blackbirds, including a hen, were brought to me by my pupils, and then war began. The original occupant apparently resented the intrusion of the others, and killed three, in spite of my

continued interference. So savage was he that many times he has attacked his victim while it was even in my hands. I have seen him take hold of another Blackbird and twist off its beak to the skull; so that I have had to kill the sufferer. At last I removed the one remaining survivor to the second aviary; and then for a few days, the bullying Blackbird made the life of the Missel-thrush a burden to it, till at last it turned, and then the Blackbird suffered. To save its life I removed it also; and singularly enough, it has never since fought—though there are now four Blackbirds in this aviary—all of them cocks however—which may account for the harmony. As in the case of the Starling it is fear of losing a magnificent songster that prevents me from releasing or giving away some of my Blackbirds. And a like cause, in part, operates with me as regards Thrushes, of which I have eleven—nine being Song-thrushes (mostly caught last winter), the others being the Missel-thrush and a Field-fare. I have too, a very fine Ring-Ousel, but, as it is this year's bird, I cannot say much about its habits, except that it is very tame, having been brought up by hand. I should like to add a Red-wing, but I have not yet been able to obtain one. The Song-thrushes have always built nests, and laid eggs; but the hatching has been intermittent, and no young birds have as yet been reared. The Missel-thrush has surprised me by the delicacy of its throat notes, for though the five or six notes of its usual song are shrill enough, it loves to come beside me (either when inside or outside the aviary) and to give utterance to the softest of tones, deep down in its throat, as if it were whispering a song, while, all the time, it turns the head to look into my eyes, as if noting the effect. This bird was a purchase; and has now been in my possession for about four years. Of the Field-fare I cannot say much, as it was only captured in our play-ground last spring. It is, however, a beautiful bird—in my opinion the most beautiful of the thrushes—and, though its voice, so far as I know, is unmusical, its elegant shape and bluish-grey colour, together with its peculiarly tipped beak, make it an ornament to the aviary. In this, my first aviary, there are several Sparrows—more than I desire indeed, for they have bred there—who are the very wildest of its denizens. Originally I had placed two or three young sparrows inside, to save them from the cats.

These produced one or two broods last year, and I fear that there are several broods this year; but I cannot catch them, without frightening all the other inhabitants, and so they escape expulsion. One fellow is rather a rarity, having two white feathers in each wing. Of Larks I have had several, and still have a pair; but only one ever distinguished himself as a songster, and he died during the snow of last winter. All my Larks, however, after a short time in the aviary, are perfectly well able to perch, which seems to be opposed to what one usually hears of their habits. In this aviary there is no tit-bit so earnestly desired by all the birds I have mentioned as wood-lice, locally known as slaters. The Jay, indeed, prefers beetles, and the Cockatoo looks on with indifference; but to see the commotion amongst Starlings and Larks and Thrushes, one would imagine no other food had been given them for a week.

Of Doves I have several kinds—the Common Ring-dove, the Turtle-dove, the Stock-dove, the White Japanese Dove, and the Egyptian Dove, the latter being like the common Ring-Dove, but suffused with a rosy hue all over the body. Last year the Stock-doves brought out one young dove, as did also the Ring-doves; but both young birds died, whilst I was away during my summer holiday. This year the Stock-doves have fully reared a beautiful pair of young ones which I presented to the Zoological Gardens; and all the other kinds were to be seen hatching. Indeed one of the most singular spectacles possible to imagine was to be seen in the aviary; for, in a very capacious nest on a tree branch, there were six Doves' eggs, and on this nest, seated in harmony, a Turtle, a Japanese, and a Common Ring-dove.

In building my second aviary I took advantage of the angle between two walls, so that there was perfect shelter from N. winds, and the wire netting was only on the S. side. I also boarded more than half the flooring of the aviary, in a sloping manner, so that the birds have always got dry footing to rest on below as well as on the perches. I also placed a number of boxes, cocoa-nuts, &c., in suitable positions for nesting; but here, as in the other aviary, my birds greatly preferred their own to my arrangements. Not many, however, ever constructed nests or laid eggs except a pair of Bullfinches and a pair of Budgerigars—these latter being indefatigable in that way.

Of the Warbler family I have only kept four; and one of these, a Stonechat, only lived with me for a few days, so that of its habits I can say but little. A Wheatear, however, which was caught in our playground, lived for about two months, and I had an opportunity of watching the peculiar movements of its tail and the spreading out of its wings whilst it sang. This bird was particularly fond of wood-lice, and though so small, whenever I brought those tit-bits to the aviary it succeeded in getting more than its share, fiercely driving away all other birds except a Robin that generally manages to have its own way in everything. The Robin is not by any means a tame bird in the aviary, and it is decidedly pugnacious, not merely with birds of its own kind, but with any bird that interferes with it. The bird is so well known that there is no need to refer to its peculiarities; but my specimen is so wild—after two years' residence in the aviary—that whenever I go inside it creeps under the boarding and remains in hiding till I have left. It sings sweetly, however, and, except for its temper, is a satisfactory bird in the aviary. My favourite, however, amongst the Warblers is the Hedge Accentor, or Hedge Sparrow as it is called. I purchased a pair about two years ago; but the hen died in less than a week, and I have never been able to obtain another. The survivor has astonished me with the beauty of its song; and I have found it well able to hold its own though apparently so timid. After a time it became quite tame, and would allow me to stroke it down, scarcely moving away even when I placed my face close to it. The peculiar shuffling of its wings seems to be involuntary.

Of Titmice I have only kept the Great or Ox-eye Titmouse and the smaller Blue-cap. I did not greatly care for the former as it more than once broke the eggs of a Canary that had paired with a Siskin, and I suspected it also of having similarly wrecked a Goldfinch's nest. I never heard it sing, and it usually was in a state of chattering wrath either with me or with some denizen of the aviary. It was very interesting though to watch the manner in which it held a grain of hempseed in its claw to peck at, always flying with a single grain to a particular spot in the aviary. Of this bird's disappearance after having been a year in the aviary I can give no explanation. It is not there now, that is all I can say for certain;

but before its disappearance I removed it to the large birds' aviary on account of its habits.

The Blue-bonnet is a more satisfactory bird and quite as amusing. It flits about incessantly, chattering continually, and yet it is a sociable bird too, never appearing happy unless it has a companion to solace its captivity. My birds are not timorous, though neither are they tame, and whenever I enter the aviary they seek the topmost perch, always remaining in exactly the same spot till I leave, their heads being hidden behind a piece of board. They love anything in the way of fat and appear fond of water; but they have not yet nested with me.

Of Finches I keep many kinds. The Goldfinch has nested and sat on its eggs more than once, but has "forsaken" the nest on every occasion, without bringing out young, though the eggs were fertile, as I have discovered by breaking them, The bird is delicate, but a thing of beauty in an aviary.

The Canary, having paired with a Siskin, has nested and brought out young, which died, but the Siskins have never paired amongst themselves. The Siskin is, perhaps, of all small birds the most satisfactory in an aviary. I have had a pair for five years and they have never showed signs of illness, not even when moulting; but they feed voraciously, and drive away much larger birds from both food and water till they are satisfied. The cock on one occasion escaped from the cage as I was entering, but instead of flying away. it settled on the netting, and allowed me to take it in my hand and place it within the aviary. It is an incessant songster, and bathes in a peculiar way by standing on the edge of the bath, merely ducking its head under water and allowing the water to run down its back.

The Brambling is a handsome fellow, and a great addition to the aviary. Some few years ago they were very plentiful and cheap in Dublin, but I have not seen so many for sale lately. I have had three for about four years and they seem very healthy. A fourth died, but it was moulting at the time, and the weather was cold. The song is not sweet, but there is not one of the Finches so handsome, and at the same time so healthy. It is particularly fond of water, and usually is the first to enter the bath.

Everyone knows the Chaffinch and its habits, but I may here say that as an aviary bird it is as nearly perfect as can be imagined, except that it does not nest—at least with me. The pair which I placed in my aviary five years ago are there still, and look quite as healthy and as happy as their kindred outside—which by the way are very fond of lighting on the wire in the endeavour to become partakers with the captives —not I suppose in the captivity, but in the good things provided for the captives.

The Common Linnet is very easily kept in an aviary, and is not, so far as I know, liable to diseases. One which I caught under my hat whilst it was trying to get into the aviary, is an especially good songster, and appears quite tame. I have an idea that it must have escaped from captivity before it was caught by me. The song is very sweet, and it continues the music till very late in the evening. The Twite I have found very hard to keep, and it appears to be not nearly so hardy as the Common Linnet. I had to renew my specimens several times, and, although I possess one for over two years, I cannot recommend this species as being so satisfactory as either the Linnet or the Redpoll. Of this latter species I have had four, for about five years, and I am able to disprove a statement in regard to its colour, which maintains that the captive bird having lost the red colour never recovers it in captivity; for at this present moment one of these four has as brilliant a colour as I have ever seen, even in the most recent captives. I once possessed a large Mealy Redpoll—purchased in Bride-street, and supposed to have been captured near Dublin, but it was accidentally hanged through being entangled in a piece of thin twine. None of these birds ever commenced even to build a nest, and I have never noticed any inclination to pair, though I always keep my birds in pairs when possible.

(TO BE CONCLUDED).

A NEW HANDBOOK TO THE GEOLOGY OF IRELAND.

Guide to the Collections of Rocks and Fossils belonging to the Geological Survey of Ireland.—By A. McHENRY, M.R.I.A., and W. W. WATTS, M.A., F.G.S. (Dublin: for H. M. Stationery Office; A. Thom & Co. Price 9*d.*)

IN the hands of those special investigators who are now replacing or assisting the omniscient but old-fashioned curators of museums, guide-books to collections are assuming the importance of scientific treatises. Her Majesty's Stationery Office has just issued, under the above title, a work of reference which will be welcome to all geologists in our islands. The late Dr. V. Ball, in his preface to this guide, clearly indicates his desire to provide better accommodation for the collections; but the series of rocks and fossils now displayed in the Science and Art Museum in Dublin is already a boon to students, as well as a public recognition of the work of the Geological Survey. Sir Archibald Geikie gives us an account of the origin of these collections. They were for some time under the care of that keen field-observer, Mr. McHenry, who has himself, during his official labours, added a large number of the specimens. Mr. W. W. Watts, during his brief residence in Dublin as a member of the Staff of the Survey, gave almost his whole attention to the petrographic portion of this guide, which he has finally edited from his new post in London. The remarkable manner in which the work has been made to keep pace with recent observation (see p. 29, for instance) is a testimony to his constant care.

The rocks are grouped under the four geographical provinces of Ireland, a plan which will be found convenient for reference in the Museum. In 80 pages we have a concise description of the floor of Ireland, a guide, in fact, to its geology, illustrated by the specimens in the Museum, which are referred to constantly by their numbers. The superiority of this method over that of the systematic catalogue drawn up by the mere curator will be at once apparent. Messrs. McHenry and Watts have produced a readable work, the details of which are largely based on original observations made in the course of survey-work. We wish that still more frequent references could have been given to the papers by other authors which have been utilised, as this would only serve to emphasise the enormous amount of new descriptive matter that is due to the writers of the guide.

We have nothing here to do with the unfortunately dark conditions under which the photographic illustrations and many of the specimens have to be displayed in the museum. The study of them has now been admirably facilitated by the guide; but why was not the concluding "Index to Places" arranged alphabetically according to the localities, like that in Rosenbusch's "Mikroskopische Physiographie," instead of in the order of the numbers on the specimens? A visitor from the country can find without difficulty the rocks of his own county; but, if

he wishes to see whether Ballinagappoge or Knockaunavoher is represented in the collection, he may have to search over an extensive series.

When we attempt to comment on the details of the text, we find the perusal of the book far more interesting than any attempt to criticise it. In a few lines, for instance (p. 17), we have an account of Sir A. Geikie's views on the "conglomerates" of Howth, and Prof. Sollas's suggestion that the majority of these rocks are breccias; while, lower down on the same page, the theory of slaty cleavage is introduced in an account of the slates of Co. Wicklow. We notice, by-the-by, that the names of the Irish counties are written throughout the work without the prefix, which is, perhaps, to be regretted from the point of view of geographical precision. An Englishman does not say that Woodstock is in Oxford, or that Whitby is in York; and such a phrase as "isolated localities in Dublin and Wicklow" (p. 18) is, we believe, liable to misconstruction.

It goes somewhat against the grain to find (pp. 18, 60, &c.) the division "Lower Silurian" merged into the general term "Silurian," although it appears as a separate system in the table on p. 16. Surely this is too great a sacrifice to deceased authority. We note, however, with pleasure that the Old Red Sandstone is accorded (p. 83, &c.) a distinct systematic position, and is not swallowed up, as was once threatened, between the Silurian and the Carboniferous. Even the alleged conformity between the Dingle Beds and the Silurian becomes a dubious matter in the field, and Jukes himself preferred to let his mapping controvert his conclusions, and to state his difficulties most plainly.

For observers in Co. Dublin, the fine account of the Leinster granite and its flanking masses will have especial interest (pp. 31–35 and 39–40). In the list of minerals (p. 32) we may take exception to the description of apatite as merely "hexagonal phosphate of lime"; to copper pyrites as "cubic sulphide" of copper, when it is tetragonal, and contains as much iron as copper; and to kaolin as "silicate of alumina" only, its mode of formation being outlined without reference to the hydration. Too many names, moreover, seem to us to be used for igneous rocks in general; the ordinary museum-student—and, for that matter, the most experienced petrologist—may really gain in philosophic knowledge by grouping together such generic names as *diabase*, *proterobase*, *hypersthene-porphyrite*, *epidiorite*, *lamprophyre*, and *kersantite*, under far more simple family-titles, distinguishing the special types by adjectival affixes. This point, however, will always be a source of friction between those to whom the name of a rock-mass comes as a reminder of some microscopic section, and those to whom it seems almost as the echo of an elfin trumpet, borne along all the range of crag and purple moorland. We have evidence that the aspect of the country itself was often in the minds of the writers of this museum-guide, as, for instance, in the account of the Mweelrea area on p. 45, and the capital description of the limestone country of Co. Clare on p. 87.

The geographical grouping of the rocks under the several provinces requires some occasional cross-references, which might be obviated by an index such as that which we have suggested. Thus a traveller between

Newcastle and Warrenpoint might expect to find his rocks illustrated in the case styled "Coast of Down" (p. 74); whereas they are more conveniently dealt with under the heading of "The Mourne Mountains." The important questions raised by the igneous rocks of Ulster are remarkably well treated in a summary of some nine pages.

We hope to hear more of the phonolite of Blackball Head (p. 91), the "Ivernites" of Co. Limerick (p. 93), and other rocks of which Mr. Watts has special knowledge, here modestly passed over. The last thirty-five pages of the guide are devoted to an account of the fossils displayed, prefaced by an outline of the classification of the animal kingdom. This latter feature seems beside the purpose of the guide, and might have been handed over to the zoological department of the museum, especially as there is no corresponding introduction to mineralogy and petrology in the earlier portion of the book. It is impossible to do justice to the details of animal structure in such limits; this is apparent in the description of the older and modern types of crinoids (p. 100), of the limbs of trilobites (p. 102), and of the pulmonata (p. 105) as "lung-bearing shellfish." In the survey of the special palæontology of Ireland, the gender of certain specific names is open to correction; but the information seems to rival the petrological portion in the attention given to recent work. As examples, the Durham concretions are correctly mentioned as "calcite" (p. 109); while *Pucksia MacHenryi* already finds a place as an Irish fossil. An important list of figured and type-specimens in the collection concludes this section of the guide.

Altogether, this little paper-covered volume is a real addition to our libraries, and its excellences are likely to be appreciated by the specialist even more than by the enquiring visitor. It will now be impossible to enter upon research in any Irish county, without referring in the first place to what Messrs. McHenry and Watts have thought fit to say upon the subject.

GRENVILLE A. J. COLE.

CORRESPONDENCE.

Quartz, Quartz-rocks, and Quartzites.

To the Editors of the *Irish Naturalist.*

In a paper recently published by the Royal Irish Academy on "Quartz, Quartz-rocks, and Quartzites," I notice that Mr. Kinahan quotes some passages from a letter written by me to him on the subject of sinters from Iceland. As his statement, made just before the first quotation, is open to some little misunderstanding, and as I have no copy of the letter, I am compelled to ask him, through you, to publish any statement in my letter, except that which he has already quoted, which has any bearing on the clastic structure of sinters. If he will be good enough to do so, the bearing of the study of sinters on quartzites and quartz-rocks will be a little clearer.

W. W WATTS,
Corndon, Worcester-road, Sutton, Surrey.

NOTES.

BOTANY.

FUNGI.

The Utility of noting Fungus-localities.—Despite the universal abundance of the Daisy, the parasitic cluster-cup fungus which it sometimes harbours, is so rare that I had never, until a few weeks ago, come across it. Happening to be at Woodenbridge, Co. Wicklow, on August 25th, and remembering that the fungus had been recorded from here by Mr. Greenwood Pim a good many years ago, I kept a sharp look-out whilst walking up the "Gold-mines Valley," and was rewarded by finding an abundance of this rare species. It was formerly called *Œcidium compositarum* var. *bellidis*, D.C., but is now known to be only a stage in the life-history of *Puccinia obscura*, Schroet., the other, or teleutospore stage, being passed on *Luzula campestris*.

E. J. McWeeney, Dublin.

A curious Coincidence.—For several years I have carefully observed *Fumaria officinalis* in order to ascertain if it ever became attacked by fungal parasites—but always in vain. Last August a plant was sent me from Westport by a friend who is commencing the study of field-botany, and wanted to be told the name of the specimen. As luck would have it, that very plant of *Fumaria* was severely infected with a parasitic mould which I had never before seen—*Peronospora affinis*, Rossm., described by Massee as "rare." Rare it certainly is about Dublin, for out of the hundreds of specimens of the host-plant I have examined, not one presented the parasite, whilst it is accidentally present on the only specimen I have ever seen from Co. Mayo!

E. J. McWeeney

MOSSES.

The Moss Flora of Aran.—The visit of the combined Field Clubs to Aranmore took place at the very worst season for collecting mosses, and the meagre list published does not do justice to the bryology of the island. Aranmore, with its dry limestone rocks, cannot promise a copious moss flora, but yet, in winter or early spring, it might very well repay a search. A full enumeration for this western outlier would be very interesting, and it is to be hoped that ere long some local botanist may undertake this work. Going there by steamer in May, 1891, and stopping all night, I had an afternoon and a morning's work amongst the plants. The search for mosses was not, on this occasion, the primary object, and the near approach of summer did not authorise the hope of much results as regards these moisture-loving plants. Nevertheless some damp nooks did turn up affording suitable habitats, and my list of species, collected in Aran, includes the following, which do not appear to have been found by the Field Clubs, whose report is the only record of Aran mosses that I can find:—*Dicranum scoparium*. L.; *Tortula montana*, Nees.; *Cinclidotus fontinaloides*, L.; *Grimmia heterosticha*, Muell.; *Orthotrichum saxatile*, Brid.; *Funaria hygrometrica*, L.; *Breutelia chrysocoma*, Dicks.; *Hypnum striatum*, Schreb.; *Neckera complanata*, L.; *Pottia Heimii*, Hedw.; *Mollia nitida*, Lindb.; *Grimmia pruinosa*, Wils.; *Zygodon viridissimus*, Dicks.; *Funaria obtusa*, Dicks.; *Bryum cæspititium*, L.; *Anomodon viticulosis*, L.; and *Hypnum rusciforme*, Neck.

S. A. Stewart, Belfast.

CHARACEÆ.

Irish Characeæ.—In the *Journal of Botany* for October, Messrs. Groves publish their records of British Characeæ for the last five years. We are glad to see Irish plants figuring prominently in the lists of new stations for the various species and varieties. Most of the Irish notes here given have been already published in the paper which Messrs. Groves contributed to these pages at the beginning of the present year.

PHANEROGAMS.

Flora of Howth.—Miss Jeannette Featherstonhaugh sends a specimen of *Antennaria dioica*, gathered early this summer, growing among heather on the upper cliff-walk. This forms an interesting addition to the flora of Howth.

R. LLOYD PRAEGER.

Aran Island Brambles.—When on Aranmore in July, I collected specimens of the few forms of *Rubus* that grew there; and they have since been submitted to Rev. W. Moyle Rogers, whose notes did not reach me in time for insertion in the botanical report of the Galway Conference. The *Rubus*-flora of Aran appears to be very limited, and consists almost entirely of *R. rusticanus*, *R. corylifolius*, and *R. cæsius*, and their hybrids. A more interesting form, and the only other form I gathered, was *R. mollissimus*, Rogers (*Journ. Bot.*, February, 1894). This plant was also the only bramble which grew on Inismacdarragh, a remote islet of the Connemara coast, celebrated for the beautiful primitive church which stands on it, and other remains of early christianity. Mr. Rogers writes—"The Aran *Rubi* are apparently very poor. Where *rusticanus* and the *cæsii* appropriate the ground they seem to try to make up for the want of other allies by hybridising endlessly. But your finding *mollissimus* there is very interesting."

R. LLOYD PRAEGER.

Carex fusca, All. (=**C. Buxbaumii,** Wahl.) **In Scotland.**—To the *Annals of Scottish Natural History* for October, Mr. Arthur Bennett contributes a short paper on the recent finding of *Carex fusca* (better known as *C. Buxbaumii*) in Scotland, which interesting discovery had been already announced in the *Journal of Botany* for September. The interest of this find to Irish botanists lies in the fact that for the long space of sixty years this has been considered an exclusively Irish plant as regards the British Isles. It was discovered in 1835 by Dr. David Moore on Harbour Island, Lough Neagh, near Toome, and has not since been found elsewhere either at Lough Neagh or in other localities. As it is a native of Scandinavia, and Central Europe, its occurrence in Scotland does not come as a surprise. The station where it has now been found by Mr. W. F. Miller, is in the district of Arisaig in Inverness-shire, on the swampy margins of a small loch, where the finder reports five large patches of the plant. The discovery is of importance also, since, on account of drainage and grazing, it is doubtful if the plant still survives in its only Irish habitat. May it long flourish undisturbed on the margins of this remote Scottish loch.

Old Plant Remedies.—In the *Dublin Journal of Medical Science* for September, Dr. Henry S. Purdon writes on "Old Native Remedies." Those who are interested in the medicinal uses, real and imaginary, of our native plants, will find interesting information in Dr. Purdon's article, which deals with the plants formerly or still in use in the neighbourhood of Belfast.

ZOOLOGY.

CRUSTACEA.

The Woodlice of Co. Carlow.—An expedition was organised by the Royal Irish Academy Fauna and Flora Committee in the spring of this year to Borris in the County Carlow. The principal object of the Committee in the selection of this locality was to try and discover the Crested and the Palmated Newts, which had been reported to occur there. Though plenty of the Common Newt were found, the rarer ones succeeded in evading capture, and we still remain in the same position as last year in regard to them—namely, we have nothing at all to show but *reports* that they live in Ireland.

The expedition was more successful with the invertebrates. Mr. Halbert will shortly publish an account of the coleoptera of the Borris district, many of which are new to Ireland. The following species of woodlice were obtained :—

Trichoniscus pusillus, *T. vividus*, *Porcellio scaber*, *Cylisticus convexus*, *Platyarthrus Hoffmanseggii* (only at Bagenalstown in the nest of the ant *Myrimca rubra*), *Oniscus asellus*, *Philoscia muscorum* and *Armadillidium vulgare*.

It will be remembered that I mentioned in my paper on the Irish Woodlice (*Irish Naturalist*, vol. iii., 1894), that *Trichoniscus vividus* was found only at Waterford. It had not been obtained anywhere else in fact in the British Islands. The discovery of this very rare species along the banks of the River Barrow is therefore of much interest. None of the other species, except perhaps *Cylisticus convexus*, deserve special mention, this being only the second Irish locality.

R. F. Scharff, Dublin.

INSECTS.

The Stridulation of Corixa.—At Mrs. J. H. Thompson's residence I had the opportunity of observing on two distinct occasions the stridulation of *Corixa*. I was attracted by the peculiar notes proceeding from the glass vessel in which the creatures were preserved for observation. Having watched till I identified the one performing, I was rewarded by a fine opportunity. Perched on a piece of the vegetable matter with which they seem to love to amuse themselves, the little fellow with the two front legs brushed to and fro rapidly the sides of his mouth, and at the time of this brushing the sound was produced. I noticed also a slight change in the note, but could not detect any corresponding change in the movement.

James Robertson, Cork.

New Irish Ichneumons.—Mr. Bignell of Plymouth informs me that two hymenopterous parasites bred from larvæ of *Sesia scoliiformis* which I took at Killarney belong to the genus *Pimpla*, and are probably a species new to science. This suggests that research in Ireland would probably result in additions to our list of parasitic Hymenoptera.

W. F. de V. Kane, Monaghan.

BIRDS.

Rare Birds near Wexford.—Two of my boys were out shooting on 24th August, and one shot an Avocet in good plumage and the other a Black-tailed Godwit. Another Godwit of the same kind was shot by one of them on September 17th. The Avocet was by itself feeding at the edge of a pool in marshy ground, and the Godwit was with some Ring Plovers on the edge of a sandbank in Wexford Harbour. The second Godwit was shot near where the Avocet was got. All specimens are in the hands of Messrs. Williams & Sons, Dame-street.

E. A. Gibbon, Rosslare, Wexford.

PROCEEDINGS OF IRISH SOCIETIES.

Royal Zoological Society.

Recent donations comprise a Kingfisher from Miss Lees, a dozen Trout and other fish from F. Godden, Esq., a Brown Bear from Lieut. R. Travers, a Lemur from Dr. More Madden, and a Seal from F. Flynn, Esq. A Red Deer fawn and three Lion cubs have been born in the gardens; while a Gibbon, another representative of the man-like Apes, three Barbary Apes, two Axolotls, six Hedgehogs, and a pair of Geese have been purchased.

12,680 persons visited the gardens during September.

Dublin Naturalists' Field Club.

September 7th.—The Club held an Excursion to Gormanstown. The weather was delightful, and a party of thirty-five proceeded by the 2.0 train northward, and entered the picturesque grounds of Gormanstown Castle, where the afternoon was spent. The season was rather late for the collecting of flowering plants, but numerous fungi were peeping up through the dead leaves in the woods, and a number of species were observed by Dr. M'Weeney, who found that one of the most remarkable features of the day's collecting was the abundance of the genus *Hygrophorus*, which comprises bright-coloured mushroom-like species of a peculiar waxy consistence. They are usually found much later on in the season. To the heavy rains in August must doubtless be attributed their early appearance this year. The species taken included *Hygrophorus pratensis*, Fr., *H. coccineus*, Schaeff, *H. chlorophanus*, Fr., *H. psittacinus*, Fr., *H. niveus*, Fr., *H. russo-coriaceus*, B. and Br., *H. nemoreus*, Fr., *H. calyptræformis*, Bk., *Clavaria fastigiata*, Linn., *Helvella crispa*, Fr., *Leotia lubrica*, Pers., *Peziza badia*, Pers., and *Sporodinia aspergillus*, Schröt. The last-named, a beautiful parasitic mould, was taken in its sporangiferous stage on a decaying agaric; whilst awaiting examination, it conjugated, forming numerous zygospores. The chief interest of the Gormanstown demesne lies in the fine old timber and rare shrubs. Near the Castle stands a marvellous old Mulberry, whose history can be traced back for 700 years. Close at hand are beautiful walks between rows of ancient Yews, overshadowed by the far-stretching flat branches of a great Cedar. Acacias and Cork-trees flourish exceedingly, and a summerhouse has been built of cork grown on the estate. A glorious Beech-tree came in for much admiration; its branches sweep the ground over an immense area, and have taken root, and will remain as separate trees long after the parent has gone the way of all timber. In the walled-in garden was pointed out an enormous Pear-tree, stated to be the largest in Ireland. The district was not rich in insects. The pretty plant-bug *Phytocoris tiliæ* was taken in numbers by beating lime; its variegated patterns harmonising well with the lichen-covered twigs. Among the spiders were *Lycosa ruricola*, *Linyphia clathrata*, and *Bathyphantes nigrinus*, while *Oligolophus tridens* and *Liobunum Blackwallii* were noteworthy harvestmen. The members returned to the station in time to catch the 6.28 train to town. Miss E. H. Goodbody, and Messrs. R. A. Cammack and H. G. Tempest, were elected Members of the Club.

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NOTES ON GLACIAL DEPOSITS IN IRELAND.

BY PROFESSOR W. J. SOLLAS, F.R.S., AND R. LLOYD PRAEGER, B.E.

II.—Kill-o'-the Grange.

[Read before the Dublin Naturalists' Field Club, 12th February, 1895].

The important brickworks of Kill-o'-the Grange are situated near the southern shore of Dublin Bay, being distant a mile and a half S.W. of the town and harbour of Kingstown. The surface of the ground at the works is just 150 feet above ordnance datum; the surrounding country is undulating and drift-covered, rising gradually from the sea to the base of the granite hills, of which the nearest (Three-Rock Mountain, 1,479 feet) is distant four miles to the W.S.W. Kill-o'-the Grange lies on the Leinster granite area, near its northern limit, the junction with the Carboniferous limestone being about two miles to the northward. About two and a half miles to the S.E. lies the northern end of the well-known coast-section of Killiney Bay, which we have discussed in a previous paper[1].

The excavations which have been made to procure clay at the brickworks, and gravel in the adjacent meadows, afford an excellent section of the local superficial deposits. As in other sections in this neighbourhood which we have described,[2] we find here a thick deposit of Lower Boulder-clay, capped by stratified gravels, large blocks of rock being prevalent at the junction of the two. The Boulder-clay is here about thirty-five feet thick, and homogeneous throughout. It rests on an uneven bed of granite, the projecting portions of which are rounded and smoothed, and strongly grooved in a N.W. and S.E. direction. Near its base, the Boulder-clay presents a peculiar character, causing it to be known among the workmen as

[1] *Irish Naturalist*, iii., 13 (1894). [2] *Loc. cit.* and *I. N.*, iii., 161, 194.

"tea-leaf," a name which aptly expresses its appearance. This is the result of a foliated structure, the foliæ being very irregular in form, and their faces, as revealed on breaking the clay, being extremely smooth and shining. The "tea-leaf" clay passes upwards imperceptibly into typical Boulder-clay, dark brown in colour, very hard, fine, and smooth in texture, and containing a fair number of pebbles, generally rather small, and most of them glaciated; also occasional blocks of large size; and sparingly scattered marine shells, usually in fragments, with now and then a scrap of lignite.

Our first visit to this interesting deposit was on the occasion of an excursion of the Dublin Naturalists' Field Club on 28th April, 1894; what we saw on that occasion decided us to return, and since then we have paid frequent visits to the locality. The advantages of working this section were two-fold—the constant excavation presented continually new faces of the clay for examination; and the workmen were speedily induced to pick out and preserve every shell or other organic object that they observed. In these ways a representative collection of the rocks and fossils contained in the deposit was speedily accumulated. The workmen showed industry and observation in their collecting; their instructions were to preserve anything in the nature of a shell which they found in the pit, and their findings showed curiously how extraneous objects make their way even to an isolated spot like this. We have no reason to believe that their collecting was not genuine; yet it was surprising to receive among numerous glacial fossils a fresh specimen of an *Oliva* and two of a foreign *Nassa*, in addition to oysters, cockles, limpets, and periwinkles which were evidently of recent origin; but even the freshest of the shells natural to the clay could be distinguished from all these at a glance, by their different texture, colour, and state of preservation. The weakest point in the men's collecting was that pieces of small or fragile shells were likely to be passed over or smashed.

The following is an annotated list of the shells obtained; we have added the existing range of each species with reference to Great Britain. We are much indebted to Messrs. E. T. Newton, F.R.S., and Percy F. Kendall for assistance given in the determination of some of the fragments.

Pecten opercularis, L.—One fragment. Present distribution, north and south of Great Britain.

P. maximus, L.—One fragment of a large specimen. Present distribution, north and south.

Lima subauriculata, Mont.—One beautiful and perfect valve, of full size, was washed out of the material filling the spire of a *Chrysodomus reversus*. Present distribution, north and south.

Mytilus modiolus, L.—Two fragments. Present distribution, northern only.

Pectunculus glycymeris, L.—Seven pieces, one of them a nearly perfect well-preserved valve. Present distribution, north and south.

Cyprina islandica, L.—By far the most abundant fossil in the deposit, but in spite of its strength, the shell is invariably broken into fragments. Out of over 150 pieces collected, the largest is only $1\frac{3}{4}$-inch in length. Most of the fragments belong to fully-grown specimens; a few to young shells. The fragments are in general quite angular, with sharp edges. Three pieces are somewhat scratched and smoothed on both sides; two others are much scratched and polished, with sharp edges; and another two are beautifully polished, with most of the edges rounded. In all these pieces the markings show about equally on each side; in at least a dozen others, the smooth inner side shows scratches. A few pieces are bored by *Cliona*. Present distribution, chiefly northern.

Astarte sulcata, Da C., var. **elliptica.**—Six complete valves, and twenty-six fragments. This variety, which is the northern form of the species, and does not now range south of Britain, alone occurred.

A. compressa, Mont., var. **striata.**—Three perfect valves. Present distribution, northern only.

A. borealis, Chemn.—Twenty specimens occurred, one of them being a beautifully complete and fresh valve; several others were only slightly broken. Present distribution, high northern, and not British.

Venus casina, L.—Frequent; thirty-six fragments were found, but no complete specimen, which is certainly remarkable, as this is one of the most strongly-built of British shells. Present distribution, north and south.

Tellina balthica, L.—Five complete specimens, and twelve others, most of them only slightly broken. One shell was bored, perhaps by a *Natica*. Present distribution, north and south.

Solen siliqua, L.—One fragment. It ranges north and south of Britain.

Mya truncata, L.—Seven fragments were found. Present distribution, chiefly northern.

Panopæa norvegica, Speng.—Twenty-one fragments of this fine shell occurred, some of them being beautifully glaciated. Its present distribution is entirely northern; in Britain it is now found on the Dogger Bank only, in about 30 fathoms.

Saxicava rugosa, L.—Four pieces. Present distribution, everywhere.

Dentalium entalis, L.—Two broken specimens. Present distribution, north and south.

Littorina rudis, Maton.—Two specimens, slightly broken, a fully-grown one, and a young shell. Present range, north and south.

Turritella terebra, L.—Sixteen broken specimens. Present distribution, north and south.

Natica Alderi, Forbes.—One small complete example, which has been bored through near the lip. Present distribution, north and south.

Purpura lapillus, L.—Two specimens, complete, but much smoothed and worn. Present range, north and south.

Chrysodomus (Fusus) contrarius, L.—Two almost complete specimens, and fragments of at least half a dozen others. This reversed form occurs throughout the newer Pliocenes, but is extremely rare in our present seas.

Pleurotoma rufa, Mont.—One complete specimen. Present range, north and south.

In addition to the above, there are a number of species which are not yet positively identified, and are withheld for the present. Among them is a *Pecten*, three species of *Cardium*, a *Cardita*? a *Mactra*, two species of *Nassa*, and two of *Fusus*. There are besides fragments of at least half a dozen other species, quite indeterminable; so that the total molluscan fauna which we have collected at Kill-o'-the Grange numbers about thirty-eight species, represented by some 400 specimens. As to the physical characters of this large assemblage, the remarks appended to the note on *Cyprina islandica* apply to all; the shells are very hard and fresh-looking, almost invariably broken, mostly with sharp angles and edges, though in some the edges are thoroughly rounded; some of them are striated, and a few are beautifully polished.

Before considering the faunistic characters of this assemblage, it may be well to enumerate the other animal forms discovered. Of Cirripedes, *Balanus Hameri* was represented by four pieces. It is a species of northern facies, occurring rather sparingly and generally in deep water. Several Ostracoda were detected; but they have not yet been named. A polyzoon washed out of the spire of a univalve also awaits determination. Thanks to the kindness of Mr. Joseph Wright, F.G.S., we are able to state that Foraminifera are abundant in the clay, and to give the following list of species obtained in about 1½ lb. of material sent to him.

Miliolina seminulum (Linné).—Rare

M. tricarinata (D'Orb.)—Very rare.

M. subrotunda (Mont.)—Frequent.

M. tenuis (Cz.)—Very rare.

Textularia globulosa, Ehr.—Common. A common fossil of the North of Ireland Chalk.

Bulimina pupoides, D'Orb.—Rare.

B. fusiformis, Will.—Frequent.

Bolivina punctata, D'Orb.—Rare.

B. plicata, D'Orb.—Rare.

B. lobata, Br.—Rare.

B. dilatata, Rss.—Common.

Cassidulina lævigata, D'Orb.—Rare.
C. crassa, D'Orb.—Very common.
Lagena apiculata, Rss.—Rare.
L. seriato-granulosa, Rss.?—Very rare.
L. squamosa (Mont.)—Very rare.
L. hexagona (Will.)—Very rare.
Nodosaria orthopleura, Rss.—Very rare. This is a Crag species.
N. hispida, D'Orb.—Very rare.
Rhabdogonium tricarinatum (D'Orb.)—Very rare.
Lingulina tenera, Born.—Very rare. Common in the Antrim Lias.
Uvigerina angulosa, Will.—Common.
U. nodosa, D'Orb.—Very rare. Common in the North of Ireland Chalk.
Cristellaria cultrata (Mont.) Very rare.
Globigerina bulloides, D'Orb.—Very common.
G. cretacea, D'Orb.—Frequent. A Chalk fossil.
G. æquilateralis, Br.—Common. A Chalk fossil; it has also been dredged off the West of Ireland, but the Kill-o'-the-Grange specimens look similar to those found in Chalk.
Orbulina universa, D'Orb.—Rare.
Discorbina rosacea (D'Orb.)—Very rare.
D. sp.—Very rare.
Rotalia Beccarii (Linné).—Very rare.
R. orbicularis, D'Orb.—Rare.
Truncatulina lobatula (W. & J.)—Frequent.
Nonionina depressula (W. & J.)—Very common.
N. orbicularis, Br.—Frequent.
N. scapha (F. & M.)—Rare.
Polystomella crispa (Linné).—Rare.
P. striatopunctata (F. & M.)—Frequent.

Mr. Wright remarks that Foraminifera are quite abundant in the clay; the fauna is in general what one would expect to find in shallow water around our present coasts, but mixed with these are derived species, some of them being comparatively plentiful; these derived forms are clearly distinguishable from those properly of the clay by their chalky texture, as well as by their generic and specific characters.

Viewing generally the Kill-o'-the-Grange fauna, and leaving out species certainly derived from older formations, and species whose identity is doubtful, we have first a group of twenty-two mollusca—fifteen lamellibranchs, a scaphopod, and six gastropods; of these, one species (*Astarte borealis*) is an arctic shell, not now found in the British area. Several others, such as the remaining species of *Astarte, Panopæa norvegica,* and *Mytilus modiolus,* have now outside of Britain an entirely

northern range; the remainder are widely distributed both north and south of Britain. It will thus be seen that the fauna has a northern, but by no means an arctic aspect. Indeed the absence of such arctic species as *Leda pernula*, &c., which usually characterize the Boulder-clay fauna, is worthy of special note. As to the bathymetrical characters of the fauna, a few of the species, such as *Solen*, *Littorina* and *Purpura*, are purely littoral; the majority are such as live in five to twenty fathoms of water: and one or two, such as *Lima subauriculata* and *Panopœa norvegica* usually inhabit a somewhat greater depth; to these last must be added the Cirripede *Balanus Hameri*. The Foraminifera do not lend themselves to an analysis of this kind, as they occur throughout a much less restricted bathymetrical range; but the occurrence of forms derived from Secondary rocks is of great importance, and will be referred to later on.

Among the specimens collected by the workmen were a number of Liassic fossils, most of them striated and polished. The following is a list, arranged according to zones, of the species found; we are indebted for their determination to Mr. A. H. Foord, F.G.S.:—

Schlotheimia angulata, Schloth.	Lower Lias.
Lima gigantea, Sow.	
Gryphæa incurva, Sow.	
Cardinia Listeri, Stutch.	
Ægoceras Portlockii, Wright.	
Belemnites breviformis, Voltz., var. γ	Middle Lias.
Lytoceras fimbriatus, Sow.	
Harpoceras bifrons, Brug.	Upper Lias.

Of these, the most abundant was *Gryphæa incurva*, of which over a dozen specimens were obtained; of *Cardinia Listeri* four were found; of *Lima gigantea* three; and of *Harpoceras bifrons* two. The most southern exposure of the Liassic system in Ireland is a few miles south-west of Belfast, whence it extends to the northern coasts of Antrim and Derry, the principal exposures being at Larne and Ballintoy. These beds belong to the lower division only, the highest zone noticed by Tate being marked by *Belemnites acutus* at Larne. It is remarkable therefore to find in the Kill-o'-the-Grange Boulder-clay not only fossils of the Lower Lias, but two species of Middle Lias age, and one, *Harpoceras bifrons*, which is characteristic of a particular zone of the Upper Lias.

From a clean face in the lower portion of the deposit of Boulder-clay, we gathered 129 stones and pebbles at random, which, when examined, yielded the following percentages:—

Carboniferous limestone,	38·2
Basalt,	15·8
Carboniferous sandstone,	15·0
Hard chalk,	5·0
Slate,	5·0
White quartzite,	3·3
Felstone,	3·3
Black flint,	2·5
Cambrian sandstone,	2·5
Cambrian slate,	1·6
Coal-measure shale,	1·6
Black micaceous grit,	1·6
Triassic sandstone,	·8
Epidiorite,	·8
Granite,	·8
Rhyolite,	·8
Lignite,	·8
White quartz,	·8
	100·0

It will be immediately observed that although the deposit lies on granite, which extends in every direction for several miles, this rock was only represented in the 129 pebbles by a single specimen, while more than half the total are derived from the Carboniferous rocks. Still more remarkable is the comparative abundance of basalts of precisely the same character as those which are found in places in the north of Ireland. But while this is certainly the nearest locality from which these rocks can have been derived, it by no means follows that they may not have come from points still further north The northern origin of the basalts is in accord with the occurrence of no less than 7·5 per cent. of Cretaceous rocks. None of the other pebbles call for special remark, except one of rhyolite agreeing in character with that of Forkill near Dundalk, the nearest point from which it can have been derived.

In addition to collecting pebbles for per-centage purposes, we paid special attention to the larger blocks. These occur almost exclusively on the denuded surface of the Boulder-clay at the base of the overlying gravels, and they present a very interesting assemblage. Among numerous specimens of riebeckite-bearing granophyre (Ailsa Craig rock) may be mentioned one angular block measuring $1' \times 8'' \times 8''$. Its surface was rough, and did not exhibit striation. Of the various

agents that have been suggested as having effected the transport of this Scotch rock, seaweed would in this instance appear to be excluded, both by the size of the block, and by the distance which it has travelled. Large fragments of Chalk flint were found, one sharp-edged piece measuring 8″ × 6″ × 6″. A fine boulder of rhyolite or quartz porphyry occurred, probably from Forkill in Co. Armagh; and near at hand was a large fragment of Coal-measure sandstone, streaked with undulating layers of coarse muscovite and carbonaceous matter, similar to sandstones which occur at Coalisland, Co. Tyrone, and Ballycastle, Co. Antrim. There were also blocks of Carboniferous limestone of considerable size, one being 2½ feet long by 2 feet broad; and one of Old Red Sandstone measuring 1′ 6″ × 1′ 6″ × 1′. Leinster granite was rare, but one grand block was seen *in situ* near the base of the Boulder-clay, rounded, with a rough unscratched surface, and measuring a yard in diameter.

It will be seen from a consideration of the travelled fossils and rocks described above, that while many of them may have been derived from the north-east of Ireland, this cannot have been the case with all. The Ailsa Craig rock must certainly have come from the Clyde, or from some of the islands to the north of it. We know furthermore that Ireland furnishes Liassic fossils of the lower division only, and to explain the presence of Middle and Upper Lias fossils we are driven again to the Hebridean islands, where the zones which might have furnished them have been shown to exist by Judd* and others. And if the riebeckite-granophyre and a portion of the Lias fossils had their source in the Inner Hebrides, some of the basalts also may have come from this region.

The occurrence in the clay of Liassic and Chalk foraminifera corroborates in a remarkable manner the evidence of the larger Liassic fossils and the travelled blocks; all these derived foraminifera are found in the secondary rocks of Antrim, and none of them elsewhere in Ireland; but, as in the case of the larger fossils and the erratics, some of them may have had a Scotch origin.

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*See Judd, "On the Secondary Rocks of Scotland," *Q.J.G.S.* 34, (1878), p. 660.

The Molluscan fauna points to a cold sea of moderate depth, and an adjoining shore-line. But the smashed condition of even the strongest shells, their polish, striation, and frequent rounding, are very remarkable features, and, coupled with the rounded and polished nature of the grains of sand in the clay, suggest that they have been exposed at some period of their history to beach conditions, and to the grinding and pounding of shore ice.

COLEOPTERA COLLECTED IN CO. CARLOW.

(For the R.I.A. Flora and Fauna Committee.)

BY J. N. HALBERT.

TOWARDS the end of last March the Royal Irish Academy Fauna and Flora Committee arranged for a short trip to the west of Co. Carlow, the objects of which were various. Dr. R. F. Scharff wished to confirm the reputed occurrence there of two rare species of newts (see *Irish Naturalist* (current volume) p. 319), and at the same time to see what could be done in certain other groups, while Mr. David M'Ardle collected the liverworts and mosses. During our stay of three days we worked the sheltered and pleasantly diversified Barrow valley between Goresbridge and Graiguenamanagh, and as all our captures were made sufficiently near Borris special localities are in most cases unnecessary. Unfortunately our visit was a little too early in the season, for the previous severe frosts would seem to have retarded the spring species, notably the *Hydradephaga*, which were decidedly rare, and in the terrestrial groups a little hard work was necessary to search them out from their yet undeserted winter quarters. There was a heavy flood in the Barrow and great numbers of Coleoptera were found in the refuse swept down and accumulated in low-lying places. The only records from the district are a few made by Dr. A W. Foot in the *Proceedings of the Dublin Natural History Society* for 1870. Dr. David Sharp has kindly given me much help with the difficult genus *Homalota*, and I am also indebted to Mr. G. C. Champion.

The following is a complete list of the species collected :—

Carabus nemoralis, Müll.
Notiophilus palustris, Duft.
Nebria brevicollis, F.
Loricera pilicornis, F.
Acupalpus exiguus, Dej., var. *luridus*, Dej.
Harpalus rufibarbis, F.
H. ruficornis, F.
Stomis pumicatus, Panz.
Pterostichus versicolor, Sturm.
P. madidus, F.
P. vulgaris, L.
P. nigrita, F.
P. strenuus, Panz.
P. vernalis, Gyll.
Amara trivialis, Gyll.
A. communis, Panz.
Calathus cisteloides, Panz.
C. melanocephalus, L.
Anchomenus angusticollis, F.
A. dorsalis, Müll.
A. parumpunctatus, F.
A. micans, Nic.
A. puellus, Dej.
Bembidium rufescens, Guér.
B. mannerheimi, Sahl.
Trechus minutus, F., var. *obtusus*, Er.
Dromius quadrimaculatus, L.
Haliplus fulvus, F.
H. ruficollis, DeG.
H. lineatocollis, Marsh.
Hydroporus lepidus, Ol.
H. palustris, L.
H. nigrita, F.
Agabus bipustulatus, Ol.
Gyrinus natator, Scop.
G. opacus, Sahl.
Hydrobius fuscipes, L.
Anacæna globulus, Payk.
Laccobius sinuatus, Mots.
L. bipunctatus, F.
Limnebius truncatellus, Thoms.
Chætarthria seminulum, Herbst.
Helophorus nubilus, F.
H. aquaticus, L.
H. brevicollis, Thoms.
Hydræna riparia, Kug.
Cercyon hæmorrhoidalis, Herbst.
C. lateralis, Marsh.
C. melanocephalus, L.
C. pygmæus, Ill.
Cercyon analis, Payk.
Megasternum boletophagum, Marsh.
Cryptopleuron atomarium, F.
Aleochara fuscipes, F.
A. brevipennis, Grav.
A. nitida, Grav.
Astilbus canaliculatus, F.
Homalota languida, Er.
H. elongatula, Grav.
H. volans, Scrib.
H. grammicola, Gyll.
H. circellaris, Grav.
H. analis, Grav.
H. exilis, Er.
H. atricolor Sharp.
H. atramentaria, Gyll.
H. longicornis, Grav.
H. pilosiventris, Thoms.
H. fungi, Grav.
Falagra obscura, Grav.
Leptusa fumida, Er.
Myllæna dubia, Grav.
Hypocyptus lævisculus, Mann.
Tachyporus obtusus, L., var. *nitidicollis*, Steph.
Tachinus flavipes, F.
T. laticollis, Grav.
Quedius tristis, Grav.
Q. semiæneus, Steph.
Q. boops, Grav.
Ocypus morio, Grav.
O. cupreus, Rossi.
Philonthus laminatus, Creutz.
P. addendus, Sharp.
P. varius, Gyll.
P. marginatus, F.
P. trossulus, Nord.
Othius fulvipennis, F.
Lathrobium brunnipes, F.
Stilicus rufipes, Germ.
S. orbiculatus, Er.
S. affinis, Er.
Medon propinquus, Bris.
Sunius diversus, Aube.
Stenus juno, F.
S. speculator, Er.
S. declaratus, Er.
S. brunnipes, Steph.
S. impressus, Germ.
S. nitidiusculus, Steph.
Platystethus arenarius, Fourc.
Oxytelus rugosus, Grav.
Trogophlœus bilineatus, Steph.
Trogophlœus elongatulus, Er.
T. corticinus, Grav.
Olophrum fuscum, Grav.
Lathrobium atrocephalum, Gyll.
L. unicolor, Steph.
Omalium punctipenne, Thoms.
Proteinus ovalis, Steph.
Prognatha quadricornis, Lac.
Pselaphus Heisei, Herbst.
Bythinus bulbifer, Reich.
Clambus armadillo, DeG.
Hister neglectus, Germ.
Onthophilus striatus, F.
Halyzia xvi-guttata, L.
Scymnus testaceus, Mots.
Atomaria mesomelas, Herbst.
Epistemus globosus, Waltl.
E. gyrinoides, Marsh.
Cytilus varius, F.
Melanotus rufipes, Herbst.
Agriotes lineatus, L.
Cis boleti, Scop.
C. nitidulus, Herbst.
Donacia impressa, Payk.
Phædon tumidulus, Germ.
P. cochleariæ, F.
Hydrothassa marginella, L.
Prasocuris phellandrii, L.
Apteropeda orbiculatus, Marsh.
Longitarsus luridus, Scop.
Cassida sanguinolenta, F.
C. flaveola, Thunb.
C. equestris, F.
C. viridis, L.
Helops striatus, Fourc.
Apion cerdo, Thoms.
A. ulicis, Forst.
A. dichroum, Bedel.
Otiorrhynchus ligneus, Ol.
Strophosomus coryli, F.
Sciaphilus muricatus, F.
Tropiphorus tomentosus, Marsh.
Barypeithes sulcifrons Boh.
Barynotus obscurus, F.
Alophus triguttatus, F.
Hypera variabilis, Hrbst.
H. nigrirostris, F.
Liosoma ovatulum, Clairv.
Ceuthorrhynchus pleurostigma, Marsh.
Eubrychius velatus, Beck.

The following species in the above list have not apparently been previously recorded as Irish.

Homalota languida, Er.—In moss on river bank, also in flood-refuse. Recorded as a rare species in the south of England.

H. exilis, Er.—Several in flood-refuse.

H. pilosiventris, Thoms.—One example in moss. Rare.

The Irish specimens of this difficult genus are frequently very puzzling through a tendency to vary. Dr. Sharp has seen any doubtful species. These were returned by him as correct, but marked as variations from the types.

Olophrum fuscum, Grav.—Found amonst dead leaves in a wood near Graiguenamanagh. A local northern species in Britain.

Homalium punctipenne, Thoms.—Under bark of ash. The allied *H. pusillum*, Grav., has been taken under fir bark in the north and west of Ireland.

Prognatha quadricornis, Lac.—Under bark of moist decaying stumps. Local, and an interesting addition to our list.

Cassida sanguinolenta, F.—Taken in moss, on a gravelly bank between Borris and Goresbridge.

Other species worthy of mention are *Anchomenus puellus*, Dej., found under a felled stump, recently taken on the Cork coast by Mr. H. G. Cuthbert. *Anchomenus angusticollis*, F., occurred in great abundance along river bank. *Aleochara brevipennis*, Grav., rare. *Hister neglectus*, Germ., in flood-refuse; this species seems to be of more frequent occurrence in Ireland than the common English *H. carbonarius*, Tel. *Melanotes rufipes*, Herbst., dug out of decayed ash. *Barypeithes sulcifrons*, Boh., in moss, and *Eubrychius velatus*, Beck., in flood-refuse.

The following species were recorded by Dr. A. W. Foot, in the paper referred to above:—

Chlœnius vestitus.	*Coccinella x-punctata.*	*Aphthona nonstriata.*
Sphœridium scarabœoides.	*Halyzia xiv-guttata.*	*Meloë proscarabœus.*
Silpha rugosa.	*H. conglobata.*	*Apion miniatum.*

THE LATE A. G. MORE.

Many friends of the late eminent Naturalist, Alexander G. More, wish to see a short memoir of him published. Any one having letters or papers of interest would greatly oblige by lending them for selection to his sister,

MISS MORE,
74, Leinster-road, Dublin.

November, 1895.

SOME WAIFS AND STRAYS OF THE CORK FLORA.

BY R. A. PHILLIPS.

In the following paper I have brought together a few notes selected from observations made during several years past on some of the more interesting plants found growing in the County Cork. My chief object in so doing has been to record the rediscovery, and verify the existence, of several species, some of which were long ago discovered by the earlier Cork botanists and recorded in Dr. Power's flora,[1] but, which having become extinct or lost sight of for a time in their original stations, were excluded from the later floras.[2]

Such are *Carduus nutans*, and *Hordeum pratense*, noted by Rev. T. Allin as "probably extinct;" *Rumex pulcher*, certainly extinct in its former station; and *Hypericum hircinum* and *Hordeum murinum*, hitherto admitted only as casuals, but still flourishing in several districts.

I have also mentioned additional localities for, or extended to a new district, a few of our rarer plants which have previously been recorded from one or two stations only, and have added remarks on one or two species whose continued existence might be considered precarious.

Papaver hybridum, L.—Recorded by Dr. Power from Little Island, very sparingly, in 1841; still continues to hold its ground in this station, though it has not apparently increased, as in last August I found it at the same place in small quantity amid abundance of its near relations, *P. Argemone* and *P. dubium*.

Arabis hirsuta, R. Br.—The only habitat of this species near Cork city was, I regret to say, recently destroyed, the old wall at Vosterberg, on which it was first found by the late Mr. T. Wright, having been taken down and rebuilt early this year.

Armoracia rusticana, Rupp.—This is now one of the most abundant and conspicuous plants on a stretch of waste ground extending for about two miles between Tivoli and Glanmire.

Diplotaxis muralis, DC.—Recorded by Mr. Alexander as occurring near the Lower Glanmire Road previous to 1833, but disallowed by the later botanists, who considered it an error. During the past summer I have found it sparingly in one or two places on the railway embankment in the same locality.

Lepidium latifolium, L.—Still plentiful at Cork Beg, where it has held its own since Dr. Smith recorded it 125 years ago, and is now apparently spreading along the causeway which joins that island with the mainland. It is also still to be had at Rev. T. Allin's station near Kinsale.

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[1] "Fauna and Flora of Co. Cork." 1845.

[2] "Cybele Hibernica," 1866; and "Flowering Plants and Ferns of Co. Cork," by Rev. T. Allin, 1883.

Crambe maritima, L.—A few plants of this species have been flourishing for several years past on the river-bank between Tivoli and Dunkettle.

Viola canina, L.—In May, 1893, I found this plant sparingly in Templemichael Glen. This is its second station in the county.

Silene gallica, L.—In a cornfield near Whitegate in September last. This was the typical large-flowered form.

Hypericum hircinum, L.—This certainly deserves a place among our naturalized exotics as, in several of the localities in which it occurs it is thoroughly established. At Glanmire and Eastferry it is abundant and spreading from walls to roadsides, rocks, and banks.

H. calycinum, L.—One of the finest floral sights to be seen in the county is at Eastferry early in July, when the roadsides and broad banks of the Ballinacurra river are covered for a mile or more with profusion of this handsome plant in bloom. It is thoroughly naturalised in many localities.

Geranium pratense, L.—Abundant on a rather mountainous road leading from Clonakilty to Rathbarry, and in fields in the same vicinity, August, 1889 and 1890. To find this showy plant in plenty in the South of Ireland was quite an event in my botanical experience, but whether it is native or naturalised I cannot now decide, as, though I could not find traces of its former cultivation, it is hard to understand how so conspicuous a plant, if it were native, should have escaped the notice of the older botanists.

Medicago maculata, Sibth.—Still at Little Island, where it was discovered for the first time in Ireland, in 1840, by D. Murray. Plentiful in several places on the banks of the river near Eastferry. In the latter locality this plant is regarded by some of the natives as the "true shamrock," the dark spots on its leaves being said to have originated when St. Patrick touched them with his fingers while illustrating the doctrine of the Holy Trinity.

Lepigonum rubrum, Fries.—In September, 1894, I found this plant, hitherto recorded only from near Kilcoleman, in some plenty on waste ground near the Marina, Cork, where it was probably introduced.

Sedum album, L.—In addition to its other stations this species is abundant and well established on walls and the railway embankment between Cork and Glanmire. I also found it on a wall at Glengariffe, in August, 1894.

Saxifraga umbrosa, L.—The Rev. T. Allin omits this species, possibly through an oversight, from his eastern division of the county, but it still exists, though not plentifully, on rocks at Inniscarra, where it was first found by Drummond.

Galium erectum, Huds.—This interesting species of "Germanic" type, recorded by Rev. T. Allin from near Midleton, is abundant also in the extensive pastures at Trabolgan and Roche's Point near the mouth of Cork Harbour. This plant, so often sown with grass seeds, can scarcely be regarded with certainty as a native of Ireland.

Dipsacus sylvestris, L.—"One plant at Berehaven." Writing in 1883, Allin thus records this species for his western division. Visiting Berehaven in 1894, I also found one plant only. But in 1890 I found it plentiful in the same division at about half-way between Clonakilty and the Island.

Carduus nutans, L.—This rare and handsome plant was recorded from Little Island by Drummond in the beginning of the present century, but in Allin's flora it is stated that it had not been seen since 1853, and was probably extinct, the other recorded locality (Berehaven) being looked on as an error. I have, therefore, much satisfaction in giving it once again a place on our county list, having rediscovered it at

Little Island, where in one spot I counted last August over fifty plants, besides individuals on other parts of the island. I also found it the following month in a new station, namely, Poorhead, on the south coast of the county, where it is fairly plentiful in cultivated fields and on cliffs.

Hieracium murorum, L.—In July last I gathered specimens of this at Fota. This is, I think, its second station in the south of Ireland.

Convolvulus Soldanella, L.—Stated by Allin to be "probably extinct" at Ballycotton, the only station then known for it in his eastern division of the county. In 1891 I found it plentiful on the strand near Youghal, thus restoring it once more to a place on the list for that division. I also found it abundant on a strand about two miles east of Lough Hyne in 1889.

Linaria minor, Desf.—This is now abundant along the railways from Cork to Queenstown and Youghal, and also in a gravel pit at Midleton.

Erinus alpinus, L.—This interesting and pretty South European plant seems well suited to our climate, the tops of many old walls in the suburbs of Cork being rendered quite dazzling in the early part of June by its bright rose-coloured flowers. At Blackrock, Douglas, and Victoria Cross, all limestone districts several miles apart, it is spreading rapidly and has made itself quite as much at home as its congener *Linaria Cymbalaria.*

Salvia Verbenaca, L.—Clay Castle, Youghal. Allin notes this, its earliest station, as "probably destroyed," but I have gathered it there nearly every summer since 1891. In 1890 I found it plentiful on roadsides near Ardfield, Clonakilty.

Rumex pulcher, L.—The Fiddle Dock, so very scarce in Ireland, has long been denied a place in the Cork flora, it having become extinct in its reputed station (Friar's Walk, Cork) long before the publication of "Cybele Hibernica," but I have now no hesitation in placing it on the list once more, this time on better evidence, having found it in the neighbourhood of Whitegate, Cork Harbour, where I have watched it closely for the past two summers. In 1894 I first noticed it growing on an uncultivated portion of Cork Beg Island and also, one plant, by a roadside nearly two miles away. This year I searched more carefully and found it plentiful among the grass and bracken in different places at Cork Beg, and several fine specimens in a third station on the roadside between Whitegate and Fort Carlisle. I described the habitat to the late Mr. A. G. More last year, but he then stated that he did not think the plant was indigenous anywhere in Ireland, so that although it is perfectly well established and appears quite at home in the above-mentioned localities we must still regard it as a doubtful native.

Milium effusum, L.—In 1890 I found this rare grass in the woods at Castlefreke, thus making a new record for Allin's western division. This year I obtained good specimens in a new locality, *i.e.* Lota Wood, Glanmire, where it luxuriates in company with *Festuca sylvatica* and *Carex pendula.*

Kœleria cristata, Pers.—Another of our rarest grasses. Sparingly on Cork Beg Island, 1894. This is its third recorded station in the county.

Glyceria aquatica, Sm.—Still continues to hold its own in a stream running into the Lee near Cork.

Bromus secalinus, L.—Plentiful in a cornfield at Castlefreke, August, 1890. New to West Cork.

Hordeum pratense, Huds.—Recorded by Dr. Power from three localities near Cork, but noted by Allin as "perhaps extinct in all." In 1890 I rediscovered it in one of these stations, a marsh at the Little Island Bridge, and every year since have seen it at the same place. I have also gathered it in a similar habitat at the Blackrock end of Cork Park.

H. murinum, L.—Admitted by Allin as a casual only, is still abundant on rocks at Haulbowline, where it was first noticed by the late Mr. J. Sullivan, and is also plentiful at Fort Carlisle, Cork Harbour, where I found it three years ago.

AN ADDITION TO THE IRISH MOLLUSCAN FAUNA.

BY R. F. SCHARFF, PH.D.

TOWARDS the end of last year, Dr. Westerlund described in the *Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft* (26ter Jahrg., 1894, p. 205), a new species of *Pisidium* from Ireland which he named *Pisidium hibernicum*.

As no figure is given with the description, I herewith add an outline sketch (three times natural size) of the shell, so as to facilitate future diagnosis. I may mention that I discovered the species during the summer of 1893, in a small mountain tarn known by the name of Lough Nagarriva, about 1,200 feet above Glengariff, in the County Cork, and sent it to Dr. Westerlund for identification. The shell is thin, of a yellowish green colour, and remarkably ventricose, so much so that its breadth is equal to its height. It resembles *Pisidium obtusale*, but is much more globular. Not only is it equal in breadth and in height, but also in length (see figures).

The following is Dr. Westerlund's description :—

Pisidium (Fossarina) hibernicum.—C. supra medium ventricosissima, lateribus leviter convexis regulariter ad marginem inferum declivis, truncato-ovata, ubique sulcato-striata, marginibus omnibus regulariter arcuatis, parte posteriore brevissima, anteriore duplo longiore, ad margines compressa, sed obtusissima ; umbones validi, lati, tumido-rotundati, prominentes. Long. $3\frac{1}{2}$, rect. $3\frac{1}{2}$, cr. $3\frac{1}{2}$ mm.

MY BIRDS.

BY REV. THOMAS B. GIBSON, M.A.

(*Concluded from page* 313.)

The Greenfinch is quite hardy; and the cock is undoubtedly ornamental, though his plumage does not improve in the aviary; but the melancholy note, and the other indicative of fright, are the only tones to which I am accustomed. The bird is not easily made *quite* tame, though an approach towards that state can be obtained with all of them. No bird is more easily obtained in Dublin; and a price of three-pence, for the very best plumaged bird, is so small that one need never worry about losing a bird; though, to be sure, a real bird-lover laments the loss of a cheap pet almost as much as he does that of a dear one. This bird is called—on account of its price I suppose—the "penny bird" by little boys in Dublin; and hens, at least, can easily be obtained at that rate. It, and the Bullfinch, are particularly fond of a branch in bud. This latter bird is a prime favourite with me; and the pair I possess could hardly be tamer. They have built a nest, hatched and brought out young; but the young died when only two or three days old, and the old ones have not nested this spring. The nest was loosely made, after the usual style, some of the hairs having been obtained by the cock out of my beard, after strenuous exertions. The hen—but not the cock, singularly enough—can pipe a few bars of "Pop goes the weasel"; but I have never been able to teach any other tune—a circumstance due, I fear, to the incapacity of the teacher rather than the taught. The Bullfinch is fond of water; and usually disputes with the Brambling for first place at the bath, though he never plunges in or rolls about in the thorough-going way the latter does. Moulting-time is very serious in regard to the health of the Bullfinch--especially with the hen, which appears to lose almost all its feathers at once—but perhaps the impossibility of keeping the birds away from the hemp, in an aviary, may account for this. I have for about a year or so, kept a good many Crossbills; but I am sorry to say only two survive now. One of these is very red in colour, being, I suppose, a year-old bird, while the other is yellowish and sings continuously. It must therefore, I suppose, be an older bird. At first, when I learned that

the wine-red colour was not the perfect plumage, I could hardly believe it; but apparently the superior power of song in the yellowish fellow bears out the contention. As to the song I cannot agree with those who describe it as "harsh," "unmelodious," or "twittering." I like the song very much; and I like the singer, too, who likes particularly to pour out his song whilst I am in the aviary, at a time when other birds, except the Siskin, restrain their notes. The bird is a delicate one; or perhaps it may be that the food I can give is not sufficiently varied. It eats hemp-seed very voraciously; and thoroughly enjoys apple-pips and berries, when I can get them. The Hawfinch is like the Crossbill in its dietary tastes; but very unlike in other particulars. I have had three for nearly a year, a fourth having died soon after purchase. Both Crossbills and Hawfinches were obtained from England, though, I believe, visitors of both kinds have been observed in Ireland, even so near Dublin as the Phoenix Park. Of the habits of the Hawfinch I can tell little, as the only habit I have observed, for so far in it, is that of endeavouring to get as far away from me as possible whenever I enter the aviary. It is, however, a beautiful bird, though stumpy-looking on account of its thick beak and short tail. The notes, too, that issue from this formidable beak are ludicrously weak. It is said to be easily tamed, but dangerous to its companions—though I have never noticed either of those traits in my specimens. It has a short quick call-note which is often heard; but its song is only a sharp twittering. The colour of the eyes is most peculiar.

The Buntings are satisfactory occupants of an aviary, especially the common Yellow Ammer, which is certainly my favourite. The cock is an incessant songster, and after five years captivity his plumage is as bright as ever. He seems to know no care or sorrow, and there are not many birds in my aviary I prize before him, though sixpence was the amount of his purchase-money. The hen is very quiet, and not nearly so tame as her partner. I have a pair of Corn-Buntings for nearly five years, yet they are still very wild and awkward, nor will they approach either food or water whilst I remain in the aviary. I cannot speak of them as favourites, but I do not agree with those who deny them the gift of song; though the song be neither so sustained, nor sweet and melancholy as that of the Yellow Ammer The Cirl

Bunting, of which I have had a pair, which died last winter, differs little, either in habits or appearance from the Yellow Ammer. It is, however, a more delicate bird in every way—in voice, in appearance, and in health. I obtained my specimens from Devonshire—a journey they bore very well—probably because they do not seem to care much for water, but cold seemed to affect them more than it did any other kind of Bunting. The voice was soft and sweet, but of neither much quantity nor quality to boast of. The Reed Bunting, with its general resemblance to a Sparrow, his black cap, and sprightly habits, is a very interesting bird. He is very fond of water, and visits the bath oftener than any other bird, but he does not bathe so thoroughly as the Brambling, or even as the Yellow Ammer. He sings on into the night, with somewhat hurried, but soft notes, and he has a most harsh disagreeable call whenever disturbed whilst singing. Next to the Yellow Ammer in beauty of plumage comes the Snow Bunting. Of this kind I have got four specimens—two having been obtained from England, and the other two purchased on the street in Dublin. The cock of this latter pair is the most beautiful bird of the kind I have yet seen, and the largest too. The wings and abdomen are pure white, whilst the rest of the plumage is like that of the hen, of a rusty reddish colour. The bird has not got much of a voice, and seems deficient in powers of flight, the hens, though perfectly well, never even flying up to the seed trough, so that I have to scatter food on the boards for them. The cock, too, prefers remaining on the ground, though he does perch when I enter the cage, which the hens never do.

GEOLOGY FOR RAILWAY TRAVELLERS.

Scenery and Geology in County Antrim. By GRENVILLE A. J. COLE, F.G.S.; pp. 19; Belfast: Printed for the Belf. & N. Cos. R. Co., 1895.

THE issue of such a pamphlet as this by an Irish railway company is an encouraging sign of the times, for it shows us that the high interest of the geological structure of north-eastern Ireland is expected to attract not a few travellers. Prof. Cole, in the clear style which our readers know so well, sets forth the main points in the history of Co. Antrim, as told by the rocks, and the tourist who is furnished with this little guide will get truer and higher pleasure from his examination of the scenery than the idle sightseer. We trust that the enterprise of the Northern Counties Railway will be abundantly justified.

STUDIES IN CRITICAL PLANTS.

Botanical Exchange Club of the British Isles: Report for 1894: Manchester, 1895.

Eleventh Annual Report of the Watson Botanical Exchange Club, 1894-95: York, 1895.

THE work of the two British Botanical Exchange Clubs, at first concerned with the greater part of the British flora, is year by year becoming narrowed into a study of critical species and varieties, owing, no doubt, to the filling up of gaps in the herbaria of the members. The latest reports of these Clubs, both of which are edited by Rev. W. R. Linton, M.A., afford interesting food for reflection to both "splitters" and "lumpers" on the vexed question of specific and varietal values. The close scrutiny and careful comparison that is now being made of our critical forms and those of the continent, will surely tend to an understanding of their relative importance, and a general agreement among botanists as to how they are to be treated in systematic works. These Exchange Club reports year by year furnish valuable contributions to our knowledge of plant-distribution, and in this respect the present issues are not behind those that preceded them. Irish plants do not figure very largely, but in the Watson report there is a fair sprinkling of them, thanks chiefly to the energy of Mr. H. C. Levinge. Mr. O'Kelly's find of *Ajuga pyramidalis* at Ballyryan, Co. Clare, furnishes a second station in Ireland for this very rare plant, and is decidedly the most interesting record that catches our eye. The most remarkable feature of the Watson Club's report is the atrocious typographical errors, to which attention has already been called in the *Journal of Botany*. The Irish records have not escaped; and the strange forms that some of the place-names have taken may puzzle some of our readers. "Magheradin," "Ameath," and "Grashill" should evidently read "Magheralin," "Omeath" and "Geashill" respectively. We presume that "Lough Beichan" stands for "Lough Brickland," more correctly "Lough Bricland," and "Castle Taly" for "Castle Taylor" "Ferry Noogan near Scarver" would furnish a pretty puzzle for future botanists, were the plant recorded therefrom of any value. R. Ll. P.

NATURAL SCIENCE IN SCHOOLS.

Thirty-ninth Annual Report of the Newton School Literary and Scientific Association, 1895.

AT the Galway Conference of the Irish Field Club Union a resolution calling for the recognition of Natural Science in Irish Intermediate Schools was unanimously passed. We trust this will bear fruit some day. Meanwhile the Report before us shows that at the Newton School, Waterford, the pupils themselves realise the value of a love for natural objects. We find that work has been done during the year in the practical study of birds, insects, and plants. The Waterford district is highly promising for natural history research, and we look forward with confidence to much good work by this Society. One of its members, H. G. Tempest, was one of the most active naturalists on the Galway excursion and several of his discoveries are here duly chronicled.

CORRESPONDENCE.

Quartz, Quartz-rocks, and Quartzites.

To the Editors of the IRISH NATURALIST.

Mr. Kinahan has been so good as to forward to me my letters addressed to him on this subject, and I will ask you to favour me by printing the whole of my second letter to him, except the two closing paragraphs which deal with other and private matters. The exact bearing of my study of the structures of siliceous sinters on the origin of quartzites, etc., will then be rather more clearly seen,

W. W. WATTS,

28, Jermyn-street, S.W.,
January 10th, 1895.

DEAR Mr. KINAHAN,

I have had three examples of Icelandic sinters cut, and examined them with a view of testing the relationship between them and quartzite. Two out of the three show nothing but irregular layers of deposit which undoubtedly give rise to the cauliflower-like surface of the sinter.

This consists of opaline silica which has very little reaction on polarized light and is consequently utterly different from the crystalline quartz which makes up the bulk of quartzites. Were such a rock broken up and recemented by geyser action it would present similar features. The broken grains would consist of *opaline silica* cemented by similar material, and would be different from any quartzites I know, which show grains of quartz—like sand-grains—which have grown larger by the addition of crystalline silica to their edges.

The third slice, however, shows little nests or pockets full of minute angular sand-grains, chiefly of quartz, but also chips of felspar and other minerals. Here and there these little pockets are embedded amongst the sinter, the rest of which has the character already described. These grains, however, are embedded in, and cemented by opaline silica, quite unlike that of quartzites, and there is no trace of any secondary *quartz*. Nor are the grains in any way enlarged by the deposit of new quartz at their edges, but these edges are either sharply splintered or very slightly rounded; in other words, they are of the form of ordinary clastic sand-grains such as may be seen in almost any fine-grained sandstone.

I do not say, of course, that some sinters may not have structures like quartzites or quartz-rocks, but I have chosen those examples from our collection—not a very large one—which looked to the naked eye most like quartzites and, on slicing them, I find *no* character in them which could possibly suggest that any of the quartzites or quartz-rocks which I know have been made by the same process.

W. W. WATTS.

PROCEEDINGS OF IRISH SOCIETIES.

Royal Zoological Society.

Recent donations include a Cormorant from Captain Boxer; a Golden Pheasant, a Ringed-necked Pheasant, and a number of fish from F. Godden, Esq.; a pair of Canadian Geese, and a Reeve Pheasant from Sir Douglas Brooke; and a pair of Wood Pigeons from K. M. Dunlop, Esq. A large Mandrill, a Chilian Sea Eagle, and two Turkey Vultures have been purchased.

10,350 persons visited the Gardens in October.

Dublin Microscopical Club.

October 17th.—The Club met at Dr. R. F. Scharff's.

Prof. Cole exhibited the petrological microscope elaborated by Mr. Dick in conjunction with Messrs. Swift and Son, of London, an example of which has been purchased for the Geological Laboratory of the Royal College of Science for Ireland. The main feature of the instrument is the rack-and-pinion arrangement, whereby the polariser and analyser can be rotated together or separately while the stage remains fixed. In the older instruments where the stage was rotated between the nicols, there was great difficulty in keeping the centering sufficiently accurate to retain the object in the field when high powers were employed.

Mr. Greenwood Pim showed a curious *Sphæria*, found on rotten wood in considerable abundance at Brackenstown, Co. Dublin, a few weeks previously. It was densely bearded with short white hairs; the perithecia under a low power resembling some furry animal. The asci could be distinctly traced, but the sporidia were not fully developed, so that the identity of the species was a matter of some doubt. It will probably prove to be *S. canescens*.

Prof. Johnson showed *Aglaozonia reptans*, Kütz., a brown alga growing on the calcareous red alga, *Lithothamnion calcareum*, and obtained by dredging in Roundstone Bay in September, 1893. This is the only Irish locality given in Harvey's "Phycologia Britannica." The exhibitor has this year got it in the S.W. of Ireland, on *Lithothamnion agariciforme*, itself an addition to the S.W. A section showing the unilocular sporangia (asexual) was exhibited. The species is well worth a detailed study at the sea-shore, as it is, in all probability, as Reinke first suggested, the asexual creeping generation of a species of which *Cutleria multifida* is the sexual erect generation.

Mr. H. H. Dixon showed preparations of the pollen mother-cells of *Lilium longiflorum*. Before entering on the early stages of karyokinesis the nucleus of these cells possesses a very delicate and complexly coiled nuclear thread. Portions of this thread lie parallel to one another, and in some places these portions present the appearance of a single thread which has undergone longitudinal fission. That this is not the case, however, appears probable from the sudden divarications of these portions from one another and the way in which they often lie across one another, and also from the fact that in later stages the divarications are not so conspicuous. As the thread thickens the parallel portions become more regular in their disposition and finally transverse fission divides it into a number of chromosomes, each composed of two parts lying more or less exactly parallel to one another. Sometimes the two portions of a chromosome form a loop which is possibly derived from a loop in the original thread, and sometimes they are twisted on one another. Thus it appears probable that the doubling of the chromosomes before the formation of the nuclear plate is in this case not due to longitudinal fission of the thread, but to lateral approximation of two portions of it.

At the equator these double chromosomes arrange themselves in such a manner that the plane of division between their two rod-like parts is vertical and not in the equatorial plane. Seen from the poles at this stage they appear triangular, quadrate or ring-shaped. Their two parts are in close contact and seem fused together at their inner extremity, while the outer or peripheral ends are often slightly parted. At the equator each chromosome undergoes a horizontal longitudinal fission beginning from the inner end, so that, seen from the equatorial plane, the chromosome (which was at first of the typically humped form) now appears T-shaped, and the two daughter-chromosomes are formed. As these latter are separating from one another the rod-like arms, which form them, diverge from one another so that a diamond-shaped space is enclosed between the two daughter-chromosomes. As the V-shaped daughter-chromosomes approach the poles, the rod-like arms of the V part asunder from one another and so form twice as many short straight chromosomes as there were in the nuclear plate. From the process described it appears probable that each chromosome in this division represents two of previous divisions which have become more or less completely united end to end. Their double nature is revealed in the mode of origin of the two parallel portions of the chromosomes which exist prior to the formation of the nuclear plate and in the separation of the two parts of the daughter-chromosomes as they approach the poles. From this it would appear that the reduction in number is effected by an end to end fusion of the chromosomes in pairs as Strasburger has already suggested as probable.

The next division to form the pollen-tetrads takes place according to the typical karyokinesis in plant-cells.

Mr. M'ARDLE exhibited a specimen of *Frullania dilatata*, L., which he collected last year near the Baily Lighthouse, Howth, which demonstrated in a marked degree the facility these plants have of reproducing themselves by vegetative budding, or adventitious branching. The specimens under the microscope showed all stages of development of the young plantlets, which were more numerous from the leaf margins, some of which bore six or more fully developed leaves, a strong shoot from one of the bracteolæ showed root hairs. The investigation of this adventitious reproduction in liverworts will account for the continuance in Ireland of plants which have never been known to bear fruit. Mr. M'Ardle quoted as a familiar instance *Jungermania cuneifolia*, Hook, known to grow in the counties of Cork and Kerry for more than half a century and has not been found in fruit, and may probably reproduce itself in this way.

Mr. G. H. CARPENTER showed the springtail *Lipura Wrightii* from Mitchelstown Cave described in the current volume of the *Irish Naturalist* (p. 31).

Dr. M'WEENEY showed parts of the omentum of a rabbit infested with the cysticerci of *Tænia serrata*, Gœze. The special points of interest were the presence of an outer cyst, derived from the peritoneum of the host, and the small, tough, nodular cicatrix at the caudal end of the vesicle. This cicatrix indicates the points of division where the worm-like cysticercus, twenty-two days old, and 1 cm. long, splits into two equal parts, of which the anterior becomes the true cysticercus, whilst the posterior appears to become atrophrid and absorbed. This process takes place in the liver of the rabbit before the parasite migrates into the peritoneum. When the rabbit's entrails are eaten by a dog, the cysticercus develops into the tape-worm, which is 1 metre long and lives in the dog's intestine.

Mr. A. FRANCIS DIXON exhibited two specimens of early human embryos and microscopical photographs of them taken from different aspects. In the youngest specimen the longest diameter of the chorionic sac was a little less than 10 mm. The other specimen was estimated to be in fourth week of development.

PROF. HADDON exhibited some specimens of *Bythotrephes*, a grotesque Water-flea with a long spiny tail, from Upper Lough Erne.

Mr. HENRY J. SEYMOUR showed a section of granite from the "Diamond Rocks," Mourne Mountains, Co. Down, collected on the occasion of the visit of the London Geologists' Association to that district last July. The section showed a well defined micropegmatitic structure, the result of the simultaneous development of the quartz and felspar crystals in the rock. Some parts of the section exhibited very well the radial arrangement round porphyritic crystals of quartz.

BELFAST NATURALISTS' FIELD CLUB.

OCTOBER 22.—The geological section met in the Club's Rooms. As this was the closing meeting of the summer session, during which these monthly meetings were inaugurated, the question of continuing them was discussed, and it was decided to meet on the second Wednesday in each month until further notice. Mr. R. Bell exhibited an interesting collection of Silurian fossils, including some Trilobites which he had obtained at Pomeroy, and Mr. W. J. Fennell exhibited rhyolite from Tardree. Contributions to the Club's collection of geological specimens were made by Miss M. K. Andrews, and Messrs. Leo M. Bell, Robert Bell, and A. G. Wilson.

OCTOBER 26.—The final geological excursion of the season took place to Templepatrick Quarry, about which Mr. M'Henry, M.R.I.A., wrote in the *Geological Magazine* for June. Favoured by brilliant sunshine, several hours were spent in studying and photographing the sections, where the rhyolite is well seen, in conjunction with chalk and basalt, overlain with boulder-clay. Heavy snow showers prevented the party from proceeding to Ballypalady, but a large erratic boulder, relic of the great Ice Age, was appropriately photographed in a snow-covered field.

NOVEMBER 13.—The Geological section met to arrange the exhibits at the Social Meeting as follows:—Miss M. K. Andrews, igneous and metamorphic rocks; Leo M. Bell, graptolites from Donaghadee; R. Bell, Silurian fossils from Pomeroy, Lias fossils from Yorkshire and Island Magee, basaltic dyke at Ballygomartin; J. O. Campbell, quartz crystals; W. Gray, quartz, altered chalk, etc.; W. J. Fennell, fossil plants from Lough Neagh beds, Carboniferous fossils, Armagh; G. M'Lean, gypsum and igneous rocks, Divis; J. Moore, Castlewellan granite, etc.; Miss S. M. Thompson, Carboniferous fossils, Galway, Clare, and Aran Islands; Rhyolites, etc.; Alec G. Wilson, graptolites, Donaghadee; beryl and topaz, Mourne Mountains, zeolites, carboniferous fossils, etc. Specimens of columnar basalt and serpentine from a dyke were presented by R. Bell, and granite from Castlewellan by J. Moore.

NOVEMBER 14.—The thirty-third winter session was inaugurated by a conversazione in the Exhibition Hall, when over 600 members and friends attended. On this occasion the presence of some members of the Dublin Field Club, and the fact that microscopy in all its branches was the chief feature added to the interest. The business of the evening began by the President (Mr. F. W. LOCKWOOD, C.E.) offering a hearty welcome to all present, and more especially to those who had come from Dublin to assist their friends and co-workers in Belfast. This over,

The PRESIDENT said he had a very pleasant duty to perform on that occasion in offering to Mr. WILLIAM GRAY, M.R.I.A., an album of local photos, with an address, as a recognition of the valuable services to the Club which he has rendered for many years. The album and illuminated address were artistically produced by Messrs. Marcus Ward & Co., the photos being by Mr. R. Welch. The President called upon the Secretary to read the address, and the album was then presented to Mr. Gray amidst applause. Mr. Gray briefly replied, saying he would ever value the presentation as another link connecting him with his many friends in the Field Club and Belfast.

One of the finest displays in the hall was the large series of views—antiquarian and scientific—taken by Mr. R. Welch during the past season, more especially those taken in Galway and Connemara on the occasion of the Field Club conference. Each department of the Club was in charge of some one or more members, around whom congregated a group of listeners. At one table Mr. D. M'Ardle and Rev. C. H. Waddell were in charge of mosses and liverworts. Close by, Mr. W. H. Phillips had the whole breadth of the hall covered with nature prints, of British ferns, and a table full of the ferns themselves. Mr. Hamilton's toads afforded interest during the evening, whilst Mr. Gray's method of looking at the time through a beetle's eye brought up a feeling of wonder at such a lowly creature being provided with about 250 perfect lenses, through each of which the watch was visible. Mr. Joseph Wright had, in company with Mr. Welch, a fine collection of foraminifera from Connemara, of which 90 species had been identified. Further on, Mr. Lyster Jameson, of Dublin, had skins of six out of seven known species of Irish bats; also some shrew mice and field mice. Beside him, Mr. Halbert, of Dublin, had an extensive collection of rare insects, collected on the D.N.F.C. excursions during the year; whilst arranged around the central dais were the exhibits of the geological section. The polished blocks of Connemara and Menlough marble looked very well. Mr. R. Bell's trilobites, from Pomeroy, were a surprise to many, being so well preserved; and Mr. M'Lean's blocks of pure white gypsum were very handsome; whilst Miss S. M. Thompson and Mr. W. J. Fennell had both varied and interesting exhibits of rocks and fossils. Mr. Morrissey exhibited a model of the Giant's Causeway.

On the large central table Professor T. Johnson was in charge of a large collection of seaweeds, and showed the best methods of examining them; also a well-mounted series of Alpine plants preserved by Lady Rachel Saunderson. Professor M'Weeney, M.D., of Dublin, at the next table exhibited variously coloured masses in little tubes, which proved to be a series of bacilli. Professor Cole's Tardree rhyolites, illustrated by samples from all the other well-known rhyolites and obsidians, were full of interest, as were the paintings of sea anemones displayed on the walls by Professor A. C. Haddon, of Dublin. Besides these, the following gentlemen exhibited:—Rev. J. Andrew, General Subjects; J. C. Carson, Micros. Apparatus; J. H. Davies, Flax injured by larva of *Eristalis*, with specimens of the insect; W. D. Dorman, M.B., Living Rotifers; W. B. Drummond, Marine Life; W. A. Firth, Diatorus; P. F. Gulbrausen, Pond Life; H. M'Cleery, Hydrozoa and Polyzoa; W. S. M'Kee, Living Fresh Water Organisms; A. Speers, B.Sc., Vegetable Tissues; J. Stetfox, Living Fresh Water Organisms; Wm. Swanston, F.G.S., Echinodermata; and Miss Andrews, Rock Sections. A good exhibit was that of Mr. Alex. G. Wilson, hon. sec., of models of the Aran curragh and pack-saddle, and the primitive style of living in these islands, as exemplified by the raw-hide sandals and the simple form of lamps, one being a scallop shell. Dr. Lorrain Smith and Mrs. Smith had a collection of disease germs, such as diphtheria and scarlet fever, in bottles, and also a "Cambridge" rocking microtome, which was kept busy cutting sections during most of the evening. Dr. Thompson had a number of tests for colour vision and optical illusions in colour—also an ingenious method of measuring small spaces of time, and a pulse-recording instrument. Dr. Cecil Shaw's microtome came in for a good deal of attention. Professor Symington's exhibit was an apparatus for drawing pictures of sections under the microscope.

In addition to the microscopical exhibits there were two series of lantern displays, at 8.30 and 9.30, from photos taken on the Galway and other excursions. The first of these was described by Mr. Gray, and the second by Mr. Fennell, who pointed out the features of the pictures, which were excellently shown by Messrs. Lizars' best lantern. At ten o'clock a short business meeting was held, and seventeen new members elected.

Dublin Naturalists' Field Club.

October 12.—The Club held its last excursion of the year. A party of 23 members and visitors proceeded by the 10.30 train to Malahide, where cars were in readiness to convey them through Swords to Brackenstown, where the extensive grounds of Brackenstown House were entered, by kind permission of D. J. O'Callaghan, D.L. The special object of the excursion was to examine the fungus flora of the neighbourhood, and under the scientific guidance of Greenwood Pim, M.A., and Professor E. J. M'Weeney, M.D., members were soon busily engaged in collecting these lowly plants. The almost complete absence of the larger fungi, such as agarics, was quite remarkable, as this is just the time of year when they usually most abound; but of smaller kinds a rich harvest was obtained. Every rotten twig and log, every decaying leaf, was carefully examined, and the result was a large collection of tiny plants. On the return journey time permitted a short stop at Swords to examine the round tower and other antiquities, and the party then proceeded to Malahide, where tea was provided. After tea a short business meeting was held, Mr. Greenwood Pim in the chair, when the following were elected members of the Club:—Dr. W. A. Dixon, Miss Mabel F. Elliott, B.A.; Charles E. Howlitt, Mrs. Howlitt, and Miss C. Matheson. Mr. Pim subsequently gave a short demonstration on the specimens obtained during the day, and the party returned to town by the 7 o'clock train. A paper by Dr. M'Weeney embodying the results of the day will appear in our January number.

November 5.—The Dublin Naturalists' Field Club inaugurated its tenth winter session with a conversazione. There was a large attendance of the members and their friends, and the interest of the proceedings was enhanced by the presence of representatives of the Field Clubs of Belfast, Cork, and Limerick. Scientific matters chiefly occupied the evening, and a large and varied collection of objects of scientific interest filled the library and lecture hall. The President (G. H. Carpenter) showed the Mitchelstown Cave fauna and also rare insects and spiders taken on the week's excursion, made by the combined Field Clubs of Ireland to Galway and Connemara in July. Indeed, the results of this excursion were visible on every hand; among the exhibits resulting from that expedition being rare beetles (Mr. Halbert), Seaweeds (Professor Johnson and Miss Hensman); Mosses and Liverworts (Mr. M'Ardle): Land Shells (Dr. Scharff), and Flowering plants (Mr. R. Lloyd Praeger).

The Vice-President (Professor Cole) showed natural glass from the volcano of Tardree, Co. Antrim, and also the first sheets of the Geological map of Europe, now in course of publication by the International Geological Congress. Mr. H. K. G. Cuthbert had a case illustrating recent additions to the Irish insect fauna. Mr. A. H. Foord, F.G.S., exhibited a fine series of fossil shells of the Nautilus group, from the Carboniferous limestone of Ireland. Professor Haddon, M.A., had on view an exquisite set of water-colour drawings of sea-anemones, chiefly from the brush of P. H. Gosse. Dr. C. H. Hurst demonstrated with a number of microscopes the metamorphoses of the gnat. Mr. Lyster Jameson showed specimens of Irish bats and other Irish mammals. Mr. A. V. Jennings showed lichens. Dr. M'Weeney demonstrated fungus growth, with specimens of large and of microscopic size. Mr. A. R. Nichols showed marine shells from Baltimore; and another fine series of marine shells was shown by Mrs. Tatlow, who obtained them in three days on Magilligan Strand, Co. Derry. Professor Sollas, F.R.S., had on view maps showing the distribution of esker ridges in Ireland, and also relief maps of Ireland, showing the relation between the elevations of the country on the one hand, and glacial striæ and geological formations on the other. Dr. Creighton, of Ballyshannon, showed a form of tow-net with which he has obtained good results on Lough Erne.

At eight o'clock the President formally opened the meeting. Twice during the evening exhibitions of lantern slides were given. The slides, none of which had been before exhibited, were the work of Messrs. Welch, Gray, and Fennell of Belfast, but especially of the first-named; and they dealt with the scenery, geology, archæology and ethnography of the district visited by the combined clubs during the Galway conference. The slides were described by Professor Haddon, and Messrs. Welch and Praeger. In addition to this contribution from the Belfast Club, three other members of that Society had exhibits. Miss S. M. Thompson showed a characteristic series of clays, scratched stones and erratics, as well as maps and photographs, illustrating the glacial deposits around Belfast. Rev. C. H. Waddell showed flowering plants, mosses, and hepatics of the North of Ireland, and Mr. W. H. Phillips, had on view a magnificent series of nature prints of British ferns, and also a number of growing specimens of rare varieties.

At 9 o'clock the meeting was called to order, while the Secretary read out a list of new members proposed for election; after which the conversazione was resumed.

Armagh Natural History and Philosophical Society.

October 3rd.—Annual meeting of the Society.—The following officers were elected:—President, Rev. W. F. Johnson, M.A., F.E.S.; Hon. Secretary, H. A. Gray, M.D.; Hon. Treasurer, J. Moore; Hon. Librarian, J. Boyd. Committee—R. Gray, F.R.C.P.I.; W. Gallagher, E. Fullerton, A. Gibson, J. Pillow, W. J. Greer, S. Davison, R. H. Dorman, R. Best, F. J. Anderson, W. Whitsitt, J. Bell, and Rev. R. Patterson. The outgoing Committee reported that the debt on the Society had been reduced to £3 10*s.* 2*d.*, which was considered highly satisfactory.

Nov. 11th.—The President gave his Annual Address, taking for his subject, "Injurious Insects." After remarking how little most people realised the power of insects for both benefit and harm, and having given an account of the devastation caused by the larvæ of the Antler Moth (*Charæas graminis*) in Glamorganshire, in 1884, the lecturer proceeded to the main part of his subject. The following insects were noticed:—The Large White Butterfly (*Pieris brassicæ*), the Great Yellow Underwing Moth (*Triphæna pronuba*), the Turnip Flea Beetle (*Phyllotreta nemorum*), the Wireworm and Click Beetles (*Elateridæ*), the Daddy Longlegs (*Tipula oleracea*), the Cockchafer (*Melolontha vulgaris*), the Potato Thrips (*Thrips minutissimus*), and the Wood Wasp (*Sirex gigas*). The lecture was illustrated with lantern slides from drawings by Miss Ormerod. The Rev. H. M. Harper acted as lanternist, and exhibited the slides in an admirable manner. A hearty vote of thanks was accorded to him, on the motion of Mr. A. Gibson, seconded by Mr. J. Bell. In proposing a vote of thanks to the President, Mr. J. H. Fullerton, C.E., alluded to the regret felt by all at his approaching departure from Armagh, and expressed a hope that, though no longer resident in Armagh, he would not sever his connection with the Society. The vote of thanks, which was seconded by Dr. Gray, having been carried by acclamation, the President in his reply said that as the parish of Acton, to which he was going, was not very far from Armagh, he should be happy to continue his connection with the Society, and render any service he could to it.

Cork Naturalists' Field Club.

This Club has had some very interesting excursions during the past session, and a good deal of information has been exchanged amongst the members. The following places have been visited:—

May 11th.—The Lee Valley, to see the old river beds, which are very plainly marked in the district. A field lecture was given by Prof. M. Hartog, M.A., D.Sc.

MAY 25th.—Fota, Mr. Smyth-Barry's demesne, specially noted for its fine collection of pine and fir trees.

JUNE 15th.—Ballyedmund, Midleton.

JULY 10th.—Upton and Innishannon, along the banks of the Bann and Brinny rivers, a district evidently worth further visits by entomologists and botanists.

AUG. 5th.—A good party left by 10.30 train for Buttevant, where cars were in waiting to drive them to Doneraile Court, the seat of Lord Castletown, through whose kindness, and that of his agent, Mr. Godfrey Levinge, J.P., the grounds were shown, and various trees of interest pointed out. Luncheon and tea were served at the Hotel, Doneraile, and, despite heavy showers, a very enjoyable day was spent.

AUG. 24th.—The members visited Warren's Court, by the kind invitation of Sir Augustus Warren, who entertained them to tea. This demesne, combining woodland and lakes, should yield good results to a longer visit in the next session.

SEPT. 7th.—Castlemartyr, Lord Shannon's extensive grounds, was the last place visited, and brought to a close some very pleasant days spent amongst some of the beautiful spots to be found in County Cork.

NOTES.

BOTANY.

PHANEROGAMS.

The Primrose in November.—On Saturday, 9th November, as Mrs. Johnson and I were walking along the road from Armagh to Markethill, we observed a Primrose in flower in the hedge. Further search produced several more flowers and quite a number of buds coming out. It would seem probable that the warm weather of September developed the buds, and the sudden mild weather of this month caused them to burst into bloom. It would be interesting to know whether similar occurrences had been noticed elsewhere.

W. F. JOHNSON,
Armagh.

ZOOLOGY.

Rock-pools of Bundoran.—In one or two of the recent numbers of the *Irish Naturalist*, there has been notice of discoveries made in the rock-pools of Bundoran.

I venture to suggest that any one desirous of following them up should do so at Dooran Point, on the opposite side of Donegal Bay, where the rock-pools are very extensive and full of life. It is, particularly, an old haunt of the Rock-boring Sea Urchin, and may very likely contain other forms of a similar distribution.

Dooran Point, also called "the Eagles' Nest" from an isolated crag, used to be rather inaccessible, but is now to be reached from Dooran Road Station, about two miles away. The nearest quarters are at Mountcharles.

W. F. SINCLAIR,
Chelsea, London.

ARACHNIDA.

Attus floricola, C. Koch.—In the record of spiders collected on the Galway Excursion (p. 256 of this volume), I stated that this rare spider was new to Ireland and recorded as British from Brighton. The Rev. O. P. Cambridge has since kindly examined my specimens and compared them and the Brighton spiders with German types. This has shown that the Lough Corrib species is the true *A. floricola*, C.K., and new to the British Isles, the Brighton spider being referable to the nearly allied form, *A. mancus*, Thorell.

GEO. H. CARPENTER.

INSECTS.

Rose Beetle in Ireland.—As I see the Rose Beetle (*Cetonia aurata*) is put down as rare in Ireland in the September number (p. 262) it may be worth while recording a specimen which was brought me in August, 1889, from the top of Slieve League, Co. Donegal.

B. TOMLIN,
Llandaff.

MOLLUSCA.

Spirula Peronii in Co. Antrim.—I do not think I ever recorded the finding of three specimens of *Spirula Peronii*—dead of course—near Port Ballintrae, in 1893. They came in with a shoal of *Ianthina*.

B. TOMLIN,
Llandaff.

Helix arbustorum near Armagh.—This seems to be a rare shell in Ireland. Dr. Scharff says—(*I. Nat.*, vol. i, p. 107)—that Thompson found it in Co. Antrim and in Co. Down. Mr. W. Kennedy (*I. Nat.*, vol. ii., p. 302), found it at Glencar Waterfall, Co. Leitrim. Mr. Standen (*t. c.* p. 230) got one dead specimen at Portsalon, Co. Donegal. I have the pleasure of recording its occurrence in a new locality, as I found it living near Armagh, last September. This is an interesting addition to the fauna of District 10 in which Armagh is situated.

JAS. N. MILNE,
Londonderry.

Lepton Sykesii, Chaster, in Killala Bay.—I have to record the occurrence of this rare shell in this locality, I may say a new shell on this coast, as it was recorded for the first time, this autumn, from Dog's Bay, Galway. I am indebted to Dr. Chaster, Southport, for its discovery in some shell drift from Bartra Island, I sent him a short time since.

AMY WARREN,
Moy View, Ballina.

Adeorbis Imperspicuus, Monterosato off Roundstone.—This shell is recorded from Roundstone by Dr. Chaster, in the *Journal of Malacology* for September 30th, 1895. The specimens first discovered in British waters were identified as *Cyclostrema millepunctatum*, Friele, but have subsequently been shown to be *Adeorbis imperspicuus*, Monterosata. This shell has been found off the Sicilian coast, and in British waters at Southport and Oban.