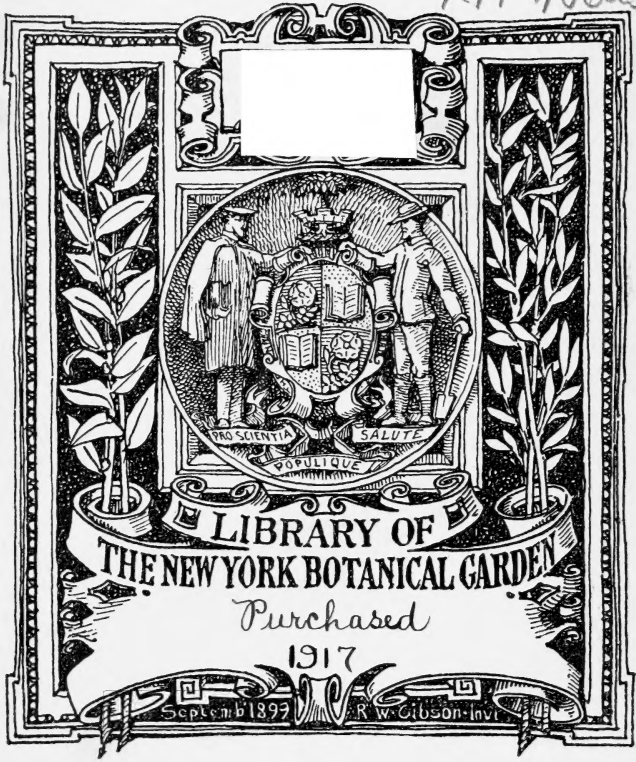
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A QUARTERLY MAGAZINE

WITH WHICH IS INCORPORATED

"The Scottish Naturalist"

EDITED BY

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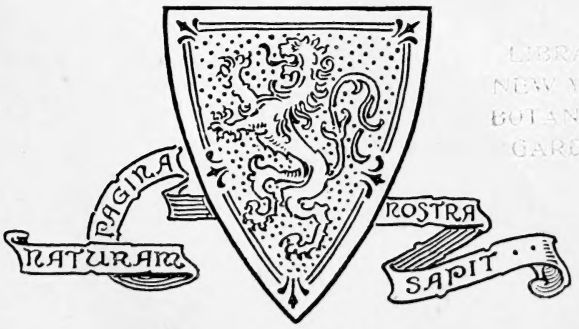

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DAVID DOUGLAS, CASTLE STREET

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PREFACE

THE completion of the first year and volume of the ANNALS OF SCOTTISH NATURAL HISTORY affords the Editors the opportunity of expressing their thanks to their Contributors and Subscribers for the kind reception and support which have been accorded to the Magazine. It is their earnest wish to make the Annals worthily represent the Zoology and Botany of Scotland, and they confidently appeal to all interested in these sciences to continue to aid their efforts by the contribution of Papers and Notes; and by bringing the Magazine under the favourable notice of all Naturalists who are not subscribers. They would remind their friends that all profits will be employed in the direct interests of the Annals.

It is hoped that the attention of the Editors will be called to any omissions that may from time to time be detected in the section devoted to Current Literature.

There has been some difficulty in obtaining *short* Botanical notes during the year; but it is believed that the mere mention of the deficiency will bring about its remedy.

LIST OF PLATES

The Annals of Scottish Natural History

No. 1] 1892 [JANUARY

EDITORIAL

IN this, the first number of "The Annals of Scottish Natural History," a brief statement regarding the important part it is hoped the new magazine will fulfil in furthering the progress of Natural History in Scotland, may not be considered inappropriate.

Limited as our pages must be to original matter relating to the Biology of Scotland, Recent and Fossil, it is evident that they cannot and should not be devoted to general questions relating to minute anatomy and physiology, for such more fitly find a place in Journals and Transactions of less restricted scope. Nor are monographs of a purely systematic nature, dealing with subjects not strictly Scottish, suitable for our Magazine. Yet, despite these restrictions, the field of work is both wide and varied, and there should, indeed, be no lack of Papers and Notes of value and interest to our readers, and ample room for "The Annals" in the serial literature of British Natural History.

In ZOOLOGY there is yet much—very much—to be ascertained regarding the innumerable species of the various Classes of the Invertebrata inhabiting Scotland, and their distribution.

Among the Mammalia—generally supposed to be well-known—we may remark that two species of Bats are included in the Scottish fauna on the strength of single specimens, and one of these was obtained as long ago as 1858. Some of the larger species of Carnivora are becoming very rare, and their occurrence in many districts is well worth placing on record. The visits of the less common Cetaceans and Pinnipeds are also fit subjects for communications to our pages. The life-history of several species of the Micro-Mammalia is still more or less enshrouded in mystery. Among the Birds and Fishes—classes possessed of remarkable powers of locomotion—the occurrence of rare wanderers always affords material for interesting records: while the details of the migratory movements and distribution of many species are desiderata. Much useful work remains to be done towards the elucidation of the life-history of the Fishes.

In BOTANY it is scarcely needful to remind those who have followed the records of the subject in Scotland during the past twenty years, that much has been done in that time towards filling up the many gaps in the census of distribution of both flowering plants and cryptogams. The "Scottish Naturalist," the "Journal of Botany," and the Transactions of the various scientific societies of Scotland, all afford most valuable materials for the completion of a *Topographical Botany* of Scotland. Yet even in this field much remains to be done, especially among the Cryptogams; nor is there reason to fear lest soon there will be no more regions in Scotland to explore, or able botanists to pursue the work with zeal and success.

Not less interesting to the worker, and often more so to the reader, are certain branches of botanical study that have in the past received less notice among us, but which we trust will receive the attention in Scotland that they deserve, and which is given to them on the continent of Europe.

The life-histories of even our commonest wild plants have scarcely been studied here, with respect to their habits

and behaviour under changed conditions, either in the wild state or when cultivated. That relations exist between insects and flowers is familiar to every one as a statement, and some may be more or less familiar with a part of the extensive literature on this subject; but how few such observations are on record from Scotland. A comparison of these relations as observed in Scotland with the records of naturalists in other countries could not fail to be interesting and instructive. The diseases of plants have been investigated by very few workers in Scotland, despite their practical importance, and the light they are certain to shed on the processes of disease in animals and in man. The Galls of Scotland have not by any means been exhausted even as regards their mere enumeration, and their distribution is very imperfectly known: while there is very much to be done in tracing their modes of formation and development.

The Cryptogams, especially the Thallophytes, will long afford material for investigation sufficient to absorb the powers and opportunities of many botanists. The life-histories of the Fungi and their relations to their environments, and to other living beings, can scarcely be said to be fully understood with regard to a single species. The popular names and folklore of plants in the various districts of Scotland deserve to be recorded; if this is not speedily done the opportunity will be lost under the advancing wave of elementary school education.

Communications on such subjects as the above will be welcome; and any information that we can give with regard to subjects of investigation, books, etc., will be most willingly supplied. Queries for information, or for discussion, will be inserted when sent by our readers with that view. There will be a space for brief notes of observations, methods of preparing material for study, and for other topics likely to prove of interest to Botanists.

Papers and notes by specialists will give information with regard to groups or species of plants that should be looked

for in Scotland as reputed to have occurred or as likely to occur in the country.

Of the FOSSIL FORMS, in both Zoology and Botany, many species remain to be discovered; many to be better understood through further investigation.

NEW BOOKS will be noticed or reviewed when they deal with the Natural History of Scotland, or are fitted to facilitate its study, or are necessary and useful to naturalists.

A short bibliography of CURRENT LITERATURE dealing with the Zoology and Botany of Scotland will be given. To render this as complete as possible the kind assistance of our readers is requested.

There now only remains the agreeable duty of offering hearty thanks for the kindly support and goodwill so freely shown by the naturalists of Scotland and England. Such a response is our best encouragement, and augurs well for the undertaking.

THE GREAT SPOTTED WOODPECKER (*PICUS MAJOR*, L.) IN SCOTLAND.

By J. A. HARVIE-BROWN, F.R.S.E., F.Z.S.

A TREATMENT of the phenomena connected with the disappearance of this species seems to us naturally to be divisible under several headings, viz. a consideration of the old and young pine forests of Speyside; the decrease and almost extinction of the squirrel, followed by its rapid resuscitation and enormous increase; and the correlation of these two sets of phenomena, and possibly of others in a minor degree.

This is a subject to which we have given some attention before.[1] But we are still of the opinion that each of the

[1] "The History of the Squirrel in Great Britain" (Macfarlane and Erskine, Edin., 1881). Reprint from *Proc. Roy. Phys. Soc. Edin.*, vol. v. 1880. With map of dispersal, etc. "On the Decrease of the Greater Spotted Woodpecker in Scotland" (*Zoologist*, 1880, pp. 85-89).

headings treated of is, and are, collectively, worthy of the attention of Scottish Naturalists, with a view to greater elaboration of details in each, and in all.

THE WOODPECKER.—Perhaps the oldest record of the presence of Woodpeckers in Scotland referred to quite another species, viz. the Green Woodpecker (*Gecinus viridis*), and at a period when oak forests flourished even to the north of the mainland. It has thus been recorded—and the record has become stale from frequent quotation, but must serve its turn again—by Sir Robert Gordon in "The History of the Earldom of Sutherland," 1630, and in which he speaks of the "lairigigh or knag (which is a foull lyk unto a paroket or parret, and makes place for her nest, with her beck in the oak trie.")

Although specimens of the Green Woodpecker have not lately been recorded and added to our list of Scottish birds there is strong evidence to show that it does occasionally occur in autumn. One bright morning in August 1887, whilst standing at the front of Arden House, Dumbartonshire, I heard what could scarcely be aught else than the cry of the Green Woodpecker. On another occasion the cry was recognised by Mr. John Cordeaux, during a walk to the Tor and old Castle of Torwood, Stirlingshire, on 29th September 1889. The records given by Mr. Robert Gray in his "Birds of the West of Scotland" (pp. 189, 190), appear for the most part reliable.

Selby met with the Great Spotted Woodpecker on the banks of the river Spey, and amid the wild scenery of the Dee, in 1833, or at least recorded the fact in that year. And MacGillivray described birds obtained north of Loch Ness and from Braemar; but whilst speaking of the distribution, does not make it distinctly clear whether he refers to it in summer or winter or both, nor for that part does Selby. MacGillivray wrote in 1840, and the birds he describes were shot in January 1834 and October 1836. But he records it as "resident in the woods [of Dee]"; it occurs but very rarely in all parts of the district, from Banchory to Glen Lui. In Mar Forest and the Invercauld woods, it is less frequent than it was some years ago" ("The Nat. History of Deeside," 1855, p. 395).

The presence of the Woodpecker is spoken of in the following terms by the authors of "The Lays of the Deer-Forest" (vol. ii. p. 258), with special reference to the Forest of Tarnaway—

"The Northern Woodpecker comes to breed in the spring, and remains until the decline of summer. Many of the old dead firs are pierced with its holes, of which it generally has two or three for escape, so that it is very difficult to surprise it on its nest. This beautiful bird is not, we believe, to be seen farther south than the pine-woods of the Spey. It is about the size of a thrush; its wings and body pied with black and white; the head a deep velvet sable, with a snow-white line above and a scarlet mark behind the eyes; the breast of a light colour, turning into crimson towards the tail."

Elsewhere, in the same volume, the authors speak of "the strange mysterious tap of the Northern Woodpecker" (*loc. cit.* p. 255).

The evidence given by Mr. Booth ("Rough Notes," vol. i.), who spent much time amongst the great old pine woods of Spey, and had the best opportunities of research when there, are worth reproducing. He says—

"The remains of the old timber in the valley of the Spey, and in many other parts of Inverness and the adjoining counties, indicate that Woodpeckers were formerly numerous in those districts. . . . On some of the largest and oldest trees I have counted from twenty to thirty holes bored right into the centre of the stem. According to the statements of my informants, it appears that these Woodpeckers commenced to decrease in numbers about 1845 or 1850. In many parts of the country only an occasional straggler was seen for nearly 30 years. I discovered, however, in passing through several of these localities in 1878 and 1879, that a few pairs had lately taken up their quarters in their long-deserted haunts. The cause of their disappearance in the first instance was perfectly unaccountable to all those with whom I conversed on the subject. . . . In the Highlands (though few nests now occupied have come under my observation) I noticed this bird breeding in Scotch fir and birch. Elm and oak appear most frequently resorted to in the more southern counties; but I have also met with broods in several varieties of fruit-trees, as well as willow and fir. The last nest I examined was in a remarkably high Scotch fir in one of the Sussex forests."

Mr. Booth then makes mention of the visitation by a large

flock extending from Dornoch to the south shore of the Dornoch Firth in Sept. 1868.[1]

It is evident, therefore, from Mr. Booth's notes, and also from what is well known to naturalists, that mixed forests of oak and other hard woods and pine are at the present time the chosen haunt of the Great Spotted Woodpecker in England, and also in Continental countries. Nowhere have we ourselves found the Great Spotted Woodpecker, and closely allied forms *P. medius* and *leuconotus*, so abundant as in the ancient oak-woods around Gorgény St. Imry, in Transylvania, or so scarce as in the belt of pine at 3000 feet in the same country, or in the great pine forests of north-eastern Russia and Norway.

There still remain positive assertions of the presence of the Great Spotted Woodpecker as a breeding species, but our own personal opinion agrees with that of the majority, and with the relations of the oldest inhabitant, that it has long been extinct as a breeding species in the old pine woods.[1] Consensus of opinion holds that at least 50 years have elapsed since the bird became extinct as a resident in the pine woods of Speyside and Dulnain. But there are now (1891) many people living, who clearly and accurately remember them as common in certain districts. There is abundance of evidence, patent to the sense of sight, that their former abundance is as undoubted now as it was then: the numerous borings, nesting holes, or "bos" are visible in Speyside forests, as well as in other parts of the north of Scotland, such as Guisachan, in Inverness-shire, where, however, on account of the great fires, few are now to be seen.

Of late years there has been evidence of occasional reappearance of the birds in their old haunts, and of their lingering in them far on into their breeding season. Of their occurrence in autumn and winter in droves, we have many seasons' records. Indeed, all our own records since we began to pay attention to the Vertebrate Fauna of Moray, relate to autumnal migrations of the bird, except one, viz.—On the 15th May 1884, the writer's mother, when driving

[1] Confusion exists in the name and identity of the bird, the Creeper (*Certhia familiaris*) getting the name "Woodpecker" applied to it, usually by the younger generation. We have always been careful about this matter.

between Aberlour and Carron in Strathspey, described to us "a bird about the size of a blackbird which flew across the road near Carron Bridge, and which alighted on the bark of a tree, and began climbing up spirally." She further described it as "spotted with white," and as "having some red about the head," and as having been observed "not more than half the breadth of the road distant."

And it may be worth recording if only to show that some uncertainty still exists as to whether it is really extinct as a nesting species, that the Rev. W. Forsyth, Manse of Abernethy, wrote to Dr. Gordon of Birnie under date of 8th May 1885, as follows :—

> "Woodpeckers are rare now in this locality. I remember when it was otherwise, and have watched them at work. The last that I saw were killed in the Castle Grant woods some forty years ago. But the Great Spotted Woodpecker is not yet extinct. They have been seen occasionally in this neighbourhood, within the last few years, and they have been known to build on the Nethy in the old fir woods within the last two years. There is little doubt they are to be found there still."

Further investigation of this, however, has failed to elicit more exact details, to date. The specimens referred to as occurring in the woods of Castle Grant are also alluded to both by Dr. Gordon and by Mr. Robt. Gray.

The most noted haunts of the bird, and localities always quoted by the natives of Strathspey, were Carnacruinch—once wooded to the summit with old pine—in Rothiemurchus, and the old wood of The Crannich, in Duthil; Castle Grant woods, near Grantown ; Tarnaway on the Findhorn ; and Abernethy generally ; but it must have been widely spread over all the old wooded tracts of Spey and Findhorn, as well as north of the Caledonian Canal. We are not able to trace the complete area of its former distribution in Scotland, but it appears doubtful if it occupied in historic time the forests of Scotland south of "Dee" and "Moray."

There is a current tradition or belief amongst persons now living in Rothiemurchus and Strathspey, that this disappearance of the Woodpecker was sudden ; and some of the older people who recollect the birds will even go so far as to fix the year at 1850 or 1851 ; whilst a few even say

"disappeared in a single night." The last statement we may dismiss as natural exaggeration, caused by an appeal to memory only, of a remarkable and sudden occurrence. Of the more modified concurrence of opinion, stating their disappearance to have taken place comparatively suddenly and about the year 1850, or 1851, there are more witnesses, and we do not feel inclined altogether to dismiss it summarily.

Regarding the more usual and wider statement that the Woodpecker disappeared about forty to fifty years ago, we can, I think, certainly accept it as fairly accurate, and say as between 1841 and 1851: dates which prove of sufficient significance, if compared with the dates of destruction of old wood, at least in Inverness-shire, of which we say more later on, and which also offer a very fair concurrence with the popular opinions given above. We have a statement of a much later date for the Woodpecker actually breeding, within twenty years back, relating to the nesting in the bole of a birch tree, but as yet we have no corroboration, and prefer for the present to withhold details, except that we believe that the statement emanated from the same source as that upon which the Rev. A. Forsyth built his belief.

Of the trees usually occupied by the birds, these have for the most part been found to be, if old, yet of moderate size, the larger ones being too hopeless for the birds to attempt.

This coincides with Lord Tweedmouth's experience, when so many old "white" trees stood within a mile of Guisachan House, previous to 1855: and we may add also, it is borne out by our own observations on Speyside. Sometimes, however, even a horizontally attached branch or limb may be used, as in the case of "The Burnt Firs," at Plodda, near Guisachan, represented in Kilgour's sketch in a volume of original sketches in the possession of Lord Tweedmouth.

Just as statements differ as to the exact dates of the disappearance of the bird, so do opinions differ as to the causes of their decrease and disappearance; and the primary purpose of this paper is to take into consideration the whole pros and cons of the subject, and to endeavour to cast as much light upon the matter as the materials at our disposal enable us to do. The almost universal popular belief that the squirrel is the primary cause, has however to be received

with caution, until others are sought for, as we presently shall proceed to do.

THE FORESTS.—It is not necessary in this place to go into full proof of the wide extent of pine and oak-woods which at one time covered great portions of Scotland, as much has already been recorded in numerous volumes. Suffice it to say as regards Scotland generally, that even at the present day evidence remains of pine and oak in almost all the old peat mosses, and even beyond the limits of the present dry land, submerged remains of forest ground still appear within view, in many parts of Scotland, north, south, east, and west, notably in the Moray Firth, in shallow water, between Findhorn and Burghead in Elgin. Evidence still remains also, high up the slopes of our mountains, here and there, notably in Argyll and Moray: as for instance on Ben Cruachan, and high up the haunches of Ben Muichdhu, Cairngorm, and Glen Guisach; reaching far up Glen Derry of Dee, and Tromie and Feshie of Moray. Evidence, we say, still remains in living giant pines, which are still numerous in the sheltered valleys of Moray, some measuring 16 feet in girth, five feet from the ground. Such are "Porter's Pine" in Abernethy, and "The Queen of the Forest," also in Abernethy, and a pine by the roadside, of the same name as the last, in the old Crannich Wood of Duthil; and many more. The old wood still occupies literally thousands of acres along Speyside, Dulnain, and Findhorn. Remains now are fewer in Guisachan, Inverness-shire, and Glen Affaric, but at this latter locality, it is believed, are the largest existing specimens of individual trees in Scotland, some of which are still in vigorous old age.[1]

Of the gradual decrease at times, and the rapid destruction at others, of the greater part of these extensive forest-tracts, the history is well known, though no perfect

[1] By the kindness of Lord Tweedmouth we have had the great pleasure of inspecting a handsome folio volume of drawings, by Kilgour and Mr. Wilson, of Guisachan, Glen Affaric, and the old pines of the forests there. We give the measurements of two taken from Lord Tweedmouth's notes.

The "Mammoth," blown down in February 1889, measured—

Girth at 1 foot from the ground 19 ft.
,, 3 feet ,, ,, 17 ft. 4 in.
,, 6 ,, ,, ,, 22 ft.

It stood near Plodda on the banks of Garvagh.

chronological account of it has been drawn up—from the decay and formation of our vast peat-mosses, visible in its later stages in still hard roots and trunks. In historic times, as we are informed in Menteith's "Forester's Guide," p. li.—

"For upwards of nineteen miles from beyond Tyndrum to Tyanne on the King's House, through the upper or eastern portion of Glenorchy, where decayed roots of trees, many of them of large size, appear on each side of the road . . . and in banks of the rivers and spreading over all the valleys, hills, moors, and mosses of Scotland. . . . Much of these extensive forests were cut down from various views, chiefly to prevent their affording shelter and rallying points to those who maintained the independence of the country. Also, the pasturing of sheep and want of enclosures where they formerly existed, prevented their reproduction."

Large woods were also cut down and burned by the Danes; and, by the orders of King Robert the Bruce, near Inveraray in later times; and on Speyside and elsewhere, ruthless destruction went on by the York Building Company's operations, until the failure of that undertaking put a stop to it.[1] Besides these causes, fire accidental or premeditated undoubtedly had its share, as there is abundance of evidence to show.

At Guisachan and Strath Affaric we have the direct testimony of one Rory Macdonald, who was an old smuggler, and who was alive in 1880, but is since deceased, that when smuggling was so largely carried on between 1840 and 1860, the smugglers made free use of all the decayed and bored trees, at which the proprietors winked, provided they

"Magog"—Girth at ground 16 feet.

3	feet from	ground	14 ft. 9 in.
6	,,	,,	14 ft. 7 in.
9	,,	,,	15 ft. 3 in.
12	,,	,,	16 ft. 8 in.
15	,,	,,	17 ft.

Cubic contents of the 15 ft. = 210 ft. 11 in.

We have seen also in this collection drawings of "The Burnt Firs," near Garvagh Bridge, in a limb of which are the borings of Woodpeckers; and the "Ospreys' Fir," with the nest on the top. The larger and finer specimens of pine trees are found on the south side of the strath.

[1] By far the best account in detail of the proceedings of the York Company, we believe, will be found in "The York Building Company; a Chapter in Scotch History," by David Murray, M.A., F.S.A. Scot. Glasgow: James Maclehose and Sons, 1883.

left the sound trees alone.[1] In the first volume of the 1st Series of the "Prize Essays and Transactions of the Highland Society," p. 185, it is mentioned that, at that date, 1799, remains of the old forests were "not unfrequent in the upper parts of Argyllshire, and also in the North Highlands, as at Braemar and the head of the River Dee." But on Deeside 80,000 trees are stated to have been swept down, in the neighbourhood of the Linns of Dee. ("The Braemar Highlands," p. 15, by Elizabeth Taylor, Edin., 1873.) The Stuarts give evidence in their "Lays of the Deer Forest" (*loc. cit.* p. 221) of vast stretches of forest growth of firs and oaks in Lochaber and Glen Treig, and in Strathfarrar, "where twelve miles of pine, birch, and oak were burned to *improve* the sheep pasture,"—and in Tarnaway of "aboriginal pines . . . oaks . . . and hollies . . . which latter were not exceeded, perhaps not equalled in Great Britain" (*loc. cit.* p. 257). But we must get on to more recent times. Even at the less remote date of 1864, shortly after the present line of the "Highland Railway" was opened, a large extent of the central plain of the Rothiemurchus Forest underwent complete denudation of its timber-growth, leaving to this day the black and charred stumps of many goodly pines. These were cut to supply demand, and the ground has since been burned, to prepare it, it is hoped, for replanting. Some of the other large areas have been more mercifully, and we think more wisely treated, annual income being secured by annual thinning out; thus at the same time preserving the wooded appearance and beauty of the landscape, and providing for the future crop by native seed, shed by the remaining trees. Such a system is followed throughout the whole area still occupied by old pine-forest on the extensive Speyside estates of the Countess of Seafield, and extending through Glenmore belonging to the Duke of Richmond and Gordon, and to the old wood of The Crannich at Carr-bridge, not to speak of other areas on Findhorn, and others north of the line of the Great Glen.

Of the re-afforesting by younger growth, the history is

[1] This proves *one cause*—by fire alone,—just at a time when the disappearance of the bird is said to have taken place. The said Rory Macdonald gave evidence also that the birds were common previous to 1851. (Compare the dates with those already given.)

also fully known, if not fully told, and within the easy reach of all who are specially interested, and it may be said to have commenced on Speyside towards the end of the last century, the example having been shown by the Duke of Athole in the valley of the Garry, and followed by the proprietors upon Speyside shortly afterwards; and in the beginning of the present century. At the present time the whole valley and minor hill-slopes of Spey may be said to have become re-habilitated in a mantle of pine-wood of various ages. On the Countess of Seafield's properties alone over 40,000,000 of trees have been planted quite in recent years; while, at the same time, many thousands of acres of the older growths have been scientifically conserved; and they are now engaged as of old, in self-regeneration. And there seems little fear at the present day, that any repetition of the old wastefulness of our forests will be permitted.

We have very rapidly, very imperfectly, and without the least attempt to go into detail, thus sketched the history of our pine-woods. Those who are interested will find a great store of unarranged materials in many of our old Chronicles, in the works of Hector Boece, in the histories of the country, in the records of the York Building Company, dating as far back as history takes us, and tradition gives us any indications.

Shortly then we wish to recapitulate, and to point out that even down to the recent date of 1864, the old forests of native pine underwent wholesale destruction; and previous to that date, the restoration of forests by younger wood had commenced on other areas—beginning at the end of the last century, about 1770, on Speyside, and continuing down to the present time, until nearly the whole valley has been again reclothed. And, at the present time, we have shown that whilst large areas of the old pines still exist, especially in Speyside, in the forests of Glenfeshie, Rothiemurchus, and Duthil, Abernethy and Glenmore, Darnaway, Castle Grant, and Altyre, these are also for the most part being conserved. To this we wish to add: old and decaying pines are still being, year by year removed to make way for light and air to the younger generations, and afford relief to those still remaining in vigorous old age. This, it is needless

to point out, is annually reducing the amount of the oldest growth, but the procedure is only consistent with good forestry and the "survival of the fittest." By burning also, as already pointed out, nearly all the old decayed timber around Guisachan was destroyed.

The main points brought out hitherto are first, that vast and very general destruction, or burning of old trees, took place between 1840 and 1860. Lord Tweedmouth relates that "in 1855 there were hundreds and hundreds of white trunks of firs burnt and drying within a mile of Guisachan House" (see previous article *op. cit.* p. 86). Now, in 1891, he tells us "there may be a dozen left between Plodda Fall and Garvagh Bridge." And second, that the Woodpecker, formerly abundant, decreased about the same time, and even somewhat suddenly disappeared from its previous summer haunts. We have now to consider the most popularly believed cause of the bird's disappearance—most popularly entertained, by those now living, who can remember the abundance of the Woodpecker, and at the same time, the almost equally phenomenal and sudden increase of the squirrel. This belief is also entertained by foresters, and head wood-managers, a class of men, who in Scotland generally are known to be men of reading, education, and veracity.

THE SQUIRREL.—We cannot afford space here to do more than simply point out in a very few words the ascertained decline, resuscitation, and increase of this animal in the valley of Spey alone; previsingly that, as elsewhere treated of in considerable detail,

> "The Squirrel is found to have lingered longest where the forest remained longest, and to have revived most rapidly, or spread most rapidly after restoration where forest trees had been planted. . . . Where trees have lingered amidst the Highland glens, they lingered too; and where trees have led them of late years they have reached considerable altitudes," *vide* "The Squirrel in Scotland," p. 165 of reprint.

Nowhere in Scotland are the above remarks more applicable than in the valley of the Spey. About the end of the 18th century a succession of severe winters, culminating in that of 1795, contributed, almost undoubtedly, to the extinction of the Squirrel in many parts of Scotland; and that it did not

become extinct in Speyside seems, almost as certainly, to have been because it was saved just in time by the planting of young trees, affording fresh food and protection. Recent storms—there is abundant evidence to show—had, and still have, direct effect upon our Squirrels, causing them to migrate to warmer or better-wooded areas, where it is possible for them to do so.

Returning now to our old pine forests, which to a large extent replaced another growth of oak and hazel, we can realise with some degree of accuracy that hazel nuts and acorns became rarer and rarer, and also that insect larvæ diminished in the number of species, just as the various species of timber became fewer, and were almost entirely replaced by pine. And we can further realise also, that just as these food-supplies became scarcer and scarcer both for bird and mammal, so would the "struggle for existence" become greater and greater. It must be remembered nearly all the plantations are composed of pine trees only, or of pine and larch. Therefore the food of our Scottish Woodpeckers was thus restricted—or nearly so—to the larvæ of insects, and the insects abounding in pine woods, to the exclusion of others whose food plants and foliage include many hard woods, as well.

There are undoubtedly many who ascribe the disappearance of the Woodpecker entirely to the Squirrel's oophilous, carnivorous, and, we may add, insectivorous propensities. So universal is this belief in Strathspey, and elsewhere north of the Great Caledonian Glen, that it cannot be passed over in silence or treated as imaginary. It is beyond denial that the Squirrel does eat eggs, and rob nests, because he has been seen to do so often; and we know also that he occasionally regales himself upon the larvæ of ants—the food of the Woodpecker—whose hills are so abundant in the pine-woods of Spey. We are afraid there can be no doubt that he occasionally, at all events, regales himself even upon a callow brood of young. In fact, a bad character is now attached to the Squirrel, and the causes of complaint are many. His misdeeds are in every one's mouth, and his name is a bye-word in Strathspey. Foresters cry him down (and hecatombs of Squirrels' bones strew the forest in consequence) and

gamekeepers add too well-founded grounds of complaint against him. In fact, the Squirrel rapidly became an agressive and progressive species, but the Woodpecker yielded before the change of forest circumstances, and became retrograde and finally either died out as a nesting species, or suddenly, as some affirm, disappeared *en masse* and fled the country about the year 1850, making however an endeavour to return again in the summers of 1878 and 1879.

Now it has been stated and reiterated, times without number, that Squirrels can and do enter into the holes made by the Great Spotted Woodpecker ; and this, stated and adhered to by many thoroughly respectable authorities, amongst whom we may again mention those whom we before quoted in our previous article, "Zool." Mar. 1880, pp. 86 and 87. Mr. J. Grant Thompson, the Countess of Seafield's head wood-manager, added, "the fact is perfectly certain," and, with settled emphasis, " I have seen them do it myself." On the other hand, such is by some denied as possible, and they even stoutly doubt if the hole made by a Green Woodpecker (*G. viridis*) would admit a Squirrel. At one time we were inclined to favour this view, but facts are stubborn things, when merely opposed to theories. Take a sharp wire, run it through a Squirrel's body and both shoulder-blades : press down the flesh thus impaled upon the wire : measure the length of the wire concealed in the flesh and bone, and compare with the diameter of an ordinary Great Spotted Woodpecker's nesting hole, and observe the results.[1]

At the present day many of the old nesting holes of the Woodpeckers in the pine trees are occupied by wasps and bees. A specimen cut off a rotten decayed pine-branch showing numerous "borings" and "tappings" of the birds, was procured for me from the forest of Rothiemurchus in the end of the summer of 1891.

[1] That the firm belief exists—it has been suggested—"is possibly owing," says our correspondent, "to a misreading, misidentification or confusion arising out of a passage by Pennant in his 'Caledonian Zoology.'" Pennant says :—"Pine martin. This species is found in pine forests, and takes possession of the holes made by the Woodpecker," and he also says—"Squirrels scarce in Scotland, a few in the woods of Strathspey." Confusion no doubt existed, even then, possibly, in the minds of Pennant's informants ; but Pennant surely should have known that martens could not enter and take possession of the holes made by Woodpeckers.

THE STARLING.—How much the former increase of the Starling, subsequent decrease, and again vast increase, may have affected the Woodpecker, directly or indirectly, is a subject for further investigation. It certainly has been the means of lessening the numbers of the Great Spotted Woodpeckers in certain districts in England. An assertive species like the Starling often may figure forth, when approaching in successive waves of dispersal, as a power for good or evil; but at present I cannot say we have any reliable data to go by; indeed, at the present day, there are few Starlings at all in the midst of the old Woodpecker tracts. But these successive waves of Starlings—about which there appears to be little doubt—are of themselves worthy of tracing out, and cannot fail to yield results.

At present, at all events, we stand at the following points of our inquiry:—

The facts and dates (approximate) of the decrease and disappearance of the Woodpecker from areas indubitably occupied by them commonly previous to 1850.

The facts and dates of the decline, increase, and enormous recuperation of the Squirrel, to a great extent coinciding with the decline of the bird.

The facts and dates of the former abundance, decline, destruction from various causes of old forests, principal amongst which appears to have been fire; and these dates coinciding on the one hand with the young planting, going on down Speyside, and on the other with the decrease of the Woodpecker.

The facts, figures, and dates connected with the young plantations on Speyside, the attaining of the same to a certain age, coincident with the resuscitation of the native Squirrels of Speyside, not to say also with the introductions of Squirrels in various parts of Scotland, from Dalkeith in the south, to Beaufort Castle in the north (see "The Squirrel in Scotland").

ON THE OCCURRENCE OF WILSON'S PETREL (*OCEANITES OCEANICA*, KUHL) IN JURA.

By HENRY EVANS, F.Z.S.

A SPECIMEN of Wilson's Petrel was found alive by the keeper's children at Inner Jura, on the western side of the Island, on the 1st of October last. The bird had become entangled in a net used to keep poultry out of a kitchen garden, and was brought to me in a perfectly fresh condition. Fortunately I was there at the time or it would have been lost. There is no doubt as to the species; the colour of the wings, the length of the tarsus (one and a half inches), and the yellow patches on the webs of the feet, make the identity of the bird certain. The net in which the Petrel was captured is about fifty yards from the sea. Unfortunately the sex of the specimen was not noted, for I did not examine the bird carefully until after it had been skinned by the keeper. The weather was fine at the time of its capture, but there can be little doubt its appearance is to be associated with the heavy gale of the 26th of September.

JURA FOREST, *26th November* 1891.

[In the North Atlantic this bird is very common on the American side; but appears to be a more or less irregular visitor to the shores of Europe. Although it has been noted on several occasions for England, and once, at least, for Ireland, yet this is the first known instance of the occurrence of Wilson's Petrel in Scotland.—W. E. C.]

FRESHWATER FISHES OF THE SOLWAY AREA.

By ROBERT SERVICE.

I HAVE been prompted to prepare the following outline Catalogue of the Freshwater Fishes of the Solway Area by a remark made in the course of a most interesting paper on

the "Fishes of Loch Lomond and its Tributaries," by Mr. A. Brown, in the July issue of the *Scottish Naturalist*. The remark to which I refer is that Mr. Brown "believes we may search Scotland in vain for a similar concourse of species." In one of the water systems of our area—the River Annan, its loch-feeders and tributaries—the number of species Mr. Brown gives for Loch Lomond and tributaries is exceeded, and it is equalled by the Nith and Dee systems. Of Mr. Brown's nineteen Loch Lomond species, the River Annan system holds all except *Coregonus clupeoides*, *Tinca vulgaris*, and *Gastrosteus spinulosus*. That leaves us with sixteen species, but to these fall to be added *Coregonus vandesius*, the Vendace; *Leuciscus cephalus*, the Chub; *Abramis brama*, the Bream; and *Thymallus vulgaris*, the Grayling. These species total up to twenty, but there is no reason why credit should not be taken for some few additional species which in their respective seasons migrate to the fresh water, viz. *Clupea alosa*, the Shad; *Osmerus eperlanus*, the Smelt; *Mugil septentrionalis*, the Lesser Gray Mullet; and *Accipenser sturio*, the Sturgeon.

The Solway Area is that division of the south-west of Scotland stretching from the Esk to Lochryan, as defined by Dr. Buchanan White ("Scot. Nat.," 1872, vol. i. p. 161). As a definite faunistic area it is almost faultless, the only objection I ever heard advanced being that the Esk watershed is altogether "too Tweed-like" in character. But it would be difficult to exclude the Esk valley without making other alterations that would only lead to further objections. The principal river systems are the Esk, Annan, Nith, and Urr, flowing into the Solway Firth; and the Dee, Fleet, and Cree flowing into the Irish Channel. It might be as well to explain that local faunists here look on the Solway Firth as all the water inside a line drawn from Balmae Head in Rerrick to St. Bees in Cumberland. The Solway Area is partitioned off from the rest of Scotland by an extremely natural boundary, consisting of a range of hills which runs right round from the head of Eskdale to the north of Wigtonshire, where it terminates in the well-known Rhinns. The principal river systems take their rise on the southern slopes of the hills that environ the area of "Solway."

Politically the faunal area described includes the entire county of Dumfries, and the two counties of Kirkcudbright and Wigton—the two last named together forming the modern Province of Galloway. With the exception of the Esk and Nith, the river systems are connected with numerous lochs, some of them of considerable size. There are comparatively few places of high angling repute, but many a capital spot is known only to a favoured few, while others again are strictly preserved for private use.

As stated at the outset, the following Catalogue is intended as a mere outline of the subject, and is only a condensed compilation of what I have gleaned casually in matters which hitherto I have not made a special study. But enough is given to show that as compared with other Scottish districts, "Solway" is peculiarly rich in species, and there is little doubt there are one or two additional species to be found yet.

Perca fluviatilis, *Linn.*—The Perch.—Abundant throughout the entire area in almost every loch and in all the rivers. Copland of Collieston is said to have introduced Perch into Loch Ken and adjacent waters in 1750 ("Statistical Acc." p. 193, 1845).

[**Cottus gobio,** *L.*—The Miller's Thumb.—Ought to occur, and doubtless does so, but I have never seen it, nor do I know of any reference to its occurrence here.]

Gobius minutus, *Gm.*—Little Goby.—I have found this species in merse pools of clear fresh water, both on the coast and up the river banks, but it probably requires to be reached by the tide occasionally.

Mugil septentrionalis, *Günth.*—Northern Grey Mullet.—A good many Grey Mullets are annually caught at the mouth of the Dee. The species is also caught inside the entrance to most of the other rivers. Those I have examined have all belonged to this species, but Mr. J. J. Armistead, the well-known pisciculturist, informs me he has seen specimens he considers to be *Mugil capito* (Cuv.)

Gastrosteus aculeatus, *Linn.*—Stickleback.—Everywhere common in suitable localities. In June 1888 I found specimens of this fish spawning amongst seaweeds in a rock pool off the Castle Point at the mouth of the Urr. The pool was only a short distance above low-water mark, and no fresh water except rain could ever enter it. I have not gone into the

question of the so-called varieties or sub-species of this variable species, and have therefore nothing to say about them.

Gastrosteus pungitius, *Linn.*—TEN-SPINED STICKLEBACK.—Quite as widely distributed as the preceding species, but not nearly so numerous in individuals.

[**Gastrosteus spinachia,** *Linn.*—FIFTEEN-SPINED STICKLEBACK.—Some years ago I saw a specimen of this fish taken from fresh water in a Spirling net at the mouth of the Nith. It had probably been left behind on the ebb of the tide.]

Pleuronectes flesus, *Linn.*—THE FLOUNDER.—Very common in all the tidal parts of the rivers, but going up also many miles higher than the tide ever reaches.

Cyprinus carpio, *Linn.*—THE CARP.—In former times this species was kept in the fish ponds attached to the great houses, and it was still to be found in some of these ponds in recent years, and may be so yet.

[**Carassius auratus** (*Linn.*)—GOLD FISH.—It can scarcely be said of this species that it is naturalised, nevertheless it breeds and thrives amazingly in a pond of warm water at the Dumfries Ironworks. There are one or two other places, where, under similar conditions, it has thriven well. Fishes taken from such places and transferred to water of natural temperature rarely live more than a month or two.]

[**Leuciscus idus** (*Linn.*)—THE IDE.—Is merely mentioned to state that Dr. Walker's supposed discovery of this species at the mouth of the Nith ("Stewart's Natural History," i. p. 382, 1817) has never been confirmed.]

Leuciscus rutilus (*Linn.*)—THE ROACH.—Occurs in the Annan system, being especially common in the lochs near Lochmaben. Also in the small river Lochar, and in a small loch in Colvend.

Leuciscus cephalus (*Linn.*)—THE CHUB (Locally "Skelly").—A well-known inhabitant of the Annan waters.

Leuciscus phoxinus (*Linn.*)—THE MINNOW (Locally "Bilter").—Universally distributed.

Tinca vulgaris, *Cuv.*—THE TENCH.—I know this fish as a local species from one spot only—a small loch in Upper Nithsdale. The late Dr. Grierson of Thornhill once showed me skins in his museum from some other locality here, but I unfortunately omitted to take a note of the place at the time, and the information cannot now be obtained.

Abramis brama, *Linn.*—THE BREAM.—Common in the Lochmaben lochs and in some parts of the Annan.

Nemachilus barbatulus (*Linn.*)—The Loach (Locally "Beardie"). —Common and generally distributed.

Clupea alosa, *Linn.* — The Allis Shad (Locally "Rock Herring").—Pretty common about the mouths of the rivers in June.

Salmo salar, *Linn.*—The Salmon.—In value and importance Salmon far outweigh all our other fish interests put together. But the constant flow of law cases arising out of disputes and claims and law-breaking in the Salmon fisheries is a real public scandal, and unsatisfactory to everybody except the lawyers. The late Frank Buckland would have found a very large number of people here to agree with him, if in his famous statement that "more lies have been told about the pike than about any other fish in the world" he had substituted "Salmon" for "pike!"

Some of the modes of Salmon fishing practised in the Solway, such as by the haaf net and shoulder net, are peculiar to the district, and have been in use from time immemorial. The old mode of pursuit on horseback as described in "Redgauntlet" is obsolete, although a few old persons still remember, and are fond of relating stories of, the time when it was in daily operation. "Burning the water" still occurs, but only as a rather rare and very lawless proceeding in some lonely out-of-the-way place.

Solway fishermen always speak of Salmon as "Fish," and almost invariably with a peculiar deferential tone of voice. Thus I asked one on a certain occasion what luck he had this morning? His answer was "A' had twae stanes o' fleuks, a skate, about a dizzen o' herrin, some codlins, and *three Fish!*"

I must not omit to remark that Shaw's almost classic researches on the life-history of the Salmon, which threw so much light on an obscure subject, were made in the upper waters of the Nith.

Salmo fario, *Linn.*—The Trout.—It is most interesting to study out the various types and varieties of Trout to be met with, but the matter need not be entered into in the present connection. Suffice it to say that almost every little stream has its own peculiar variety. A very fine variety, distinguished by pink flesh and large spots, is peculiar to Loch Skene, an isolated mountain loch at an elevation of about 1000 feet at the head of Moffat dale. The Trout of the streams running into Loch Ken are also distinguished by large spots and superior weight, fish up to 10 and 12 lbs. being caught occasionally. The Trout of Lochs Kindar and Lochinvar are extremely like (if they are not identical with) true *S. levenensis.* Trout of similar character are found in Loch Skerrow and also in the small loch at

Jordieland near Kirkcudbright. Tailless Trout are caught occasionally in Loch Enock, and this curious aberration has also occurred in the Nith.

Salmo levenensis, *Walk.* — Loch Leven Trout. — Has been extensively introduced of late years, and specimens are now caught in most of the rivers with tolerable frequency.

Salmo trutta, *Flem.*—Sea Trout.—Abundant, coming up the rivers in successive "runs," which are supposed to be dependent on the state of the weather. The great bulk of the "Hirlings" which, beginning to run in July, continuing to come up in swarms all the autumn months, form so large and fine a proportion of the angler's takes in the Solway rivers, are the young of the Sea Trout. But "Hirlings" are also the younger stages of other races of Salmonidæ, varying to a most wonderful extent in character and types.

Salmo eriox, *Linn.*—The Bull Trout.—Whether this is a distinct species or hybrid, or sterile form, seems to be a vexed question at present. "Bull Trouts" of various types are captured occasionally in the Nith and Annan and more plentifully in the Dee.

[**Salmo ferox,** *Jard.* & *Selb.*—Great Lake Trout.—Very large Trout are now and again caught in Loch Ken and Loch Cree and in some of the smaller lochs, the descriptions of which read very like *S. ferox.* I have never personally examined any of these big Trout. Whether we have the true *ferox* must be left to the future for decision.]

Salmo alpinus, *Linn.*—The Charr.—Found abundantly in Loch Grannoch, and not quite so numerously in Loch Dungeon. My friend Mr. T. R. Bruce, while resident at Slogarie, put a quantity of Loch Grannoch Charr into Lochenbreck some years ago, but it is believed the experiment was not successful. Charr of a type which differs widely from the others are found in Loch Doon, but as that loch belongs to the Ayrshire watershed, we must be content with the mention of the fact. There is an interesting notice of the Grannoch Charr in one of the appendices to Symson's "Galloway" (1684) which runs as follows:—"A Cuddin is a little fish as big as a large trout, short, but thick-bodied; its belly a pure red colour; its taste very sweet; and is only found in a lake called Lake Grenoch, in a very wild moorish place where they abound."

Osmerus eperlanus, *Linn.*—The Smelt.—(Locally "Spirling" and sometimes "Rash" or "Rush-fish" in allusion to the rush-like smell.) Abundant in the Firth, ascending the tidal parts of the Nith, Annan, Urr, and Cree in the winter and spring

months. They are seldom captured nowadays in the rivers proper, owing to the restrictions exacted by the salmon lessees and others, but a tolerably regular fishing for them is carried on in the estuaries. Small meshed nets are not in use in the rivers, owing to the reason mentioned, hence the Spirlings are only caught when the loops of the salmon nets are drawn tight preparatory to the last portion of the nets being lifted from the water. When the Spirlings are present their peculiar scent is quickly detected on the salmon nets.

Coregonus vandesius, *Rich.*—The Vendace.—At one time this species was thought to be confined solely to the Lochmaben lochs, but it is now known to occur across the borders in Windermere and Bassenthwaite. Of late years it was believed to be getting scarce, but a few months ago a draught was taken in the Castle Loch and the Vendace turned out in numbers as of old. It has often been stated that this species is so delicate that it will not bear transport, but this is a mistake, as with care it has been transferred to other waters. But any introductions of this sort have been ultimately quite unsuccessful in naturalising the fish elsewhere. It is popularly supposed that from some reason or other the Vendace breeds only in the Mill Loch, whence the young fry find their way to the Broomhill and Castle Lochs. An odd fish now and then finds its way down to the Annan, but they do not thrive there and soon die. Formerly, two clubs known respectively as the Vendace Club, and St. Magdalene's Vendace Club held each an annual meeting at the lochs, in July or August, when the net was drawn for Vendace, and the fish taken were prepared for the fish dinner which followed in the evening. The St. Magdalene Club was on somewhat democratic lines, and occasionally as many as 2000 people assembled at the annual fishing, and various athletic sports were engaged in after the netting was over for the day. Both clubs have been defunct for many years, and the Vendace have been left to look after their own interests.

Thymallus vulgaris, *Nilss.*—The Grayling.—The late Mr. Shaw of Drumlanrig put 2000 Grayling ova into a stream in the Drumlanrig policies leading into the Nith in the spring of 1857. The following year breeding fish were introduced into the same river by Lord John Scott. Now the species swarms in all suitable localities. A few have been taken in the upper waters of the Annan, but none in the lower reaches. I am unaware when or by whom they were introduced there.

Esox lucius, *Linn.*—The Pike (Locally "Gedd").—In most of the rivers and in nearly every loch. The district has always been

famous for big Pike, and I have a long list of large ones that have been recorded from time to time. First and foremost is the monster taken in Loch Ken towards the end of last century by John Murray, gamekeeper to John, Viscount Kenmure. It is said to have weighed 72 lbs., and, as the old sportsman carried it along for presentation to his master, its head rested on his shoulders, while the tail swept the ground. The skeleton of the head is still preserved in a case in Kenmure Castle, where I have seen it, along with another head of a pike which is very small by comparison, and weighed only 27 lbs. Other local records are—One 32½ lbs. taken 23d April 1813 in the Castle Loch, Lochmaben, by one of the French prisoners of war: one 45 lbs. April 1830, at Hightae; one, 43 lbs., 10 June 1835, Castle Loch; one, 35 lbs., 1834, in Loch Ken, by a boy named Kenna; one, 18¼ lbs., 12th May 1857, Lochrutton, by the late Mr. Boyd; one, 20 lbs., 24th August 1858, Auchencrieff. Of late years the principal captures have been; one in Auchenstroan Loch, 32 lbs., got by breaking the ice, January 1881; two in May 1887 in the Castle Loch, weighing respectively 32 and 35 lbs.; one in Carlinwark Loch, 18th June 1889, 20 lbs.; one in Loch Ken, June 1890, 30 lbs.; and one of 30 lbs. out of a mere farm pond in Kirkpatrick Durham in June 1891.

Anguilla vulgaris, *Flem.*; **A. latirostris,** *Risso.*—Common Eel.—Whether these are distinct species or not may be doubted. Both types are everywhere numerous.

Accipenser sturio, *Linn.*—The Sturgeon.—Almost every year one or more are captured in the estuaries. They are, however, very rare within the actual limits of the rivers. A small one of three feet in length was seen at the Suspension Bridge in the Nith in June 1890.

Petromyzon marinus, *Linn.*—The Sea Lamprey (locally "Ramper Eel").—Comes up the rivers to spawn, and is fairly common.

Petromyzon fluviatilis, *Linn.*—The River Lamprey (locally "Ramper Eel").—Much more abundant than the last.

Note.—The American Charr (*Salmo fontinalis*, Mitch.) has been put into some of the Stewartry rivers, and also in Loch Doon. The American Black Bass was introduced into the Upper Annan by Mr. Smith of Craigielands. Specimens of both these species have been caught since their introduction, but sufficient time has not elapsed to pronounce their naturalisation a success.

ON *ANARRHICHAS MINOR*, OLAFSEN, AND ITS OCCURRENCE ON THE ABERDEENSHIRE COAST.

By MORRIS YOUNG, F.E.S., Curator of the Free Museum, Paisley; and WILLIAM EAGLE CLARKE, F.L.S.

PLATE I.

THE specimen figured was captured in a trawl off Aberdeen on or about the 17th of October last, and was sent to the Glasgow market for sale. Here it came under the notice of Mr. Robert Beith, who purchased and presented it to the Paisley Museum, where it is now on exhibition as a mounted specimen.

The fish was a female and contained about a cupful of ova. It weighed 26 pounds and was 49 inches in length. The fin-ray formula is as follows:—D. 74; C. 16; A. 45; P. 20. Canine teeth: five in the outer and inner rows of the upper jaw; and seven in the outer and inner rows of the under jaw. There are now eight, but have been ten, teeth on the Vomer. The teeth generally are weaker than those in other specimens of *Anarrhichas lupus* in the Paisley Museum. When in the flesh the general colour of the fish was light tan, and the spots black. The transverse bands characteristic of *A. lupus* are absent, for the slightly darker shading here and there on the sides can scarcely be considered to represent them. I have searched the works of Yarrell and Day, and other books on Ichthyology, without finding any description of such a form of the British Wolf-fish; and I think it is a distinct species for the following reasons:—

1. The spots are so large, dark, and conspicuous, while in *A. lupus* they are not at all so.
2. There are no signs of the distinct bands characteristic of *A. lupus*.
3. The teeth are generally weaker, and the canines do not project nearly so much as in *A. lupus*.
4. The head is much more strongly formed than in the specimens of *A. lupus* I have seen.
5. The head is connected to the body in a much more graceful manner than in *A. lupus*.

M. Y.

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R. Mintern lith. Mintern Bros. imp.

ANARRHICHAS MINOR. *Olafs.*

In the year 1875 Professor Steenstrup, who has made the genus *Anarrhichas* a special study, contributed [1] an important and, it may be added, much-needed paper on the subject, in which he recognises three species as inhabiting the Atlantic Ocean, namely :—

A. lupus, *L.* (= *A. strigosus*, Gm., and *A. vomerinus*, Agass.)—Thus diagnosed: dusky or ashy, with from nine to twelve darker transverse bars, and small spots irregularly dispersed; teeth very strong, the vomerine series being much longer than the palatine series; fin rays—D. 75, A. 45. Range—Shores of the Atlantic Ocean, and Arctic Europe and Greenland.

A. minor, *Olafs.* (= *A. pantherina*, Zouiew; *A. maculatus*, Bloch; *A. eggerti*, Stp.; *American variety* of *A. lupus*, Günther, "Cat. Fishes," iii. p. 209).—Dark ashy; the whole body, especially the back, covered with large round dark spots; transverse bars are wanting; teeth not so strong as in *A. lupus*, the palatine series and the vomerine series about the same length; fin rays —D. 77, A. 45. Range—Shores of Iceland, Western Greenland, Finmark, North Russia.[2]

A. latifrons, *Steenstrup.*—Not a well-known fish. Colours probably uniform, and perhaps marked with ill-defined spots; teeth, less strong and much smaller and more attenuated than in either of the former species, the palatine series of teeth narrower posteriorly and much longer than the vomerine; fin rays—D. 79, A. 45. Range—Shores of Iceland and Western Greenland.

In addition to the characters alluded to in the above diagnoses, Professor Steenstrup bases his conclusions relating to these species upon important cranial peculiarities which he describes and figures.

It is not quite clear in what light Professor Steenstrup regards *A. denticulatus*, Kröyer, from Western Greenland; of which there is a specimen in the British Museum ("Brit. Mus. Cat. Fishes," iii. p. 211). Dr. Günther, in his useful "Study of Fishes" (1880), unfortunately does not

[1] NOGET OM SLÆGTEN SØULV (*Anarrhichas*) OG DENS NORDISKE ARTER AF, Professor Japetus Steenstrup. (Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjöbenhavn, 1876, pp. 159-202, Tab. iii.)

[2] Prof. Steenstrup ("Vid. Medd." 1878, pp. 109-113) identifies *A. leopardus*, Agass. ("Spix. Pisc. Bras.," p. 92, 1829), with *A. minor*, which implies an extension of the range of this species as far south as Brazil.

afford us any information regarding this evidently rare form. It is important to note, however, that he recognises three species of *Anarrhichas* for the Atlantic, though he only alludes to *A. lupus* by name.

Dr. Day in his "British and Irish Fishes" (1880-1884, i. pp. 195-197) evidently ignores this work of Professor Steenstrup's. He was certainly cognisant of it, because he refers to it in his synonomy of *A. lupus*, but not otherwise. This is both surprising and disappointing, because, even if our author was not prepared to accept the conclusions arrived at by Professor Steenstrup, he at least ought to have described the forms or varieties of *A. lupus* covered by his bibliographical references. But though he includes among the synonyms of our common Wolf-fish such suggestive appellations as *A. pantherinus* and *A. maculatus*, yet he tells us absolutely nothing about the form to which these names actually refer.

Regarding the identity of the interesting Scottish specimen under consideration, it is to be noted that in all the essential particulars furnished by Mr. Young's description the fish agrees in quite a marked manner with *A. minor*. Thus the large dark spots, the absence of transverse bars, and the comparatively smaller teeth, all point unmistakably to that species. But to these characters, which chiefly relate to the external appearance of the specimen, I am able to add others. Mr. Young has kindly sent me an excellent impress, in gutta-percha, of the palatal series of teeth—which, along with the cranial characters, furnish the most important evidence of identity. This impress decides, it is thought, the specific identification of the fish, since it clearly shows the palatine and vomerine series of teeth to be as nearly as possible of equal length, agreeing with Professor Steenstrup's description and figure of the dentition of *A. minor*. I may also add that I counted the impress of ten and eleven teeth in the respective palatine series. Mr. Young's remarks on the more massive appearance of the head, as compared with that of the Common Wolf-fish, are also of importance. Here, again, we have a characteristic feature of *A. minor*, in which the cranium is broader than in *A. lupus* by reason of the frontal bones being more expanded. I

ought to remark that Mr. Young has not, I believe, seen Professor Steenstrup's paper, and thus his critical remarks upon the specimen under his charge are the more valuable.

In conclusion, I consider that only one deduction, as to specific identity, can be drawn from the significant combination of characters possessed by this Scottish Wolf-fish, namely, that it is the *Anarrhichas minor* of Eggert Olafsen ("Reise i Island," 1772, p. 592)—a new and interesting addition to the British fauna.

The Plate is an accurate reproduction in lithography of a photograph taken of the fish when in the flesh.

W. E. C.

NOTE ON AN ABNORMALLY DEVELOPED THORNBACK (*RAIA CLAVATA*, L.)

By R. H. Traquair, M.D., F.R.S.
Keeper of the Natural History Collections, Museum of Science and Art, Edinburgh.

A few weeks ago Mr. Charles Muirhead presented to the Museum of Science and Art a specimen of a Ray caught thirty miles east of the Isle of May, which seemed to him to be somewhat peculiar in its appearance. The form, colouring, dermal armature, and dentition of this Ray (see Fig. 1) show clearly that it is a Thornback (*Raia clavata*, L.), though the large thorns are not so abundant on it as we often see them on other and more especially on larger specimens. The fish is a female; its entire length is $22\frac{1}{4}$ inches, its greatest width 15 inches. In front and on each side of the snout there is an angular notch which is deeper on the left than on the right side, and consequently the anterior aspect of the fish appears as if divided into three points, one median and two lateral.

Of course it is evident at the first glance that this malformation is conditioned by the non-adherence to the sides of the head of the anterior extremities of the pectoral fins, which consequently project freely on either side of the snout. A similar case, also in a Thornback, is figured by Day, "British

Fishes," vol ii. Pl. CLXXI. Fig. 2; and the extraordinary monstrosity in the same species figured in the third edition of Yarrell's "British Fishes," vol. ii. p. 584, seems to be of the same nature, though in addition the pectoral fins are deformed in their shape. This condition in a Ray offers a certain amount of analogy to those well-known instances of Turbots and Flounders, in which the anterior extremity of the *dorsal*

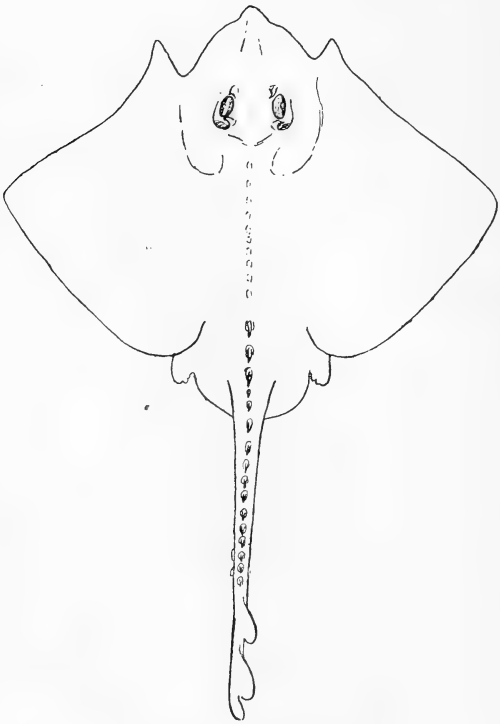


FIG. I.

fin also projects forward as a free pointed process instead of being tied down to the top of the head. In these Pleuronectids, however, this state of the dorsal fin is always determined by an arrestment, to a greater or lesser degree, of the movement of the upper eye from the blind to the ocular side of the head, but it is difficult to conceive of any cause which might underly the non-adherence of the extremities of the pectorals in these abnormal Thornbacks.

LIST OF THE TYPE AND FIGURED SPECIMENS IN THE "POWRIE COLLECTION" OF FOSSILS.

By R. H. Traquair, M.D., F.R.S.,
Keeper of the Natural History Collections, Museum of Science and Art, Edinburgh.

Those who are interested in Scottish Geology and Palæontology will likewise be interested to learn that the important collection of fossils formed by Mr. Powrie of Reswallie has recently been acquired by the Edinburgh Museum of Science and Art.

This collection, principally illustrative of the palæontology of the Forfarshire Old Red Sandstone, may be termed a historical one. At the time of completion of Agassiz's great works, very little was known about the fossils of Forfarshire, and it was not till years afterwards that the researches of local collectors, notably Mr. Powrie, Rev. H. Mitchell, Rev. H. Brewster, and Mr. M'Nicol, showed that the Old Red of this county possessed a fauna of interest and importance beyond what had been previously supposed.

The special importance of the Forfarshire collection brought together by Mr. Powrie lies in its containing so many specimens which have been described and figured in the works of Page, Egerton, H. Woodward, Ray Lankester, and of Mr. Powrie himself. For he has worked not merely with his hammer as a collector, but also with his pen as an original contributor to scientific knowledge. Mr. Powrie also, many years ago, purchased a large portion of the collection of the late Mr. Patrick Duff of Elgin, and thus added to his cabinet a series of fossils from another region of Scotland, namely the country lying along the southern shore of the Moray Firth. Among these is a small but interesting selection of the fragmentary fish-remains from the Upper Old Red of Scat Craig, which contains many of the original specimens figured by Mr. Duff in his "Geology of Morayshire" (Elgin, 1842), as well as by Agassiz in his "Poissons Fossiles du vieux grès rouge." Here we find, in addition, the original example of Mantell's *Telerpeton Elginense* from the reptiliferous sandstone of Lossiemouth. All geologists remember that

this was long considered as a reptile of the Old Red Sandstone period, though the affinities of the ever increasing series of reptilian remains which have been since discovered in these beds have in recent times determined their age to be, in all probability, Triassic.

One carboniferous fossil, or rather pair of fossils, in the Powrie collection is also worthy of notice, namely two of the original specimens of *Eurypterus Scouleri*, from Kirkton near Bathgate, figured by Hibbert in 1835 in his celebrated "Memoir on the Burdiehouse Limestone." I am not aware of any specimens of this remarkable creature having been found since Hibbert's time.

As all working Naturalists, whether they busy themselves with things recent or fossil, are aware of the importance of knowing the whereabouts of original specimens of which descriptions or figures have been published, I have thought that a list of those contained in the "Powrie Collection," all of which are Scottish fossils, might form an appropriate contribution to the first number of the "Annals of Scottish Natural History."

In all cases the first name given is that which was applied to the specimen in the work in which it was described or figured. Corrections or rectifications of nomenclature come afterwards.

I. Specimens Constituting Original Types upon which Species have been Founded.

SILURIAN.

Merostomata—

Stylonurus Logani, *H. Woodward.*—Imperfect specimen from Logan Water, Lesmahagow. H. Woodward in "Geol. Mag." vol. i. (1864), p. 197, Plate X. Fig. 1. The counterpart of this specimen, belonging to the Museum of Practical Geology, is figured in "British Fossil Merostomata," Plate XXIV. Fig. 1.

OLD RED SANDSTONE.

Merostomata—

Eurypterus Brewsteri, *H. Woodward.*—Carapace from Kelly Den, near Arbroath, described and figured by H. Woodward, "Geol. Mag." vol. i. (1864), p. 200, Plate X. Fig. 3, and in "Brit. Foss. Merost.," p. 151, Plate XXVIII. Fig. 4.

Pterygotus minor, *H. Woodward.*—Entire specimen from Farnell, described and figured by H. Woodward, "Geol. Mag." vol. i. (1864), p. 199, Plate X. Fig. 2, and in "Brit. Foss. Merost." p. 35, Plate I. Fig. 4.

Stylonurus Powriei, *Page.*—A nearly perfect specimen from Pitscandly, first named and figured by D. Page in "Advanced Text-book of Geology," 2d Ed. 1859, p. 181, Fig. 3. Described and figured by H. Woodward in "Qu. Journ. Geol. Soc." vol. xxi. (1865), p. 482, Plate XIII. Fig. 1, and in "Brit. Foss. Merost." p. 122, Plate XXI. Fig. 1.

Stylonurus ensiformis, *H. Woodward.*—Detached tail spine, described and figured by H. Woodward, "Geol. Mag." vol. i. (1864), pp. 198-199, woodcut, and in "Brit. Foss. Merost." p. 126, Plate XXI. Fig. 5. Turin Hill.

Stylonurus Scoticus, *H. Woodward.*—A large and nearly entire specimen from Montroman Muir, described and figured by H. Woodward in "Qu. Journ. Geol. Soc." vol. xxi. (1865), pp. 484-486, Plate XIII. Fig. 2, and in "Brit. Foss. Merost." p. 126, Plate XXIII.

Myriopoda—

Archidesmus M'Nicoli, *Peach.*—One of the two type specimens described and figured by B. N. Peach, "Proc. Roy. Phys. Soc. Edin." vol. vii. (1882), p. 182, Plate II. Fig. 26.

Pisces—

Diplacanthus gracilis, *Egerton* (= *Ischnacanthus gracilis*, Powrie).—Counterpart of original type specimen, a nearly entire fish, figured and described by Egerton in "Dec. Geol. Surv." vol. x. (1861), p. 69, Plate IX. Farnell.

Climatius uncinatus, *Powrie.*—A complete fish, described and figured by Powrie, "Qu. Journ. Geol. Soc." vol. xx. (1864), p. 422; also in "Trans. Edin. Geol. Soc." vol. i. (1870), p. 296, Plate XIV. Fig. 11.

Euthacanthus Macnicoli, *Powrie.*—Entire specimen, described and figured by Powrie, "Qu. Journ. Geol. Soc." vol. xx. (1864), p. 425, Plate XX. Fig. 2. Also in "Trans. Edin. Geol. Soc." vol. i. (1870), Plate XI. Fig. 3. Turin Hill.

Euthacanthus gracilis, *Powrie.*—Imperfect specimen described and figured by Powrie, *op. cit.* p. 291, Plate XI. Fig. 4.

Euthacanthus elegans, *Powrie.*—Badly preserved specimen from Farnell, described and figured by Powrie, *ibid.* p. 292, Plate XII. Fig. 5.

Euthacanthus grandis, *Powrie.*—Type specimens, an imperfect fish and a detached tail, described by Powrie, "Trans. Edin. Geol.

Soc." vol. i. (1870), p. 292. Enlarged scales figured, *ibid.* Plate XII. Fig. 6. Turin Hill.

Euthacanthus curtus, *Powrie.* — Imperfect fish, from Farnell, described and figured by Powrie, *ibid.* p. 293, Plate XII. Fig. 7.

NOTE.—Messrs. Smith Woodward and Sherborn, in their "Catalogue of British Fossil Vertebrata," p. 65, have placed this species in *Diplacanthus* with a query. A second specimen in the collection from Turin Hill shows, however, that there were more than one pair of intermediate ventral spines, so I have kept it here for the present, although its general contour is somewhat unlike that of the other members of the genus.

Parexus falcatus, *Powrie.*—Complete fish from Turin Hill, described and figured by Powrie, *ibid.* p. 294, Plate XIII. Figs. 9, 9a.

Pteraspis Mitchelli, *Powrie.*—Cephalic shield from Bridge of Allan, figured in restored outline by Mr. Powrie in the "Geologist" for 1863, p. 68, *woodcut*, and named by him *Pteraspis Mitchelli* in the same journal for 1864, p. 172. Figured and described also by Lankester, "Brit. Cephalasp." Pal. Soc. p. 33, Plate V. Figs. 6 and 10.

Eucephalaspis Powriei, *Lankester* (= *Cephalaspis Powriei*).—Described by Lankester, *op. cit.* pp. 47-48.

A. Entire specimen, from Leysmill near Arbroath, beautifully preserved, Lankester, *op. cit.* Plate X. Fig. 1.

B. Detached cranial shield. Lankester, *op. cit.* Plate IX. Fig. 5.

Eucephalaspis asper, *Lankester* (probably = adult form of *Cephalaspis Pagei*).—Imperfect specimen from Turin Hill, described and figured by Lankester, *op. cit.* p. 50, Plate X. Fig. 5.

Eucephalaspis Pagei, *Lankester* (= *Cephalaspis Pagei*).—Described by Lankester, *op. cit.* pp. 49-50.

A. Nearly entire specimen, Lankester, *op. cit.* Plate X. Fig. 3.
B. do. do. Fig. 4.
C. do. do. Plate XI. Fig. 4.
All are from Turin Hill Quarries.

Cephalopterus Pagei, *Powrie.*—Original specimen, described and figured by Powrie in "Trans. Geol. Soc. Edin." vol. i. (1870), p. 298, Plate XIV. Fig. 16. Turin Hill.

Placothorax paradoxus, *Agassiz* (= fragments of pectoral limbs of *Bothriolepis major*, Ag. sp.)—The two type specimens described and figured by Agassiz, "Poiss. Foss. v. grès rouge," p. 134, tab. 30 a, Figs. 20-23. They were previously figured by P. Duff, "Geol. Moray," Plate VII. Figs. 3-4, as "fragments of

dorsal spines of a fish which has been referred to the genus *Cestracion*." From Scat Craig.

Holoptychius giganteus, *Agassiz.*—Two scales from Scat Craig figured by Agassiz, "Poiss. Foss. v. grès rouge," Atlas tab. 24, Figs. 3 and 8. Duff's figure "Geol. Moray," Plate VII. Fig. 10, is probably taken from the same specimen as Agassiz's Fig. 8.

Dendrodus latus, *Duff* (= *D. biporcatus*, Owen = *Holoptychius giganteus*, Ag.)—Detached laniary tooth, with portion of internal dentary bone attached, figured by P. Duff, *op. cit.*, Plate VI. Fig. 4; also by Agassiz, "Poiss. Foss. v. grès rouge," tab. 28, Figs. 1, 2.

Dendrodus incurvus, *Duff* (= *Holoptychius nobilissimus*, Ag.)—A mandibular internal dentary bone with laniary tooth attached, figured by P. Duff in "Geol. Moray," Plate VI. Fig. 11. Figured also by Agassiz under the name of *Cricodus incurvus*, "Poiss. Foss. v. grès rouge," p. 88, tab. 28, Figs. 4 and 5. Scat Craig.

NOTE.—Agassiz's genus *Cricodus* has been referred to the Rhizodontidæ by myself[1] and by Mr. Smith Woodward[2] on account of Pander's identification of it with his *Polyplocodus*, which assuredly belongs to that family, and also because the transverse section of a tooth figured by Agassiz as *Cricodus* without specific name, "Poiss. Foss." vol. ii., part i., tab. H, Figs. 11, 12, is apparently of Rhizodont character. But Agassiz in the text, *ibid.* p. 156, states that the tooth from which this section was taken had its large pulp cavity filled with a black matrix; likewise that it was a fragment broken at both ends, which "provenait d'une dent enorme car il avait la grosseur d'un doigt." It is therefore almost certain that this Rhizodont tooth, which he says is from Scotland without naming any precise locality, is of carboniferous age, especially seeing that a few pages further back (*ibid.* p. 105), he states that *Cricodus* occurs both in Devonian and in carboniferous rocks. It is certainly very different from the tooth figured by Duff as *Dendrodus incurvus*, which Agassiz afterwards refigured in his "Fossil Fishes of the Old Red Sandstone" as *Cricodus incurvus*, and apparently adopted as the type of the genus, seeing that he named no other species. For, on examining this original specimen of *incurvus*, I found, somewhat to my surprise, that it was in reality a Dendrodont or Holoptychian tooth, apparently belonging to Owen's species *D. sigmoideus*, and this I have long been convinced is synonymous with *Holoptychius nobilissimus* of Agassiz. The name *Cricodus*

[1] "Geol. Mag." (3) vol. v. 1888, p. 515.

[2] "Catalogue of the Fossil Fishes in the British Museum," part ii. 1890.

must therefore drop, as no genus can be founded on the fragment of which a section is figured in Agassiz's larger work.

Cosmacanthus Malcolmsoni, *Agassiz.*—"Poiss. Foss. v. grès rouge," p. 121, tab. 33, Fig. 28. Previously figured by P. Duff, *op. cit.* Plate VII. Fig. 5, as a "dorsal spine." Scat Craig.

NOTE.—The nature of this fragment is still doubtful; it does not seem to be a selachian spine as supposed by Duff and Agassiz. By Pander it was interpreted as the outer penultimate marginal plate of the lower part of the arm of an Asterolepid, but its sculpture is different from that on the arms of *Bothriolepis major*, the common Asterolepid of the Scat Craig deposit.

CARBONIFEROUS.

Merostomata—

Eurypterus Scouleri, *Hibbert.*—Two of the original specimens from Kirkton near Bathgate, figured by Hibbert, "Trans. Roy. Soc. Edin." vol. xiii. (1836), Plate XII. Figs. 1 and 2.

A. Carapace;—Hibbert, *op. cit.* Plate XII. Figs. 1 and 2 upper part. H. Woodward, "Brit. Foss. Merost." p. 136, Plate XXV., and woodcut Fig. 41.

B. Eight most posterior body segments in apposition;—Hibbert, *op. cit.* Plate XII. Figs. 1 and 2, lower part. H. Woodward, *op. cit.* p. 136, Plate XXVI.

TRIAS.

Reptilia—

Telerpeton Elginense, *Mantell.*—"Qu. Journ. Geol. Soc." vol. viii. 1852, pp. 100-105, Plate IV. An imperfect skeleton from the neighbourhood of Lossiemouth.

RHAETIC.

Pisces—

Hybodus Lawsonii, *Duff.*—Three of the type specimens from Linksfield, figured by P. Duff, *op. cit.* Plate IV.

A. Plate IV. Fig. 1, Dorsal spine.

B. Figs. 5 and 6, Teeth.

II. SPECIMENS WHICH HAVE BEEN FIGURED, BUT WHICH ARE NOT THE ORIGINAL TYPES OF SPECIES.

OLD RED SANDSTONE.

Merostomata—

Pterygotus Anglicus, *Agassiz.*—Specimen showing the ventral surface of the body and tail with the metastoma and part of

the left maxillipede; described and figured by H. Woodward, "British Fossil Merostomata," p. 34, Plate I. Fig. 1. From Turin Hill.

Pterygotus Anglicus, *Agassiz.* — Detached head showing the position of the eyes, described and figured by H. Woodward, *op. cit.* p. 36, Plate I. Fig. 2. Turin Hill.

Pterygotus Anglicus, *Agassiz.*—Small entire specimen from Turin Hill. H. Woodward, *op. cit.* pp. 34, 35, Plate II. Fig. 1.

Pterygotus Anglicus, *Agassiz.* — Detached penultimate joint of swimming foot. H. Woodward, *op. cit.* pp. 38, 39, Plate V. Turin Hill.

Pterygotus Anglicus, *Agassiz.*—Large telson or terminal joint. H. Woodward, *op. cit.* p. 42, Plate VI.

Myriopoda—

Kampecaris Forfarensis, *Page.*—Specimen figured by B. N. Peach, "Proc. Roy. Phys. Soc. Edin." vol. vii. (1882), Plate II. Fig. 1*d*. Canterland, Kincardineshire.

Pisces—

"Dorsal Spine of Onchus."—P. Duff, *op. cit.* Plate VII. Fig. 7. This is the base or inserted portion of an undetermined selachian spine. Scat Craig.

Acanthodes Mitchelli, *Egerton* (= *Mesacanthus Mitchelli*, Traq.)— Powrie, "Trans. Geol. Soc. Edin." vol. i. (1870), Plate X. Fig. 1. Turin Hill.

Diplacanthus gracilis, *Egerton* (= *Ischnacanthus gracilis*, Powrie).— Powrie, "Trans. Geol. Soc. Edin." vol. i. (1870), Plate X. Fig. 2. Turin Hill.

"Apparently a Diplocanthus."—P. Duff, *op. cit.* Plate XI. Fig. 3. This is a specimen of *Diplacanthus striatus* (Ag.), from Tynet Burn.

Climatius reticulatus, *Agassiz.*—Specimen figured by Powrie, "Trans. Edin. Geol. Soc." vol. i. (1870), Plate XIII. Fig. 10.

Parexus incurvus (= *Parexus recurvus*, Agassiz).—A beautifully preserved fish from Turin Hill, figured by Powrie, "Trans. Geol. Soc. Edin." Plate XII. Fig. 8.

NOTE.—The specific name given to this fish by Agassiz was *recurvus*, but a mistake has crept in of writing it *incurvus*, which is participated in even by Mr. Smith Woodward in his "Catalogue of the Fossil Fishes in the British Museum," part ii., 1891, p. 34.

Scales of Pteraspis, from Bridge of Allan, figured by Lankester, "Brit. Cephalasp." Plate V. Fig. 1.

Pteraspis Mitchelli?—"A very large but obscure specimen," from Bridge of Allan, figured by Lankester, *op. cit.* Plate V. Fig. 11.

Cephalaspis sp.—Portion of a head showing the orbits as seen from below, figured by Lankester, *op. cit.* Plate X. Fig. 2.

Caudal fin of Cephalaspis, from Turin Hill, figured by Lankester, *op. cit.* Plate XI. Fig. 3.

"Plate on the head of Holoptychius nobilissimus."—P. Duff, *op. cit.* Plate VII. Fig. 1. This is the anterior median plate of the head of *Bothriolepis major* (Ag.)

Pterichthys oblongus.—P. Duff, *op. cit.* Plate VIII. Fig. 2. The subject of this figure is a specimen of *Pterichthys Milleri*, Ag., and a considerable amount of "restoration" enters into the representation of the carapace. From Tynet Burn.

Pterichthys cornutus.—P. Duff, *op. cit.* Plate X. Fig. 2. This is a small specimen of *Pterichthys productus*, Ag. from Tynet Burn.

"Fragment of the lower jaw of a fish."—P. Duff, *op. cit.* Plate VI. Fig. 1. This is a portion of a Holoptychian mandible, probably of *H. giganteus*, Ag. Scat Craig.

"Lower jaw of a smaller individual."—P. Duff, *op. cit.* Plate VI. Fig. 2. This is the greater part of a small Holoptychian mandible. Scat Craig.

"Jaw of fish with teeth remaining in their places."—P. Duff, *op. cit.* Plate VI. Fig. 3. Detached internal dentary bone of *Holoptychius* of which Mr. Duff says: "In hazarding a conjecture I would refer this jaw to the genus *Glyptolepis*." Scat Craig.

Dendrodus biporcatus, *Owen* (= *Holoptychius giganteus*, Ag.)—Detached laniary tooth from Scat Craig, figured by P. Duff, *op. cit.* Plate VI. Fig. 5.

Dendrodus compressus, *Owen* (= *Dendrodus biporcatus*, Owen = *Holoptychius giganteus*, Ag.)—Detached laniary tooth from Scat Craig, figured by P. Duff, *op. cit.* Plate VI. Fig. 7.

Dendrodus sigmoideus, *Owen* (= *Holoptychius nobilissimus*, Ag.). —Two detached laniary teeth from Scat Craig figured by P. Duff, *op. cit.* Plate VI. Figs. 8 and 10.

Dendrodus sigmoideus, *Owen* (= *Holoptychius nobilissimus*, Ag.)— Detached laniary tooth from Scat Craig figured by Agassiz, "Poiss. Foss. v. grès rouge," Tab. 28, Fig. 3.

TRIAS.

Reptilia—

Stagonolepis.—Portion of the caudal region, figured by Huxley, "Crocodilian Remains of Elgin Sandstones," Plate III.

RHAETIC.

Pisces—

"**Fragment of dorsal spine destitute of fluting.**"—P. Duff, *op. cit.* Plate IV. Fig. 4. An undetermined bone, not a selachian spine, though it is referred by Duff to *Hybodus Lawsonii.*

"**Scale of fish not determined.**"—P. Duff, *op. cit.* Plate IV. Fig. 7. This does not seem to be a scale but an internal bone.

A LIST OF THE MACRO-LEPIDOPTERA OF BALERNO, MIDLOTHIAN.

By E. W. Carlier, M.D., B.Sc.

The locality to which the following list refers may be divided into three distinct portions:—

1. The Road, leading from Balerno to the common, is bordered by hedges of hawthorn and beech, with here and there a stone wall; behind these are cultivated lands, pastures, or small woods of common forest trees.

2. The Common, now much reduced by drainage, formerly covered a large area; the few remaining acres consist of peat bog, very damp and full of holes, but possessing a varied vegetation. This bog, which is cut in two by a grassy path running east and west, is bounded on the south by Bavelaw Burn, on the east by the main road and Bavelaw Wood, on the west by a broken hawthorn hedge, beyond which is arable land, and on the north by a farm road bordered by a belt of lime and beech trees.

3. Bavelaw Wood, which is little more than a plantation of Scotch firs and beech trees, with a sprinkling of young mountain ash, situated to the east of the main road, is raised a foot or two above the level of the common, which does not prevent it from being very damp and boggy. It

reaches to Bavelaw Burn on the south, is surrounded by fields on the east and north, and overlooks the common towards the setting sun.

The area is therefore by no means a large one, but actually teems with many forms of insect life.

This list is compiled mainly from my own notes, which extend over a period of nine years, and contains only those species that I have been fortunate enough either to catch myself or to see captured by my friends. It is therefore necessarily incomplete, but contains some few species which, as far as I can ascertain, have not hitherto been recorded as occurring in the locality. Unfortunately my visits have been almost entirely confined to Saturday afternoon rambles, and therefore those species which fly only by night will not be found in any great number in it.

One night, and one only, was I able to devote to sugaring in the wood. It did not prove a success, only yielding some dozen *Monoglypha*; but by searching the trunks of trees and beating up the undergrowth I have, however, managed to take a few specimens of some night-flying species.

My friend Mr. W. Evans, F.R.S.E., etc., to whom I am indebted for great assistance, has kindly consented to supplement my list from his own notes, which are voluminous and extend over a much longer period. The notes on additional species supplied by Mr. Evans will appear as an appendix at the end of my list, followed by others also supplied by him from the diary of Mr. Andrew Wilson, Dentist, Edinburgh. Some of Mr. Wilson's captures, which were made between 1852 and 1858, were probably taken outside, though close to, my limits.

Dr. Northcote has also kindly supplied me with a list of captures from the same locality which I have incorporated with my own. I have also drawn attention to the species mentioned by Lowe and Logan—marking them L. & L.—both in their "List of the Lepidopterous Insects of Midlothian," and the additions thereto recorded in vol. i. pp. 3, 4, and 259 of the "Proceedings of the Royal Physical Society of Edinburgh."

The arrangement and nomenclature followed in this list is that of Mr. Richard South, F.E.S.

My thanks are due to Mr. Robert Crighton for his kindness in allowing me to wander unmolested in Bavelaw Wood.

RHOPALOCERA

Pieris brassicæ, *L.*—Fairly abundant along the road, becoming less numerous as the cottage gardens are left behind. I have only taken one specimen in the wood on the 19th June 1891. L. & L.

Pieris rapæ, *L.*—Common in the fields bordering the road from May onwards. L. & L.

Pieris napi, *L.*—Common near Balerno, especially on railway embankments. A few caught on the road. L. & L. One taken by Mr. Wilson in wood, 26th April 1854.

Vanessa urticæ, *L.*—By no means uncommon along the road, but not found in the bog, though a few specimens have been taken by me in the wood. L. & L.

Vanessa cardui, *L.*—Met with in fair numbers both along the road and in the wood. L. & L.

Cœnonympha typhon, *Rott.*; Davus, *Fb.*—I have only seen two of these rather scarce insects during the whole of my wanderings in this locality. One I took myself at the north corner of the bog, on the 23rd July 1885, and the other was taken two years later on the road between the wood and the moss by my friend Dr. W. Beveridge. Taken also by Mr. Wilson: one on the banks of Balerno burn, 26th June 1853; one near Bavelaw Wood among grass, 10th July 1853; two among grass on bog, 20th July 1855; one in the same place, 13th July 1856; and a number on 12th July 1858. It is mentioned also by L. & L. in the "Proc. Roy. Phys. Soc." vol. i. p. 3.

Cœnonympha pamphilus, *L.*—Very common in June, especially along the west side of the common. L. & L.

Polyommatus phlœas, *L.*—Occasionally met with in June on the farm road just beyond the western limit of the bog. L. &. L.

Lycæna icarus, *Rott.*; alexis, *Hb.*—In the same locality with the last species, but rather less frequently. L. & L.

HETEROCERA

Nemeophila plantaginis, *L.*—One specimen taken on the moor, 20th July 1885. Flying abundantly in the sun along the north side of common, 23rd June 1888, since which time I have not taken a single specimen. This insect has also been taken on

the moor by Mr. W. Evans, Mr. Wilson, Dr. Northcote, and Dr. Beveridge. Mentioned by L. & L. in "Proc. Roy. Phys. Soc." vol. i. p. 4.

Spilosoma fuliginosa, *L.*—I have only taken a few specimens of this insect, one of which, captured on the 16th June 1888, had a perfect though diminutive left upper wing. Mr. W. Evans has also taken them in the bog. L. & L.

Spilosoma menthastri, *Esp.*—Occasionally found on the road. L. & L.

Hepialus velleda, *Hb.*—I have taken only one specimen of this insect on the bog, 19th July 1890, but have no doubt that at dusk it would be abundant. Mr. Wilson mentions it as common in Bavelaw Wood, 14th July 1885. It is mentioned by L. & L., "Proc. Roy. Phys. Soc." vol. i. p. 3.

Hepialus lupulinus, *L.*—A few specimens in June only along the road. L. & L.

Bombyx rubi, *L.*—Larvæ of this insect were taken close to the bog by Dr. Northcote. Mr. Wilson took 50 larvæ on bramble, etc., at Balerno Burn, 15th Aug. 1852, and again on 16th Sept. 1855.

Saturnia pavonia, *L.*; carpini, *Schiff.*—This is a very common insect both on the bog and in the wood during May. The larvæ are abundant in July. It has also been taken there both by Mr. Evans and Dr. Northcote. L. & L.

Leucania impura, *Hb.*—Taken by Dr. Northcote. L. & L.

Leucania pallens, *L.*—Taken by Dr. Northcote. L. & L.

Tapinostola fulva, *Hb.*—Taken by Dr. Northcote at the side of the bog. Mr. Wilson says it is common in Balerno Moor and Moss. 4th Sept. 1853. L. & L.

Xylophasia monoglypha, *Hufn.*; polyodon, *L.*—Very common in the wood in June and July, coming freely to sugar. It has also been taken there by Mr. Evans and Dr. Northcote. L. & L.

Mamestra brassicæ, *L.*—Occasionally found asleep on the trunks of trees in the wood during July. L. & L.

Apamea basilinea, *Fb.*—Taken by Dr. Northcote. L. & L.

Miana fasciuncula, *Haw.*—Taken near the bog by myself, Dr. Northcote, and Mr. Evans. L. & L.

Celæna haworthii, *Curt.*—Dr. Northcote caught them in abundance on the bog in August, where they have also been captured by Mr. Evans and Mr. Wilson. L. & L.

Agrotis corticea, *Hb.*—This insect is sometimes found on the trees in the wood. L. & L.

Agrotis strigula, *Thnb.*; porphyrea, *Hb.*—This is a very common insect on the bog, where it has also been taken by Mr. Wilson, Mr. Evans, and Dr. Northcote. It is the *chersotis* of L. & L.

Noctua glareosa, *Esp.*—Common in the wood on the stems of the fir trees in September. It is the *hebraica* of L. & L.

Noctua c-nigrum, *L.*—Found occasionally in the wood by myself and Dr. Northcote. L. & L.

Panolis piniperda, *Panz.*—During April and May of 1888 this insect was so common on the fir trees of the wood that Dr. Northcote and myself captured over 100 specimens, varying in tint from bright orange red to greenish brown or black. Lately it has been less abundant. It has also been taken by Mr. Wilson, Mr. Evans, and is mentioned by L. & L., "Proc. Roy. Phys. Soc." vol. i. p. 3.

Pachnobia rubricosa, *Fb.*—Occasionally met with in the wood asleep on the fir-tree trunks. I have three specimens, one taken 21st April 1888, another 28th April 1888, and a third 5th April 1890. Dr. Northcote has found one or two in the wood. Mr. Evans has also taken one specimen on a tree in the wood on the right-hand side of the road near Marchbank above Balerno, 26th May 1883.

Tæniocampa gothica, *L.*—Fairly common on the pine trees of Bavelaw Wood. It has been taken also by Mr. Evans and Dr. Northcote. L. & L.

Tæniocampa stabilis, *View.*—Taken by Dr. Northcote in the wood. L. & L.

Calymnia trapezina, *L.*—Taken by Dr. Northcote. L. & L.

Polia chi, *L.*—Very abundant at times, dark varieties being now and again met with both on the road and in the wood. It has been plentifully taken by Mr. Evans in the wood. L. & L.

Hadena dentina, *Esp.*—I took some dozen specimens of this insect from the fir trunks in Bavelaw Wood on 7th July 1888. L. & L.

Plusia iota, *L.*—This insect is scarce, only two specimens having been taken by me in the wood, 27th July 1888. L. & L.

Plusia gamma, *L.*—Very common everywhere in July. L. & L.

Anarta cordigera, *Thnb.*—I have only been fortunate enough to capture one specimen of this very pretty little insect, which rose from the heather on the north side of the road that bisects the bog. May 1887.

Phytometra viridaria, *Clerck*; laccata, *Scop.*; ænea, *Hb.*—Of this pretty little moth I only succeeded in catching one

specimen, though several were seen darting about in the sunshine near the road that bisects the bog. July 1887.

Rumia luteolata, *L.*; cratægata, *L.*—Very common all along the road at dusk in June. It has been taken both by Mr. Evans and Dr. Northcote. L. & L.

Metrocampa margaritaria, *L.*—Readily beaten from lime trees that border the road during July, occurring also in Bavelaw Wood. It has been captured by Mr. Wilson, Mr. Evans, and Dr. Northcote. L. & L.

Ellopia prosapiaria, *L.*; fasciaria, *Schiff.*—This insect may be commonly found early in July just emerged from the pupa, either on the ground at the roots of the pine trees in the wood, or on the bark of these about half a foot above the grass. Caught also by Mr. Evans, Mr. Wilson, and Dr. Northcote. L. & L.

Selenia bilunaria, *Esp.*; illunaria, *Hb.*—Frequently occurring under the hawthorn hedges lining the road, especially near Balerno. Recorded by Mr. Wilson from Bavelaw Moor, 29th May 1853. L. & L.

Odontopera bidentata, *Clerck.*—A very common insect in Bavelaw Wood, usually hidden behind the rugosities of the bark of Scotch fir trees; many specimens show a melanotic tendency. Recorded both by Mr. Evans and Mr. Wilson. L. & L.

Cabera pusaria, *L.*—I have taken this insect in July from lime trees on the left side of the road, just beyond Balerno, and Mr. Evans has taken it in Bavelaw Wood in June 1884. L. & L.

Halia vauaria, *L.*; wavaria, *Fb.*—Taken by Dr. Northcote and once by Mr. Evans.

Numeria pulveraria, *L.*—Rare, but occasionally found in the bog in May 1887.

Scodiona belgiaria, *Hb.*—I have only taken a single specimen of this insect, a male, that had fallen into the small burn which crosses the bog, July 1887. Mr. Evans captured a female on Currie Moor in July 1880, and a single specimen, var. *favillacearia*, fell to the lot of Mr. Wilson on the 13th July 1856.

Ematurga atomaria, *L.*—This very common insect has been taken in abundance on the bog during May and June by myself, Dr. Northcote, Mr. Evans, and Mr. Wilson. It is doubtless the *Eupisteria carbonaria* of L. & L.

Bupalus piniaria, *L.*—Very common in the wood in June, as many as 20 or 30 females having been found at one time clinging to grass stems within the area of a yard or two. Taken also by Mr. Evans, Mr. Wilson, and Dr. Northcote. L. & L.

Oporabia dilutata, *Bork.*—Very abundant in the wood and all along the road in October. Also taken by Mr. Evans. L. & L.

Larentia didymata, *L.*—Abundant in July, many dark specimens occurring in the wood. Taken also by Mr. Evans. L. & L.

Larentia multistrigaria, *Haw.*—I have taken two specimens only from the wood, 21st April and 25th April 1888. It has been captured by both Mr. Evans and Mr. Wilson. L. & L.

Larentia cæsiata, *Lang.*—This insect is very plentiful in the wood, where it rests on the fir-tree trunks during July. It has also been taken by Mr. Evans, Mr. Wilson, and Dr. Northcote. L. & L.

Larentia viridaria, *Fb.*; pectinitaria, *Fues.*; miaria, *Bork. Sta.*—Very common in the wood during July, the specimens varying much in intensity of colour. Taken also by Dr. Northcote, Mr. Evans, and Mr. Wilson. L. & L.

Emmelesia albulata, *Schiff.*—Taken both by Dr. Northcote and myself in the marsh along Balerno Burn near the reservoirs in June. Abundantly by Mr. Evans in Harelaw Wood, by road-side above Balerno, May and June 1882, and by Mr. Wilson. L. & L.

Emmelesia decolorata, *Hb.*—Taken in June with *E. albulata* in considerable numbers, and also at north-west corner of bog. L. & L.

Eupithecia helveticaria, *Bdv.*—I took some six specimens of this insect on the bog in June 1888, where it has also been captured by Dr. Northcote. Mr. Wilson found the larvæ on juniper by Balerno Burn, 5th September 1858. Mentioned by L. & L. in "Proc. Roy. Phys. Soc." vol. i. p. 259.

Eupithecia absinthiata, *Clerck.*—Taken now and again in the wood by myself and Dr. Northcote.

Eupithecia exiguata, *Hb.*—A few specimens only in the wood. Mr. Wilson has it *E. exiguaria* var. Bavelaw Wood, 13th July 1856. L. & L.

Thera simulata, *Hb.*—Occurs in the wood in fair abundance during May and again in July. Dr. Northcote has also taken it there, as did Mr. Wilson, 26th July 1853 and 2nd July 1854. L. & L.

Thera variata, *Schiff.*; *var.* **obeliscata**, *Hb.*—Occasionally found in the wood by myself, Dr. Northcote, and Mr. Evans. Mentioned by L. & L., "Proc. Roy. Phys. Soc." vol. i. p. 259.

Melanthia ocellata, *L.*—Fairly common in the wood during June. Also taken by Mr. Evans, Mr. Wilson, and Dr. Northcote. L. & L.

Melanippe tristata, *L.*—Common in June among the tall ferns that line the base of the hedge, bordering the south side of the farm road for half a mile beyond the western limit of the bog. It has also been taken by Dr. Northcote, and along the bank of Balerno burn by Mr. Wilson, 29th May 1853. L. & L.

Melanippe sociata, *Bork.*; subtristata, *Haw.*—Very common in the low undergrowth of the wood during June. Also taken there by Dr. Northcote. It is the *M. alchemillaria* of L. & L.

Melanippe montanata, *Bork.*—Very common in the wood and along the road during June, where it has also been found by Dr. Northcote and Mr. Evans. L. & L.

Coremia designata, *Hufn.*; propugnata, *Fb.*—Found in the wood in June, but not very common. Mentioned by L. & L., "Proc. Roy. Phys. Soc." vol. i. p. 259.

Cidaria truncata, *Hufn.*; russata, *Bork.*—Very common in the wood, where it has also been taken by Mr. Evans. L. & L.

Cidaria immanata, *Haw.*—By no means a rare insect in the wood, where it has also been taken by Mr. Evans. L. & L.

Cidaria suffumata, *Hb.*—Very common indeed in the wood during April and May. It has also been taken by Mr. Wilson, Mr. Evans, and Dr. Northcote. L. & L.

Cidaria testata, *L.*—Found in the wood during July. It is the *Harpalyce achatinaria* of Lowe and Logan, and has also been taken by Mr. Evans and Mr. Wilson.

Cidaria populata, *L.*—Occurs also in the wood during July, where it has been taken both by Mr. Evans and myself. L. & L.

Cidaria fulvata, *Forst.*—Taken by me along the road near Balerno in July. Also by Mr. Evans. L. & L.

Additional Species from Mr. Evans' Notes.

Hydrœcia nictitans, *Bork.*—Roadside above Balerno, Sept. 1884, and abundantly by Threepmuir pond (west end) on the same day. Also taken by Mr. Wilson. L. & L.

Xylophasia rurea, *Fb.*—Roadside near Balerno in July 1889. L. & L.

Miana arcuosa, *Haw.*—A few taken in Harlaw Wood 22nd July 1884. L. & L.

Noctua festiva, *Hb.*—Taken on the moor a little east of Bavelaw Wood in July 1889, and at sugar by Mr. Wilson in Bavelaw Wood, 14th July 1855. L. & L.

Dianthœcia cucubali, *Fues.*—Three dozen larvæ taken from flowers

of the ragged robin (*Lychnis flos-cuculi*) on Balerno Bog, 4th August 1884. Taken also by Mr. Wilson. L. & L.

Dasypolia templi, *Thnb.*—A female specimen captured in Bavelaw Wood on the 21st April 1888 ("Scottish Naturalist," 1891, p. 40).

Hadena pisi, *L.*—Larvæ of this insect were taken on Balerno Moor in 1880 and hatched in May 1881. Also taken by Mr. Wilson. L. & L.

Cheimatobia brumata, *L.*—Very abundant both by the road and the moor, 14th November 1891. L. & L.

Emmelesia minorata, *Tr.*; ericetata, *Curt.*—A few specimens taken on Balerno Moor on the 4th and 11th August 1884. Also by Mr. Wilson. L. & L.

Eupithecia satyrata, *Hb.*—Larvæ of this species common on the flowers of scabious on Balerno Moor, 4th Aug. 1884 and 11th Aug. 1885. Mr. Wilson found the larvæ of var. **callunaria**, *Stgr.*, common on scabious on Bavelaw Moor 14th Sept. 1856, and again on 5th Sept. 1858.

Eupithecia indigata, *Hb.*—Abundant in Harlaw Wood on the 26th May 1883. Taken by Mr. Wilson in Bavelaw Wood, 1st June 1856. L. & L.

Eupithecia nanata, *Hb.*—Common on Balerno Moor 23rd June 1889. Taken also by Mr. Wilson. L. & L.

Thera firmata, *Hb.*—Taken in Bavelaw Wood, 17th Sept. 1881. L. & L.

Hypsipetes sordidata, *Fb.*; elutata, *Hb.*—Taken near Balerno on 11th Aug. 1884. L. & L.

Melanippe fluctuata, *L.*—Taken at Balerno. L. & L.

Additional Species from Mr. Wilson's Notes.

Argynnis selene, *Schiff.*—One specimen taken on a flower in marsh at the side of Balerno Burn, 28th June 1853. Mentioned by L. & L., "Proc. Roy. Phys. Soc." vol. i. p. 3.

Demas coryli, *L.*—One specimen taken from a fir tree in Bavelaw Wood, 28th June 1856. Mentioned by L. & L., "Proc. Roy. Phys. Soc." vol. i. p. 259.

Acronycta rumicis, *L.*—Twelve larvæ taken on bramble at Balerno Burn, 16th Sept. 1855, hatched June 1856. L. & L.

Apamea gemina, *Hb.*—Two were taken at sugar in Bavelaw Wood, 14th July 1855. L. & L.

Agrotis suffusa, *Hb.*—One was taken at sugar in Bavelaw Wood, 11th Sept. 1858. L. & L.

Noctua brunnea, *Fb.*—One larva of this insect was taken on Bavelaw Moor, 28th Oct. 1855. L. & L.

Phlogophora meticulosa, *L.*—One specimen was found on a tree in Bavelaw Wood, 13th June 1858, and another came to sugar there on 11th Sept. 1858. L. & L.

Hadena adusta, *Esp.*—One larva taken from heather by Balerno Burn, one imago at sugar in Bavelaw Wood, 14th July 1855, and two at night on Bavelaw Moor 23rd June 1855. L. & L.

Plusia festucæ, *L.*—One specimen taken at Balerno Burn from grass, 28th June 1853. L. & L.

Anarta myrtilli, *L.*—One specimen taken on Bavelaw Moor, 20th May 1854. L. & L.

Euclidia mi, *Clerck.*—One specimen captured on the banks of Balerno Burn, 24th May 1853. L. & L.

Cabera exanthemata, *Scop.*—Four imagines taken at birches by Balerno Burn, 28th June 1853; another at the same place, 2nd July 1854; and 5 larvæ on rough willow in the same spot, 16th Sept. 1855. Mentioned by Lowe and Logan, "Proc. Roy. Phys. Soc." vol. i. p. 3.

Macaria liturata, *Clerck.*—One specimen captured in Bavelaw Wood on the 8th and another on the 16th July 1852. L. & L.

Oporabia filigrammaria, *H.-S.*—A single specimen taken on Bavelaw Moor, 16th Sept 1855. L. & L.

Emmelesia alchemillata, *L.*—The larvæ were common on hemp-nettle seeds at Bavelaw, 14th Sept. 1856. Mr. Wilson calls this *E. Hydraria*. L. & L.

Eupithecia pygmæata, *Hb.*—One imago captured near rushes at Balerno Burn, 2nd July 1854, and another at hedge of Harelaw farm, 12th July 1858. Mr. Wilson speaks of this insect as *E. palustraria*. L. & L.

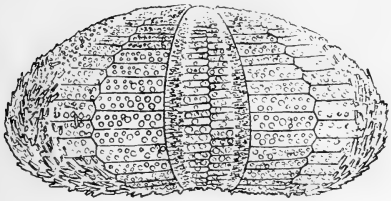
Hypsipetes trifasciata, *Bork.*; impluviata, *Hb.*—One pupa was found in moss near alders above Balerno on 15th Feb 1857, and hatched 21st April of the same year. L. & L.

Coremia munitata, *Hb.*—Taken near Bavelaw Burn, 16th Sept. 1855. L. & L.

Cidaria dotata, *L.*; pyraliata, *Fb.*—Two specimens were taken in Bavelaw Wood on 26th July 1853. L. & L.

Eubolia plumbaria, *Fb.*; palumbaria, *Bork.*—One specimen taken at Balerno Burn, 2nd July 1854. L. & L.

Tanagra atrata, *L.*; chærophyllata, *L.*—One specimen from a hedge at Bavelaw. L. & L.



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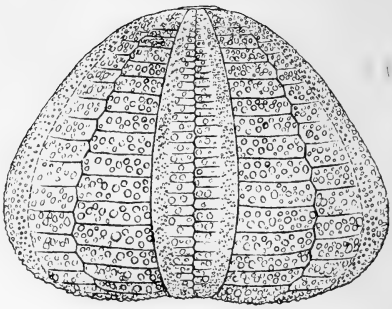

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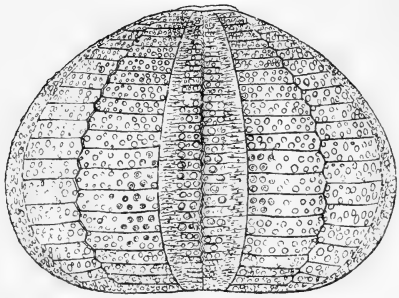

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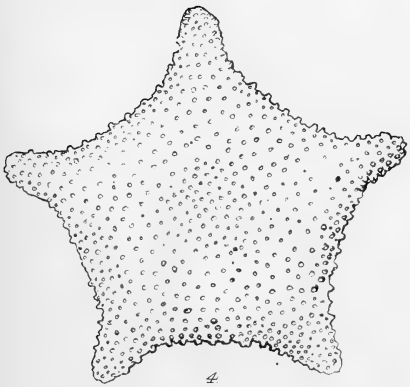

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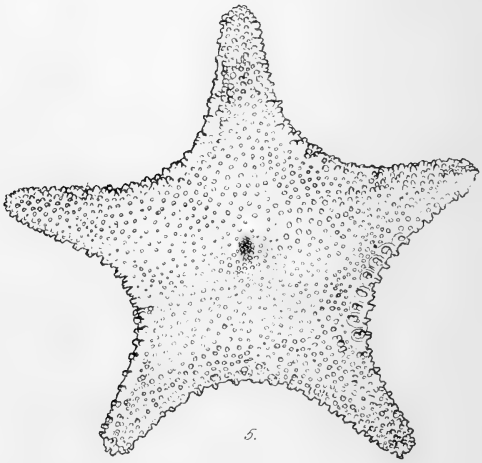

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FORMS OF ECHINUS ESCULENTUS, *Linn.*
AND GONIASTER PHRYGIANUS (*Parelius*)

NOTES ON SOME SCOTTISH ECHINODERMATA.

By Thomas Scott, F.L.S.,
Naturalist to the Fishery Board for Scotland.

Plate II.

I. On a Depressed Form of Echinus esculentus, *Linn.*

A more than usually depressed form of *Echinus esculentus* was obtained in the Firth of Forth in June last (1891), which it may be of interest to notice. There is, as is well known to students of the Echinodermata, considerable variation in in the form of this species, but the variety now under consideration is the most depressed of the numerous specimens I have observed among the captures made during several years' trawling on the east coast of Scotland. In form it approaches very closely to *Strongylocentrotus drobachiensis*, Müller,—a species which we have obtained on one or two occasions in the vicinity of Inchkeith, a little east of the south end of the the island,[1]—but is to be distinguished at once by the possession of three pairs of pores in the row instead of four or five pairs as in *Strongylocentrotus*. This variety is represented $\frac{2}{5}$ the natural size on Plate II. Fig. 1, and measures 4.65 inches in diameter, and 2.3 inches in height. Fig. 2 represents another variety of the same species with somewhat flattened sides, which was obtained off Musselburgh at from five to six fathoms. Fig. 3 gives us a specimen of the usual form, both natural size. These latter figures show by comparison more clearly the unusual form of the variety under consideration: they, also, are represented $\frac{2}{5}$ of their natural size.

II. On Goniaster phrygianus (*Parelius*) = Goniaster equestris, *Agassiz.*

During the last few years I have obtained two specimens of a Goniaster from the Firth of Forth which closely resemble each other in form, but which differ considerably from specimens of *Goniaster phrygianus* taken in the Moray

[1] *Strongylocentrotus drobachiensis* is common in the Cromarty Firth, and we almost invariably obtain a number of specimens of this species every time we trawl between Cromarty and Invergordon.

Firth, where, in the deep water (30 to 50 fathoms) the species is moderately common, being of frequent occurrence among the refuse of the trawl net. Plate II. Fig. 4 represents one of the Firth of Forth specimens, while Fig. 5 is one of the Moray Firth specimens ; respectively $\frac{1}{4}$ and $\frac{1}{6}$ their natural size. In the Forth specimen, as shown by the figure, the space between the arms is shallow, and the arms are very short. In the Moray Firth specimen, on the other hand, the space between the arms is deeply concave, and the arms comparatively long. I have examined a considerable number of the Moray Firth specimens and find that, though the length of the arms and the concavity of the space between them varies to some extent, none of those examined possessed the short arms, or the shallow, and nearly straight, interspaces that distinguished the two specimens from the Firth of Forth.

One of the Forth specimens was obtained a few miles east of May Island by a trawler, and is the one represented by Fig. 4. The other was obtained by myself from deep water some distance west of the May Island, and is now in the Museum of Science and Art, Edinburgh.

III. On Brissopsis lyrifera (*L. Agassiz*).

I have on several occasions during the last three years obtained specimens of *Brissopsis lyrifera* in the vicinity of May Island, Firth of Forth. Though by no means a rare species on some parts of the Scotch coasts it does not appear to have been known to occur in the Forth estuary or its vicinity previous to my discovery of it in 1888. It was first obtained about two miles north-westward of the May, and since then further specimens have been captured both in the locality referred to and also at Trawling Station ix., a few miles south-eastward of that Island. The following records of this species from the latter locality are from the "Eighth and Ninth Annual Reports of the Fishery Board for Scotland":—6th June 1889, three specimens; 17th August 1889, one specimen; 13th May 1890, one specimen; 5th August 1890, one specimen. A few others have been obtained this year (1891). In Mr. W. E. Hoyle's "Revised List of the British Echinoidea" in the "*Proceedings of the Royal Physical Society of Edinburgh*" for 1889-90, "Aberdeenshire and the Moray Firth" and

"Off Montrose 42 fms.," are the only localities for this species on the east coast of Scotland.

This species does not appear to be common on our east coast, but on the west it is sometimes obtained in great abundance. In the early part of 1887 I was on board a trawler working over 20 fathoms water off Craigmore, near Rothesay, when the trawl net on being hauled up was found to contain a large quantity of fine mud, amongst which there were a great number of *Brissopsis*. I counted more than sixty whole specimens, besides which there were many others more or less damaged. This large capture of *Brissopsis* has been however far exceeded by one recorded by Mr. W. Anderson Smith in the Fishery Board's "Ninth Annual Report" (1891), part iii. p. 298. I cannot do better than quote Mr. Anderson Smith's description of his interesting capture. He says,—"Besides the ordinary echinoderms we had a most remarkable haul of what we formerly considered a rare form of heart urchin, *Brissopsis lyrifera*, completely choking our net, which hung like a huge bag of potatoes and could not be lifted. We calculated the quantity of these urchins as representing not less than three tons weight."

That it should occur in such enormous numbers on the west coast and only one or a very few at a time on the east coast, where the physical conditions appear to be equally favourable for its existence, is rather singular, and is not easily explained. Beam-trawling has been more vigorously prosecuted on the east coast than on the west and may have something to do with the difference alluded to, but the true explanation will have, I think, to be sought for elsewhere.

ON THE FLORA OF SHETLAND.

By William H. Beeby, F.L.S.

In continuation of already recorded researches[1] into the Flora of this county, I paid my sixth visit to the Islands last summer, spending there over three weeks, which included

[1] "Scottish Naturalist," 1887-1891.

the beginning of July and part of August. Ollaberry was made the centre of operations, the intention being to work some of the interesting parts of the Northmaven peninsula, which I was unable to reach on my previous short visit to the same place, owing to their distance from headquarters. However, the exceptionally bad weather of last summer stood in the way, and consequently some of the more distant localities still remain untouched. A good deal of work was done among the crags on the north side of Roeness Voe, and although they afforded much likely ground, little of special interest was gathered except among the Hawkweeds. In this genus *Hieracium Farrense*, Hanbury proved an interesting addition to the Shetland list; while at North Roe a second locality was found for *H. zetlandicum*.

While dealing with these endemic species, it may not be out of place to refer to the growing tendency, on the part of some botanists, to make too much of the *degree* of difference exhibited by plants, while practically ignoring the *kind* of difference, which, it is maintained here, is really the important factor. Thus, the most transient states of plants due to the direct action of their environment are often far more distinct in appearance from their normal forms than are some varieties from their types; but the first-named return at once to their normal state on being removed from their special surroundings, while the latter remain permanently distinct from their types even when grown under circumstances most disadvantageous to the continuation of the particular variation. That these two kinds of variation exist in plants is certain; and the separation of them seems to be the very basis on which all investigations of the Phanerogamia must be made, if it is hoped that this branch of botany is to throw any further light on Evolution. Since these two kinds of variation are now sometimes treated as one, and since theories are based on, or illustrated by, this heterogeneous aggregate, no apology is needed for these remarks. To give a varietal name to a species of *Batrachium* when it produces its floating leaves, or when a trilobed leaf becomes suborbicular in floating, is but one step short of giving the plant another varietal name when it flowers, and yet another when it fruits! Each individual plant, in certain species, has inherent

to it the capacity to produce two kinds of leaves; the particular environment merely determines which particular one of the two kinds shall be produced. This capacity for adaptability reaches its climax in Britain in some of our amphibious plants, such as *Batrachium* and *Potamogeton*. In the *Hieracia*, though present, it is developed to a comparatively small extent only.

In connection with the foregoing observations it may now be pointed out that some of the more critical *Hieracia*, although differing in comparatively slight ways from other known types, are not the result of this last-named kind of variation. Mr. F. J. Hanbury, for example, has cultivated these plants for years, and has now, I believe, some two hundred British forms growing in his garden. He finds, when transplanted to this new environment, so different from their native surroundings, that, although now growing under practically identical conditions, they do not tend either to converge towards each other, or to revert to other known types. Hence their variation is of another order, and they (the British endemic forms), only differ from some of the most marked endemic forms of other islands in *degree*, and not in *kind*, of variation, which is precisely what might be expected. Whether they be classed as species or varieties is a question chiefly of convenience; no amount of lumping, however, will make the groups in critical genera correspond to the isolated "species" in genera which are now stationary, and in which the tendency to vary is quiescent. No doubt a very distinct endemic species from some distant island cuts a very imposing figure; but it may be questioned whether its value does not decrease in a degree corresponding to the increase in its distinctness. It may be here suggested that some oceanic islands, with their strongly-marked endemic forms, have perhaps, to a considerable extent, taught their lesson already; and that more is likely to be learnt from the critical genera (the wild analogues of variable florists' flowers) of one's own country, with their numerous intermediates and almost certainly present endemic forms, than by describing those more distinct ones which we cannot study in connection with their nearest relations, partly because they may already be too far evolved to have any, and also because they are

too far removed from us to enable us to study them closely in that relation, even if it exist.

But to return to Shetland; unless some other island is mentioned, the records below refer always to Northmaven, the peninsula which constitutes the northern parish of Mainland. The following abbreviation is used :—

† = Not recorded for the county in "Top. Bot.," ed. 2, or in Bennett's "Additional Records," unless with some form of query.

(**Lepidium sativum**, *L.*; and **Malcolmia maritima**, *R. Br.*—Casuals on waste ground near the Knabb, Lerwick.)

Polygala vulgaris, *L.*—As the plant previously recorded was not altogether satisfactory, I may mention that this species occurs, fine and typical, on grassy banks by the Gluss Burn, near Ollaberry.

† **Rubus Idæus**, *L.*—In a sheltered hollow in the ravine of the Eela-water Burn.

† **Matricaria maritima**, *L.*—On the stony shore at North Roe. I am disposed to regard this plant as distinct from *M. inodora*, at all events as a sub-species. It is so regarded in the last edition of the "Catalogue of Scandinavian Plants," while Nyman classes it as a distinct species.

† **Lapsana communis**, *L.*—In some plenty on the undercliff on the western shore of Sullom Voe, near Lunnister.

Hieracium.—I am indebted to Mr. F. J. Hanbury for examining my series of Shetland Hawkweeds. I have not ventured to record any species not named or passed by him.

H. Schmidtii, *Tausch.*—Dr. Lindeberg refers the Bergs of Skelberry plant to var. *crinigerum* (Fries.) He also refers the plant provisionally alluded to as "*H. lasiophyllum*" ("Scot. Nat.," Jan. 1890), to the same variety.

† **H. oreades**, *Fries.*—Rocks at the foot of Cliva Hill, near Brae, Delting.

† **H. Farrense**, *Hanb.*—In two places on the north side of Roeness Voe, opposite Heylor, among crags, alt. 400 and 450 feet. The occurrence in Shetland of this local species is very interesting.

† **H. zetlandicum**, *Beeby* (in "Journ. Bot.," August 1891). Banks and low hills on the east side of Sand Voe; low hills east of North Roe, towards the Ness of Burravoe. In plenty in both localities, which are about a mile apart. Further observations show that in my original description I have rather over-estimated

the small size of this species; although much more commonly found as described, it is rather larger and bears more flowers when growing under the shelter of rocks. When in fruit it has a very distinct appearance, somewhat calling to mind *Serratula tinctoria* when in the same condition.

† **H. protractum**, *Lindeb.*—Abundant about the east side and north end of the Loch of Cliff, Unst (No. 610). Dall of Lumbister and Mid Yell Voe, Yell (No. 611). Rocks north of Mavisgrind, Northmaven. Rocks at the foot of Cliva Hill, near Brae, Delting. The two first-mentioned gatherings have been submitted to Dr. Lindeberg, who confirms the name. This Norwegian Hawkweed is the most widely diffused species in Shetland, where it occurs in five distinct stations in three different islands. It is not known to occur elsewhere in Britain.

† **H. Friesii**, *Hartm.* (**H. gothicum**, *Backh.*)—About the north end of the Loch of Cliff, Unst. Banks by the Gluss Burn, near Ollaberry; grassy places near the sea, Hamar Voe; ravine of the Eela-water Burn; the last three stations in Northmaven.

† **H. croceatum**, *Fries.*—Low hills at North Roe. In three places on the north shore of Roeness Voe.

† **H. auratum**, *Fries.*—In many places on the north shore of Roeness Voe, among rocks. Sparingly on the south side of Roeness Voe, with some curious shade-grown forms. Rocks near Mavisgrind. Dr. Lindeberg confirms the naming of one of the Roeness Voe gatherings.

(**H. dovrense**, *Fries.*—This record ("Scot. Nat.," Jan. 1889), must be withdrawn; the plant proves to be a form of *H. Friesii*, Hartm.)

† **H. truncatum**, *Lindeb.*—Rocks at the foot of Cliva Hill, near Brae, Delting; referred to this species by Mr. Hanbury, who thinks, however, that possibly it may not be quite identical with Lindeberg's type. This plant has been previously found on the mainland of Scotland.

† **Ruppia spiralis**, *Hartm.*—Pools just north of Fugla Ness, and salt marshes at Haggrister Bight, Sullom Voe. In both stations the plant was infested by the rare fungus *Tetramyxa parasitica*, for the name of which I am indebted to Prof. Trail.

Scirpus multicaulis, *Smith.*—Punds Loch; a second locality for the county.

Deschampsia discolor, *R. & S.*—Abundant by a small loch on the north-east side of Roeness Hill.

CONTRIBUTIONS TOWARDS A FLORA OF THE OUTER HEBRIDES.

By Arthur Bennett, F.L.S.

A WISH to see the western isles of Scotland thoroughly explored for their botanical productions has induced me these five years past to endeavour to interest any one who I knew was likely to help on the work; and by the kindness of Messrs. Duncan, King, Somerville, and Cotton I have been enabled to see a good series of plants from the Outer Hebrides. From looking to their distribution elsewhere I have been led to think that the number of species that inhabit these islands would, and will, be largely added to. The supposed falling off in species from east to west in Scotland[1] I believe to be very much overstated. When the Outer and Inner Hebrides are thoroughly searched, I quite think the number of plants not yet found there will be very much reduced.

These notes must be taken as expressing the wish that others will endeavour to carefully search any of the islands, as opportunity occurs. And we want these western floras complete before we can judge of the past and present floras on safe grounds.

For the use of future workers I give a list of such books and papers as I have consulted.

J. H. Balfour and **C. C. Babington**.—"Trans. Bot. Soc. Edin.," 1844, pp. 133-154.

M'Culloch's "Western Islands"; a few species are mentioned in this.

T. Pennant's "Tour in Scotland and Voyage to the Hebrides," 1774-1776, with figures of plants.

W. Macgillivray in "Edinburgh Journal of Natural and Geographical Science," 1830, p. 91; and in "Edin. Phil. Journal," 1842, p. 47.

Dr. Stirton, in "Scot. Naturalist," 1886, p. 182.

R. M. Barrington, "Notes on the Flora of St. Kilda," in "Journal of Botany," 1886, pp. 213-216.

Arthur Bennett, in "Scot. Naturalist," 1887, pp. 56-66; 1888, pp. 247-261; 1889, pp. 111-112.

[1] **S. Grieve**, "Trans. Bot. Soc. of Edinburgh," 1887, pp. 487-490.

Arthur Bennett, in "Trans. Nat. Hist. Soc. of Glasgow," 1889, pp. 37-41.

A. Somerville, in "Trans. Nat. Hist. Soc. of Glasgow," 1889, pp. 183-188.

Arthur Bennett, in "Scot. Naturalist," 1890, p. 273; 1891, pp. 188-189.

Mr. A. H. Gibson at the July (1891) meeting of the Edinburgh Bot. Soc., read a paper on "The Phanerogamic Flora of St. Kilda," published in October 1891.

What I here propose to do is to give those species added to the flora of the islands since Messrs. Balfour and Babington's list; and others, that have been only reputed.

Ranunculus Drouetii, *Godr.*—East side of S. Uist, *A. Somerville.*

Ranunculus trichophyllus, *Chaix.*; var. **demersus**, *N. E. Brown.*—S. Uist, *A. Somerville.* Type in Barra, *A. Somerville.*

Ranunculus Baudotii, *Godr.*—East side of S. Uist, *A. Somerville.*

Ranunculus repens, *L.*; *forma* **alpina**, *Rostrup.*—St. Kilda, *Barrington.*

Ranunculus bulbosus, *L.*—Scarp, *W. S. Duncan.*

Ranunculus Ficaria, *L.*—Mingulay, *J. Finlayson.* St. Kilda, *Barrington.*

Nuphar luteum, *Sm.*—Lakes in N. Uist, but extremely rare, *Macgillivray.* Not yet confirmed.

Fumaria confusa, *Jord.*—S. Uist, *A. Somerville.* Scarp, *W. S. Duncan.*

Fumaria officinalis, *L.*—Barra, *A. Somerville.*

Nasturtium officinale, *L.*—Barra, *A. Somerville.* Bernera, *W. S. Duncan.*

Arabis sagittata, *D. C.* (*hirsuta*).—Harris, on Ben Capval, *W. S. Duncan.* Bernera, *W. S. Duncan.*

Erophila vulgaris, *D. C.*—Harris, *W. S. Duncan.*

Cochlearia danica, *L.*—Bernera, *W. S. Duncan.* Barra, *A. Somerville.* St. Kilda, *Barrington.*

Cochlearia officinalis, *L.*; var. **alpina**, *Bab.*—St. Kilda, *Barrington.*

Cochlearia anglica, *L.*—Mingulay, *J. Finlayson.*

Subularia aquatica, *L.*—Harris, *W. S. Duncan*, in Macgillivray's station.

Raphanus maritimus, *Sm.*—Abundant, *Macgillivray*; not yet confirmed.

Draba incana, *L.*—Upon the granitic vein of Capval, in Harris, *Macgillivray*; not yet confirmed.

Viola Curtisii, *Forster.*—Barra. S. Uist, *A. Somerville.*

Polygala serpyllacea, *Weihe.*—Barra, *A. Somerville.* St. Kilda, *Barrington.*

Polygala (eu-) vulgaris, *L.*—S. Uist, *A. Somerville.*

Cerastium alpinum, *L.*—*Magillivray*; not confirmed.

Cerastium tetrandrum, *Curtis.*—Scarp, *W. S. Duncan.* St. Kilda, *Barrington.*

Sagina apetala, *L.*—Barra, *A. Somerville.*

Spergula arvensis, *L.*; **sativa**, *Boem.*—Barra, S. Uist, *A. Somerville.*

Lepigonum salinum, *Fr.* (**genuinum**).—Barra, S. Uist, *A. Somerville.*

Hypericum elodes, *Huds.*—Barra, *A. Somerville.*

Geranium dissectum, *L.*—S. Uist, *A. Somerville.*

Ilex aquifolium, *L.*—Put in brackets by Watson; but Mr. Duncan found it on steep rocks with *Rubi*, *Lonicera*, etc., undoubtedly wild in Harris.

Trifolium medium, *L.*—Barra, *A. Somerville.*

† **Trifolium hybridum**, *L.*—S. Uist, *A. Somerville.*

Trifolium procumbens, *L.*—*Macgillivray*; not confirmed.

Trifolium dubium, *Sibth.*—Barra, *A. Somerville.*

Vicia sylvatica, *L.*—Obbe in Harris, *W. S. Duncan.* Recorded by *Macgillivray*, from Glen of Rodell in Harris.

Vicia lathyroides, *L.*—Recorded by *Macgillivray*; not confirmed.

Lathyrus montanus, *Bernh.*—N. Harris, *W. S. Duncan.*

Rubus Idæus, *L.*—S. Uist, *A. Somerville.*

Rubus incurvatus, *Bab.*—Obbe, Harris, *W. S. Duncan*; determined by Mr. J. G. Baker.

Rubus polyanthemos, *Lindb.*—S. Uist, *A. Somerville.*

Agrimonia Eupatoria, *L.*—S. Uist, *A. Somerville.*

Rosa spinosissima, *L.*—Barra, *A. Somerville.*

Rosa Sabina, *Woods.*—*Dr. Walker*; according to a note by Turner in Herb., Kew.

Rosa mollis, *Sm.*—Harris, *W. S. Duncan.* S. Uist, *A. Somerville.*

Rosa canina, *L.* (**lutetiana**, *Leman*).—Harris, *W. S. Duncan.*

Rosa canina, *L.* (**dumalis**, *Bechst.*)—Harris, *W. S. Duncan*; *f. glaucophylla*, Barra, *A. Somerville.*

Saxifraga oppositifolia, *L.*—St. Kilda, *Barrington.* Husival More, Harris, *W. S. Duncan.*

Saxifraga nivalis, *L.*—*Macgillivray;* never confirmed.

Drosera obovata, *M. et K.*—Scarp, *W. S. Duncan.*

Lythrum Salicaria, *L.*—S. Uist, *A. Somerville.*

Peplis Portula, *L.*—*Duncan*, cat.

Epilobium alpinum, *L.*; var. ? *anagallidifolium* (Lam.)—Harris, *W. S. Duncan.*

Epilobium obscurum, *Schreb.*—Scarp, *W. S. Duncan.* ? *tetragonum*, S. Uist, *A. Somerville.*

Eryngium maritimum, *L.*—S. Uist, *A. Somerville.*

Sanicula europæa, *L.*—"Top. Botany."

Apium nodiflorum, *Reich.*—Barra, *A. Somerville.*

Apium inundatum, *Reich.*—S. Harris, Barra, *W. S. Duncan.*

Cicuta virosa, *L.*—Loch na Linna Moire, S. Uist, *A. Somerville.*

Œnanthe Crocata, *L.*—S. Uist, *A. Somerville.*

Caucalis Anthriscus, *Huds.*—"Top. Botany," ed. 2.

Hedera Helix, *L.*—Doubted as native by Watson; but Mr. Somerville, for Barra, says, "wild on rocks on hillside."

Sambucus nigra, *L.*—St. Kilda, introduced, *Gibson.*

Galium uliginosum, *L.*—S. Uist, *A. Somerville.*

Galium Aparine, *L.*—*f. minima*, two to three inches high, leaves erect, $\frac{1}{4}$ inch long, fine pointed. Lochboisdale, S. Uist, *A. Somerville.* A curious state of the plant.

Sherardia arvensis, *L.*—S. Uist, *A. Somerville.*

Valerianella olitoria, *Moench.*—Barra, *A. Somerville.* Harris, *W. S. Duncan.*

Gnaphalium uliginosum, *L.*—Harris, *W. S. Duncan.*

Chrysanthemum Leucanthemum, *L.*—Mingulay, *J. Finlayson.* Barra, *A. Somerville.*

Matricaria Chamomilla, *L.*—*Macgillivray*; not confirmed.

Petasites vulgaris, *Desf.*—Watson suggests that *Tussilago* was mistaken for this by Balfour and Babington. I have no confirmation of it.

Arctium minus, *Schk.*—Barra, *A. Somerville.* Scarp, *W. S. Duncan.*

Cnicus heterophyllus, *Willd.*—Harris, *W. S. Duncan.*

Cnicus arvensis, *Hoffm.*; var. **argenteum** (*Vest.*)—S. Harris, *W. S. Duncan.*

Saussurea alpina, *D. C.*—North and South Harris, *W. S. Duncan.*

Hieracium anglicum, *Fr.*—Barra, *A. Somerville.*

Hieracium argenteum, *Fr.*—S. Uist, *A. Somerville.* Harris, *Backhouse*, "Mon. Brit. Hier." p. 49.

Hieracium scoticum, *Hanb.*—Barra, *A. Somerville.*

Hieracium iricum, *Fr.*—I suppose that by the *H. Lawsoni* of Balfour and Babington's list this is intended; but I have seen no specimen.

Hieracium crocatum, *Fr.*—An immature specimen of what is probably this, Scarp, *W. S. Duncan.*

Taraxacum palustre, *D. C.*—St. Kilda, *Barrington.*

Sonchus arvensis, *L.*—Mingulay, *J. Finlayson.*

Sonchus oleraceus, *L.*—Scarp, *W. S. Duncan.*

Arctostaphylos Uva-ursi, *Spreng.*—*Macgillivray*; not confirmed.

Moneses grandiflora, *Salisb.*—"Harris and Bernera about 1783 by Mr. James Hoggan, *Mr. Gotobed.*" Smith, in "Flor. Brit." (1800), ii. p. 446; not confirmed by any recent author.

Lysimachia nemorum, *L.*—Obbe, Harris, *W. S. Duncan.*

Anagallis arvensis, *L.*—Mingulay, *J. Finlayson.*

Samolus Valerandi, *L.*—S. Uist, *A. Somerville.* S. Harris, *W. S. Duncan.*

Gentiana campestris, *L.*—St. Kilda, *Macgillivray*; not confirmed.

Myosotis versicolor, *Reichb.*—Scarp, *W. S. Duncan.*

Calystegia Soldanella, *R. Brown.*—Eriskay, *A. Somerville.*

Veronica scutellata, *L.*—Obbe, Harris, *W. S. Duncan.*

Plantago maritima, *L.*; var. **pygmæa**, *Lange.*—St. Kilda, *Barrington.*

Melampyrum sylvaticum, *L.*—*Macgillivray*; not confirmed.

Orobanche rubra, *Sm.*—Refound in 1891 by *W. S. Duncan* in Macgillivray's station.

Utricularia intermedia, *Hayne.*—Scarp, *W. S. Duncan.*

Mentha hirsuta, *L.*—Barra, *A. Somerville.*

Lycopus europæus, *L.*—Tarbert, Harris, *W. S. Duncan.* S. Uist, *A. Somerville.*

Thymus Chamædrys, *Fr.*—S. Uist, *A. Somerville.*

Scutellaria minor, *L.*—S. Uist, *A. Somerville.* Obbe, Harris, *W. S. Duncan.*

Stachys arvensis, *L.*—Mingulay, *J. Finlayson.*

Ajuga reptans, *L.*—S. Uist, *A. Somerville.*

Ajuga pyramidalis, *L.*—Scarp, S. Harris, *W. S. Duncan.*

Atriplex Babingtonii, *Woods.*—St. Kilda, *Barrington.* Watson in "Cybele Brit." vol. ii. p. 323.

Atriplex laciniata, *L.*—S. Uist, *A. Somerville.*

Salsola Kali, *L.*—St. Kilda, *Macgillivray*; not confirmed.

Polygonum aviculare, *L.*; var. **arenastrum.**—Mingulay, *J. Finlayson.*

Polygonum (Roberti), *Loesl*; **Raii**, *Bab.*—Barra, *A. Somerville.*

Polygonum Hydropiper, *L.*—Obbe, Harris, *W. S. Duncan.*

Polygonum amphibium, *L.*; **terrestre**, *Leers.*—Barra, *A. Somerville.*

Polygonum Bistorta, *L.*—S. Uist, *A. Somerville.*

Polygonum viviparum, *L.*—Scarp, almost at sea-level; frequent from 50 to 150 feet above it. On Husival More (alt. 1603 feet) it grows but a short way above the base, and on summit with *Habenaria viridis*, etc., *W. S. Duncan.* Abundant on Oreval (2165 feet) and Ceartaval (1807 feet.)

Polygonum viviparum, *L.*; var. **alpinum**, *Wahlb.*—Scarp, *W. S. Duncan.*

Rumex conglomeratus, *L.*—St. Kilda, *Barrington.*

Myrica Gale, *L.*—Barra, *A. Somerville.*

Malaxis paludosa, *Sm.*—Harris, *T. A. Cotton.*

Listera cordata, *A. Br.*—Harris, Scarp, *W. S. Duncan.*

Listera ovata, *R. Br.*—Scarp, N. Harris, S. Harris, *W. S. Duncan.*

Orchis mascula, *L.*—Scarp, *W. S. Duncan.* In chasms in the steep rocky coast, south and south-west of Harris, *Duncan.*

Orchis incarnata, *L.*—Barra, *A. Somerville.* Scarp, *W. S. Duncan.*

Habenaria bifolia, *R. Br.*—S. Harris, *W. S. Duncan.* North of Bowe.

Habenaria chloroleuca, *Ridley.*—Harris, *W. S. Duncan.* Abundant on coast for $\frac{3}{4}$ mile.

Allium ursinum, *L.*—S. Uist, *A. Somerville.*

Scilla verna, *L.*—Barra, *A. Somerville.* Scarp, *W. S. Duncan.*

Juncus effusus, *L.*—Scarp, *W. S. Duncan.* St. Kilda, *Barrington.*

Sparganium ramosum, *Curtis.*—"Top. Bot." In his "Geog. Distrib." Watson recorded under *simplex*, "I have seen no specimens of either species."

Sparganium affine, *Schnizl.*—Scarp, *W. S. Duncan.* Barra, S. Uist, *A. Somerville.*

Lemna minor, *L.*—S. Uist, *A. Somerville.*

Potamogeton natans, *L.* (*verus*).—Scarp, *W. S. Duncan.*

Potamogeton polygonifolius, *Pour.*—St. Kilda, *Barrington.*

Potamogeton lucens, *L.*—*Macgillivray*; not confirmed.

Potamogeton Friesii, *Rupr.*—S. Uist, *A. Somerville.*

Potamogeton heterophyllus, *Schreb.*—Barra, *A. Somerville.*

Potamogeton pusillus, *L.*—Scarp, *W. S. Duncan.*

Potamogeton pectinatus, *L.*—S. Uist, *A. Somerville.*

Potamogeton filiformis, *Nolte.*—Benbecula, *Dr. Stirton.*

Ruppia rostellata, *Koch.*—(?)

Eleocharis uniglumis, *Link.*—Barvas, Island of Lewis, *Babington*, "Manual Brit. Botany," 1847.

Eleocharis multicaulis, *Sm.*—Scarp, *W. S. Duncan.*

Eleocharis pauciflorus, *Lightf.*—Scarp, *W. S. Duncan.*

Scirpus Savii, *Seb. et Maur.*—Barra, *A. Somerville.*

S. Tabernæmontani, *Gmel.*—S. Uist, *A. Somerville.*

S. maritimus, *L.*—S. Uist, *A. Somerville.*

Carex pauciflora, *Lightf.*—N. and S. Harris, *W. S. Duncan.*

Carex incurva, *Lightf.*—Scarista, Harris, a patch of about 400 square yards, *F. C. King.* Messrs. *Balfour* and *Babington* gathered a single specimen "of this or *C. stenophylla*."

Carex limosa, *L.*—Scarp, *W. S. Duncan.*

Carex pallescens, *L.*—S. Harris, *W. S. Duncan.*

Carex riparia, *Curtis.*—*Macgillivray*; not confirmed.

Alopecurus pratensis, *L.*—"Top. Botany."

Agrostis canina, *L.*—Scarp, *W. S. Duncan.*

Aira caryophyllea, *L.*—*Macgillivray*; not confirmed.

Trisetum flavescens, *Beauv.*—St. Kilda, *Macgillivray*; not confirmed.

Avena pubescens, *Huds.*—Scarp, *W. S. Duncan.*

Kœleria cristata, *Pers.*—Scarp.

Poa compressa, *L.*—*Macgillivray*; not confirmed.

Poa pratensis, *L.*; var. **cœrulea** (*Sm.*)—S. Uist, *A. Somerville.*

Festuca loliacea, *Huds.*—Named by Balfour and Babington, but not admitted by Watson. Scarp, *W. S. Duncan.*

Festuca sciuroides, *Roth.*—"Top. Botany."

Bromus giganteus, *L.*—? Very doubtful.

Brachypodium sylvaticum, *R. et S.*—Barra, *A. Somerville.*

Elymus arenarius, *L.*—"Of very rare occurrence," *Macgillivray*; not confirmed.

Scolopendrium vulgare, *Symons.*—Scarp, Harris, *W. S. Duncan.*

Lastrea æmula, *Brackenbridge.*—Scarp, *W. S. Duncan.*

Phegopteris polypodioides, *Fée.*—Harris and Scarp, *W. S. Duncan.*

Ophioglossum vulgatum, *L.*—North Rona, *Barrington.* Benbecula, *Dr. Stirton.*

Ophioglossum vulgatum, *L.*; var. **polyphyllum**, *A. Br.*—St. Kilda, *Barrington.*

Botrychium Lunaria, *Sw.*—St. Kilda, *Barrington.* Scarp, *W. S. Duncan.*

Equisetum pratense, *Ehrh.*—Obbe, Harris, *W. S. Duncan.*

Equisetum arenarium, *Newman.*—Links of Scaristra, Harris, *W. S. Duncan.*

Lycopodium annotinum, *L.*—Authority?

Isoetes lacustris, *L.*—Scarp, *W. S. Duncan.*

Pilularia globulifera, *L.*—Frequent about Obbe in Harris, *W. S. Duncan.*

Chara fragilis, *Desv.*—S. Uist, *A. Somerville.* var. **barbata** (*Gant.*)—S. Uist, *Somerville.*

Chara hispida, *L.*—S. Uist, *A. Somerville.*

Nitella translucens, *Agardh.*—Harris, 1889, *Mrs. W. S. Duncan.*

Nitella opaca, *Agardh.*—Harris, *Duncan.*

Nitella batrachosperma, *A. Br.*—Loch near Obbe, Harris, *W. S. Duncan.* This is the only station at present known in Great Britain. It was discovered here by Mr. Duncan in July 1888, and was sent to me by the finder, through Mr. F. C. King.

Balfour and Babington's estimate of the Flora was 349 species and varieties (without *Characeæ*). This present list adds 143 species and varieties (without *Characeæ*) making a total of 492 at present known. To this I think it probable that at least 50 or 60 species will be added and eventually found to occur.

It would extend this paper too much to give the additional localities for a large number of the species in Balfour and Babington's list, so I only give a few interesting notes on some. But I wish it to be understood that I consider I merely hold these materials "in trust" until some Scottish botanist will undertake a Flora of the Islands, when I shall be pleased to hand over all the material I possess. Unless otherwise stated, the notes are by Mr. Duncan, who

is a resident on the islands, and I hope will do good work in the future.

Thalictrum alpinum, *L.*—In S. Harris to within six or seven feet of high-water mark.

Corylus Avellana, *L.*—Mr. Watson remarks on this "In the Hebrides the hazel has perhaps been introduced, after having become extinct there." Mr. Somerville considers it certainly wild and native in S. Uist; and Mr. Duncan in Harris.

Populus tremula, *L.*—With its stems twisted, out of rocks in Barra and S. Uist, *Somerville.*

Ajuga pyramidalis, *L.*—S. Harris, etc., not unfrequent in the O. Hebrides, *W. S. Duncan.*

Until more searching has been done it is not advisable to make any comparisons with adjacent counties, etc.

NOTES ON SCOTTISH WILLOWS.

By F. Buchanan White, M.D., F.L.S., F.E.S.

I.

Amongst several collections of willows, which have recently been sent to me for examination, is a very interesting one made in Dumfriesshire by Mr. James Fingland, of Thornhill. In this collection, in addition to several noteworthy forms, about which I may have something to say on another occasion, there are some specimens of a willow which I have been hoping would sooner or later be found, namely a hybrid between *Salix purpurea* and *S. phylicifolia.*

In discussing—in the "Revision of British Willows"—the nature and characteristics of Smith's *Salix Croweana*, I pointed out that it was probable that under that name two plants had been confounded, one an abnormal condition of *S. phylicifolia*, the other a hybrid of *S. phylicifolia* and *S. purpurea.* As, however, I had seen but two specimens, both imperfect and not of certain British origin, of this supposed hybrid, I could not well say much about it at that time. It was therefore with much pleasure that I found in Mr. Fingland's collection the plants in question.

As I have shown in the "Revision," the name *Croweanà* Sm. properly belongs to the abnormal state of *S. phylicifolia*, and since the hybrid seems to be undescribed, I propose for it the title × *Salix secerneta* (*S. purpurea* × *S. phylicifolia*). Of *S. secerneta* there are in Mr. Fingland's collection examples from two different bushes; and as these are markedly different, it is desirable to give a description of each of them.

No. 59.—Glenairly Bridge, Sanquhar, Dumfriesshire; Sept. 3d and May 30th.—Shoots and twigs like those of *S. phylicifolia*, quite glabrous. Leaves long and narrow for their size, the largest about 2 inches long by $\frac{1}{2}$ inch wide, ovate-lanceolate acuminate (often obliquely), paler green but scarcely glaucous below; margins finely serrate; mature leaves quite glabrous, some of the younger leaves sparingly hairy below with long straight hairs. No stipules. Catkins (♂) small and narrow, the largest $\frac{1}{2}$ inch long, shortly peduncled, the peduncle with about 3 small lanceolate leaves, which are sometimes hairy below. Scales spathulate, often concave, rounded at the apex, base brown, upper half black, subcoriaceous and often slightly shining, clothed with long white hairs. Nectary short, broadly quadrate. Flowers monandrous, the filaments of the stamens being connate for their whole length; anthers small, four-celled; empty anthers not fuscous.

From the leaves alone this plant might be passed over as merely a form of *S. phylicifolia*, but in the flowers the *purpurea* element is shown by the structure (but not the colour) of the stamens and also of the scales. At the date (3d May) when the flowering specimens were gathered the catkins were rather *passè*, which suggests that the flowering period is intermediate between those of the parents.

No. 60.—Same locality as No. 59.—Leaves and twigs of *S. phylicifolia*. Catkins (♂) short and narrow, shortly pedunculated, with about two small peduncular leaves. Scales spathulate, acute, lower half brown, upper half very black, subcoriaceous, somewhat shining. Nectary quadrate. Filaments either nearly or quite free, or connate for a short distance.

This form is very near *S. phylicifolia*, but the connation of the filaments, and in a less degree the structure of the scales, indicate its relationship with *S. purpurea*.

Mr. Fingland has found another very remarkable willow

(No. 40) on the banks of the Nith below Sanquhar. Unfortunately (in some respects) the flowers are hermaphrodite, the upper part of the catkins being ♂ and the lower ♀. Yet although it is thus a monstrosity, of a kind which is not uncommon amongst willows, it deserves special notice, as it seems to be a ternary hybrid, the result of the crossing of *S. purpurea*, *S. phylicifolia*, and *S. aurita*. Whether the binary hybrid (*i.e.* the plant of the first hybridization) was the above mentioned *S. secerneta* (*S. purpurea* × *S. phylicifolia*), or *S. ludificans* (*S. aurita* × *S. phylicifolia*) or *S. dichroa* (*S. purpurea* × *S. aurita*) it is of course impossible to say, although, if I am correct in my assumption of the parentage of the plant, it must have been one of them. It may be thus described— × *Salix sesquitertia* nov. hybr. (*S. purpurea* × *aurita* × *phylicifolia*). Twigs and shoots like those of *S. phylicifolia*. Leaves (largest $2\frac{1}{2}$ by about 1 inch) oblong obovate, very shortly pointed or plicate-pointed; margins crenate-serrate, slightly incurved below; glaucous below with veins more or less raised, the youngest leaves showing the rugosity more distinctly; the younger leaves more or less subpubescent below, the pubescence somewhat crisped but often shining, old leaves nearly or quite glabrous. Stipules (rarely present) small, reniform. Catkins moderate ($\frac{3}{4}$ inch long), dense-flowered, subsessile or very shortly peduncled, peduncles with 2 or 3 very small leaves; catkins mostly ♀, but with a variable number of ♂ flowers at the apex. Scales spathulate, rounded at the apex, clothed with numerous long white hairs, reddish brown at the base, upper half black, those at the apex of the catkins often somewhat subcoriaceous and concave; ovary conical, subobtuse, densely clothed with white pubescence, as is the pedicel, which is about twice as long as the nectary; style about as long as the moderate-sized stigma; stigma-lobes erect-patent, rather broad, mostly undivided but sometimes notched or bifid; filaments of the stamens connate as far as the anthers, which are four-celled; empty anthers showing a tendency to become subfuscous. Occasionally some of the anthers at the point in the catkins where ♂ and ♀ flowers intermingle are beginning to change into ovaries.

The *purpurea* element in this curious plant is indicated by the monandrous ♂ flowers, and in a less degree by the

structure of the stigmas and the length of the pedicel in the ♀ flowers. From leaf-specimens it might readily be considered to be *S. ludificans*, since the leaves combine the characters of *S. phylicifolia* and *S. aurita*, their glabrosity, texture, and in some degree their pubescence showing the former species, and their shape, veining (especially of the young leaves), and pubescence the latter. The catkins show some affinity also to that species, but the evident style points to *phylicifolia*.

It is to be hoped that plants bearing unisexual catkins will yet be discovered. Although I have, in the description given above, mentioned the hermaphrodite nature of the catkins, that is of course no characteristic of the hybrid, being merely peculiar to the specimens seen by me.

In connection with this willow I should like to say a few words about the nomenclature of hybrids, since there is much divergence of opinion on the subject amongst botanists.

In the "Revision" I expressed my belief that "whilst there is a decided advantage in employing a compound name—since it conveys distinct information—such can be used in those cases only where no earlier name exists, and where there is no doubt about the parentage."

This opinion I am now inclined to modify. If only binary hybrids existed the utility of adopting a name composed of the designations of the parent species (when these are certain) would admit of no doubt. Such a name conveys information and is not too unwieldy. But when we have to deal with hybrids into whose parentage three or more species enter, it is doubtful whether the inordinate length of the compound name would not altogether outweigh any advantage it possesses. Names are not essential parts of organisms, but are merely convenient symbols for indicating the particular plant or animal under discussion. If such a symbol is cumbrous—as it would be if the binomial system of nomenclature were replaced by (say) a trinomial system —its convenience would disappear.

It seems to me therefore that for ternary hybrids we *must* adopt a single and not a compound name, and that—whilst there is no imperative necessity — it would be advantageous to do the same in the case of binary hybrids also.

LIST OF FUNGI FOUND AT STIRLING,

On *26th* and *27th October* 1891.

By Charles B. Plowright, M.D., H. G. Ward,
and Rev. J. Robertson.

[Those species not recorded from the province of Forth in "Mycologia Scotica" are indicated by *, and one not recorded from Scotland by **]

Agaricus (Amanita) muscarius *L.*; rubescens, *Fr.*

***(Lepiota)** Carcharias, *Pers.*; *amianthinus, *Scop.*

(Armillaria) melleus, *Fl. Dan.*

(Tricholoma) rutilans, *Schæff.*; *imbricatus, *Fr.*; terreus, *Schæff.*, *carneus, *Bull.*

(Clitocybe) laccatus, *Scop.*; infundibuliformis, *Schæff.*; metachrous, *Fr.*

(Collybia) maculatus, *A. and S.*; butyraceus, *Bull.*; dryophilus, *Fr.*; confluens, *Pers.*; *ambustus, *Fr.*

(Mycena) purus, *Pers.*; galericulatus, *Scop.*; polygrammus, *Bull.*; *luteo-albus, *Bolt*; *ammoniacus, *Fr.*; galopus, *Pers.*; epipterygius, *Scop.*; vulgaris, *Pers.*

(Omphalia) fibula, *Bull.*

(Clitopilus) *prunulus, *Scop.*

(Pholiota) *erebius, *Fr.*; *flammans, *Fr.*

(Inocybe) *calamistratus, *Fr.*; rimosus, *Bull.*; *eutheles, *B. and Br.*; geophyllus, *Sow.*

(Hebeloma) *fastibilis, *Fr.*

(Flammula) *sapineus, *Fr.*; *inopus, *Bolt.*

(Galera) tener, *Schæff.*; hypnorum, *Batsch.*

Stropharia) æruginosus, *Curt.*; semiglobatus, *Batsch.*

Hypholoma) sublateritius, *Schæff.*; *capnoides, *Fr.*; fascicularis, *Huds.*; *dispersus, *Fr.*

(Psiloeybe) semi-lanceolatus, *Fr.*

(Panæolus) fimiputris, *Bull.*

Coprinus plicatilis, *Fr.*

Cortinarius **largus, *Fr.*; collinitus, *Sow.*; *anomalus, *Fr.*; *evernius, *Fr.*; *armeniacus, *Fr.*; castaneus, *Fr.*

Hygrophorus hypothejus, *Fr.*; *lætus, *Fr.*; coccineus, *Fr.*; *miniatus, *Fr.*; conicus, *Fr.*

Lactarius turpis, *Fr.*; deliciosus, *Fr.*; vellereus, *Fr.*; var. exsuccus, *Smith*; rufus, *Fr.*; serifluus, *Fr.*

Russula nigricans, *Fr.*; foetens, *Fr.*; cyanoxantha, *Fr.*; Queletii *Fr.*; *fellea, *Fr.*; ochroleuca, *Fr.*; fragilis, *Fr.*

Cantharellus cibarius, *Fr.*; aurantiacus, *Fr.*

Marasmius Oreades, *Fr.*; peronatus, *Fr.*; androsaceus, *Fr.*

Boletus luteus, *L.*; chrysenteron, *Fr.*; edulis, *Bull.*

Polyporus amorphus, *Fr.*; annosus, *Fr.*

Stereum hirsutum, *Fr.*

Thelephora palmata, *Fr.*

Corticium sanguineum, *Fr.*

Clavaria cinerea, *Bull.*; rugosa, *Bull.*; inæqualis, *Fl.*, *Dan.*; vermicularis, *Scop.*

Calocera viscosa, *Fr.*; cornea, *Fr.*

Dacrymyces stillatus, *Fr.*

Phallus impudicus, *L.*

Lycoperdon gemmatum, *Fr.*; pyriforme, *Schæff.*

Mucor *fusiger, *Link.*

Sepedonium chrysospermum, *Link.*

Helvella crispa, *Fr.*; lacunosa, *Afzt.*

Diatrype disciformis, *Fr.*

ZOOLOGICAL NOTES.

Lesser Shrew (*Sorex minutus*, L.) **in Fife.**—On the 2d November I noticed an extremely small shrew running among long heather on the northern part of the Tents Muir, Fife. Having succeeded in catching it, I found that it belonged to some species with which I was not acquainted, and I accordingly sent it for identification to Mr. Eagle Clarke, who informs me that it is a specimen of *Sorex minutus*—a species which, though a very widely distributed one in Scotland, has not hitherto, he believes, been recorded for Fife. Under these circumstances the occurrence may be worth noting.—William Berry, Newport, Fife.

Polecat (*Mustela putorius*, L.) **in Dumfriesshire.**—Mr. George Anderson, gamekeeper, informs me that in May last he captured a

Polecat in one of his weasel traps on the lands of Glenlee. This is the only occurrence on the estate for upwards of 25 years. Formerly Polecats were numerous enough everywhere in this district, and it is very remarkable how quickly they have been exterminated.—ROBERT SERVICE, Maxwelltown.

The Blue-throated Warbler (*Cyanecula suecica*, L.) **in Orkney.**—On the 15th August 1891 Mr. Gilmour, of the Pentland Skerries Lighthouse, sent me a schedule with notes taken in May 1890, which he intended sending to me at the time, but had laid it aside, and it was only the other day he found it put away in a drawer, and he remarks: "My object in sending it now is to let you see about a bird we saw here on the 12th of May (last year, of course), and which you will see fully described in the schedule on that date. There is little doubt but it was as stated, the Blue-throated Warbler. I had many opportunities at the time of seeing it quite near with the glass. I even shot at it but missed, owing, I believe, to the shot being too large for such a small bird. The blue throat and the nice colours on the breast made it very conspicuous. It was, in fact, the prettiest bird I have seen here." Description of the bird as given in the schedule. "It resembles a Redstart on the back and keeps its tail erect somewhat like a Redbreast. The throat is a bright blue, and underneath the blue is a black border on the breast, also a red band with a white stripe. The red and black is more distinct on the breast than the white. Seen it very minutely with spy-glass. This is undoubtedly the Blue-throated Warbler." On referring again to the schedule, we find under date 12th May that the wind was moderate, the weather variable, with fog and haze. A Blackcap and two male Redstarts were also seen, and at midday several Swallows, all these birds being uncommon, the Blackcap especially so, in Orkney. There can be no reasonable doubt that Mr. Gilmour is right in his identification of this bird, and to him we are thus greatly indebted for being enabled to place on record the appearance of the Blue-Throated Warbler in Orkney for the first time.—T. E. BUCKLEY, Inverness.

Jay (*Garrulus glandarius*, L.) **in the Botanic Gardens, Edinburgh.**—On the 11th of October 1889 I was greatly pleased to observe a beautiful Jay in the Botanic Gardens, which was very wary, and I again saw it on the 15th of November in the same year. As this bird has become rare in the south of Scotland, the occurrence of a specimen in the city of Edinburgh is worthy of record.—WM. SERLE, Leith.

Wrynecks (*Iynx torquilla*, L.) **on the East Coast of Scotland.**—Though there is nothing particularly noteworthy in the occurrence of the Wryneck on our coasts during spring and autumn, the simultaneous detection of four examples—pointing as it unmistakably does to the passage of a migratory flight—is perhaps not unworthy

of being placed on record. On 20th August last, one was picked up in a dying condition on the burnside at Thorntonloch, a few miles east of Dunbar, and taken to Mr. Durie, to whom (through Mr. G. Pow) I am indebted for the particulars and the remains of the bird itself. On 24th August Mr. Small, George Street, Edinburgh, received one for preservation from the Pentland Skerries, and at the end of the same month another reached him from Kirkwall. About the same time a fourth was sent to Mr. Lewis Dunbar, Thurso, as I am informed by Mr. John Gunn, who saw it in Mr. Dunbar's hand.—William Evans, Edinburgh.

Snowy Owl (*Nyctea scandiaca*, L.) **in Argyllshire.**—My keepers have seen a large Snowy Owl here for two or three days. Yesterday it flew across in front of the Duchess, who, with a party, all stopped to see the wonderful big white bird, which seemed to be as big as a White Heron. This is not the first time the bird has been seen here. The late Dr. Smith, minister, told me many years ago that he had seen one hunting in Glen Aray in this parish.—Argyll, Inveraray, 30th Sept. 1891.

Spotted Crake (*Porzana maruetta*, Leach.) **in Shetland.**—Saxby does not mention the Spotted Crake as occurring in Shetland, in his "Birds of Shetland." But Saunders, in the "Manual of British Birds," says it has twice occurred in the Islands. On the 26th October last (1891), whilst snipe-shooting in Shetland, I met with the species. My spaniel "bunched" one in the marshes of Dunrossness, which would not rise on wing, and the dog fetched it alive to me. I have only once before met with an example in Scotland, viz. in a marsh at Dunipace in Stirlingshire, which when flushed, flew three yards or so and alighted, but was not seen again.—J. A. Harvie-Brown, Dunipace, Larbert.

The reported occurrence of Grus leucogeranus, *Pallas*, in the Outer Hebrides.—Mr. E. W. Marshall of Marlow, Buckinghamshire, writes as follows to "The Field" of 14th November 1891, p. 758:—"In the report of a recent meeting of the Zoological Society, which appeared in last week's 'Field,' I see that Dr. Hamilton made allusion to the shooting of a white crane (*Grus leucogeranus*) in the Outer Hebrides in August last. I think I am justified in concluding that this bird was one of a pair which belonged to me, and which made its escape last August. These two birds only came into my possession last summer. They were imported by Mr. W. Jamrach, and being full winged, were turned out with one wing 'brailed' instead of being cut. The bird in question must have broken its 'brail,' or contrived to get it off. My man happened to be on the spot at the time it escaped, and saw it rise suddenly and fly away in a northerly direction. I think it well to mention this fact, lest your readers may imagine that this white crane is a rare visitor from Japan or Northern India, upon whose skin probably a high price would be

set." There can be no doubt, I think, that this is the bird which was shot by Dr. MacRury on the Island of Barra, as recorded by me in "The Scottish Naturalist" for October 1891, p. 145.—Wm. Eagle Clarke, Edinburgh.

The Gray Phalarope (*Phalaropus fulicarius*, L.) **in Islay.**—As I was driving along the northern shore of Loch Indaal on the 13th of October, I was startled and delighted to see a small flock of six Gray Phalaropes swimming in a little pool of shallow water just beyond the force of the waves. A continued storm of wind from the south-west had blown for several days, and had only then begun to calm down, and this no doubt had arrested the birds in their migration to the south. To an ornithologist the little flock presented a most enchanting sight. Elegant themselves, the birds floated buoyantly on the water, which indeed they scarcely seemed to touch. They were constantly in motion, every movement being gracefully beautiful. Without intermission they pecked at the water getting no doubt microscopic life on the surface. One of their number was on the shore, where it ran nimbly about among the drifted sea-weed, at which it pecked as continually as its companions in the water. The utter fearlessness of the birds, and their indifference to the presence of man, was charming, as they allowed me to approach within a few yards without taking the slightest notice. They remained in the same spot for three days after I first saw them. One Phalarope was observed a fortnight later swimming close to the same spot. The Phalaropes chose the lee and not the windward side of the loch, where at the same time many Storm Petrels (most unusual visitants to Islay) had flown for shelter. During seventeen seasons I never before saw a Phalarope in the island, but I may mention that about the same date a fisherman killed two of these birds with an oar in Loch Fyne near Tarbet. It is clear from published accounts that a very large number of Phalaropes have this year been driven by storms to the seaboard of England, the whole coast line having been alive with the birds. The years 1866, 1867, 1886 were also remarkable in this respect.—R. Scott Skirving, Edinburgh.

Gray Phalarope (*Phalaropus fulicarius*, L.) **in Jura.**—A Gray Phalarope was killed, on the 12th of October, by a boy with a stone whilst the bird was wading about on the beach at Ardfin, Jura. The bird is now in my possession.—Henry Evans, Jura Forest.

Gray Phalarope (*Phalaropus fulicarius*, L.) **in S.W. Scotland.**—The Gray Phalarope is a rare straggler to this district when blown off its course by some gale during the autumnal migration. I have received one from Mr. Webster, who shot it on 28th September at Portrack. Early in October another was killed near Carsethorn when swimming in a small pool left by the tide. A boy threw a stone at it and knocked it over. Still another specimen of the same bird was seen swimming in the tideway near the same locality.

The last occurrence I know of was a pair shot by Mr. Irving Murray at Priestside, in November 1887. Previous to that, many years ago, one was shot on the margin of Lochrutton.—Robert Service, Maxwelltown.

The Nesting of the Woodcock (*Scolopax rusticula*, L.) **in North Uist.**—It may be of interest to record the breeding of the Woodcock in the Outer Hebrides. My gamekeeper reports to me having found two nests in the spring of 1891. I am not aware that such a fact has been previously recorded from the "Long Island," and, from the entire absence of both plantations and natural wood, few would expect such a district to be selected. My keeper sends me the following particulars, which I give as nearly as possible in his own words. He found the nests on the 15th of April. Both were within one hundred yards of each other, and in the centre of the best cock-shooting ground, on the south-east side of Eval. One of the nests was on the side of a small moss knoll, and consisted of moss and dry withered grass and contained four eggs. The second nest was on the bank of a small stream, and was placed among withered ferns close beside a boulder. In this case there was no attempt to make a nest, it was simply a natural hollow in which there were two eggs. When visiting the nests, after the young had been hatched, he could easily make out by the pieces of shell found in this second nest that the bird had only three eggs. There is good feeding ground round about the nests. He then proceeds to say—"Although I did not find them, I am of opinion that there were more nests than those, as I saw three other birds on that same date."—J. W. P. Campbell-Orde, Kilmory.

Ruff (*Machetes pugnax*, L.) **in Orkney.**—A Reeve was shot by Mr. Watt of Skaill, at Tankerness, Orkney, on 7th September 1891. It was one of three observed at same time and place. I have another preserved specimen shot on 27th August 1890 by Mr. Alfred Cowan of London, at Rennibister, Firth, Orkney. As I have heard of several others having been got here during the fall migrations, the Ruff can hardly be termed a very rare visitant in Orkney.—T. S. Peace, Kirkwall.

Buffon's Skua (*Stercorarius parasiticus*, L.) **in the Solway District.**—Following on the remarkable visitation of the Fork-tailed Petrels to the Solway, particulars of which will be found in Mr. Evans's note, there has been a much more remarkable immigration of Buffon's Skua. Indeed, more specimens of this handsome species have been seen and shot on both sides of the Solway than have been known to visit us during all the years of the past half a century. There is little doubt that, as was clearly the case with the Petrels, this unusual visit is attributable to the boisterous weather of the early part of October. The first one I heard of was got on the 21st of October at Priestside of Cummertrees, and was received by

me the following morning. The same day one was shot on the moor at Lochanhead. Another bird was sent to Mr. Hastings from Glen Æ. Mr. Robert M'Call saw one off Carsethorn on the 24th. Two others were sent from some one in Dumfries to a person in Carlisle. Mr. R. Armstrong, Thornhill, tells me he saw a small Skua sweeping along the troubled surface of the sea off Fairlie, in Ayrshire, on the morning after the stormy night of the 18th-19th. Coupling this with the fact that Skuas were shot so far inland as Lochanhead Moor and Glen Æ, it is highly probable that the Skuas may have travelled over the well-known fly line betwixt the Ayrshire coast and the Solway Firth.—Robert Service, Maxwelltown.

Buffon's Skua (*Stercorarius parasiticus*, L.) **in the Scottish Solway area.**—Although Buffon's Skua has occasionally occurred in Southern Scotland, its appearances within the faunal area embraced by the Scottish Solway are sufficiently irregular to be worth chronicling. I have examined two fine adults of this Skua, males in change, sent to a bird-stuffer in Carlisle from the neighbourhood of Dumfries on or about the 17th of October. Nine others were shot about the same time on the north-west coast of England, and these Scottish birds were no doubt travelling down the Irish Channel with the rest when a strong gale on 16th October induced them to seek the shelter of the Solway coast. One of the Dumfries birds retained the long central rectrices. The other had moulted these feathers.—H. A. Macpherson, Carlisle, 26th October 1891.

Great Shearwater (*Puffinus major*, Faber) **in Tiree.**—Mr. Peter Anderson of Tiree sent me for identification the head of a Great Shearwater, which he had found on the 14th or 15th of October last "about 200 yards from the sea, and was all battered with rain and eaten by gulls. General plumage brown above and white below." As this species has been much confounded in the past with the Sooty Shearwater (*P. griseus*), satisfactory records of this bird for Scotland are very few; indeed, the Tiree specimen is, perhaps, the third Scotch one about whose identity there can be no doubt. Mr. Anderson sent at the same time the head of a Fork-tailed Petrel (*Cymochorea leucorrhoa*), also from Tiree.—J. A. Harvie-Brown, Dunipace, Larbert.

Unusual numbers of the Fork-Tailed Petrel (*Cymochorea leucorrhoa*, Vieill) **on the Scottish Coasts.**—The latter part of September 1891 will long be remembered on account of the succession of severe gales which blew across our Islands from the North Atlantic. The 26th and 28th were particularly stormy days, the wind blowing with hurricane force from the west or north-west. As a consequence many birds which make the wide Atlantic their winter home, or use it as a highway during passage from their summer to their winter haunts, were caught in the tempests and driven upon our western shores—numbers being

carried to inland localities, a few even right across Britain. No species seems to have suffered more than the Fork-tailed Petrel, as the following records, which relate entirely to Scotland, clearly show. The first I heard of was on Tuesday, 29th September, when Mr. Small, taxidermist, Edinburgh, showed me three which he had that day received for preservation. One was from Kelso, where it had been killed the previous evening, the second came from Ayr, and the third was sent from Ardrishaig. Thinking others would likely have been sent to Mr. Hope, I at once called at his shop and found he had received two, one the previous evening from Langholm, and the other had been picked up that morning in the streets of Edinburgh—in the division of George St. between Hanover St. and Frederick St. On 2d October another was received by Small from Kelso, and on the same day a specimen from Mull was taken to Hope. Mr. Small tells me the Kelso birds when first noticed were pursued by rooks, and with regard to the Mull example Mr. A. B. Steele of the Edinburgh Museum writes me as follows, "On the 26th September last a specimen of this bird in a weak condition was shot by Campbell M'Kechnie, Esq., younger of Tenga at the south-east end of Loch Frisa, wind had been blowing a hurricane for days before." At the same time numbers appeared in the Solway, but before proceeding to mention these it may be well to draw attention to other Argyllshire records. In the "Field" of 17th October, Mr. A. D. Lawrie writes as follows from the yacht Rawn, Tayvallich Bay, Loch Leven, under date 11th October; "During the recent severe weather we were driven for shelter into Kames Bay, Loch Melfort. The gale was very stiff, and for several days we were surrounded by a large number of Fork-tailed Petrels. Often a dozen at a time would be flying close to us. During the lulls in the squalls I shot five as specimens, and sent them to be stuffed; but although we were anchored close under a weather shore, it was seldom safe for a boat to leave the yacht. At last the storm moderated; the petrels had then become very tame. I touched one with a broom as he flew over, another settled on the bowsprit; after we were under way, one of the crew caught another for a moment in his sou'-wester, but it escaped. Another Fork-tailed Petrel was recently picked up dead here on the shore of Loch Leven. I have never seen any of these birds in Argyllshire before." Mr. Scott Skirving, writing to Mr. Eagle Clarke on 20th October, states that about the same time as the birds were sheltering in Kames Bay, great numbers of Petrels (in all probability likewise of this species) were seen in Loch Indaal, Islay. The remains of one was sent to Mr. Harvie-Brown from Tiree, and the Rev. A. H. Macpherson had another from Skye (letter to Mr. Eagle Clarke, 11th November). To Mr. R. Service I am indebted for the following Notes from the Solway district, where unprecedented numbers appeared. On the night of 27th September

one was killed by coming in contact with the telephone wires in the High Street of Annan, and the following morning, Mr. Wannop shot one (of a flock of six or eight) near the Solway viaduct. Shortly afterwards the same gentleman saw another flock of four or five at Annan Waterfoot and subsequently he saw a single bird at Milnfield Railway bridge. Then Mr. Service examined a pair which were caught at Newbie, and on 30th September Mr. Farish, yr. of Kirkland showed him another which he had found a couple of days previously at Gamerigg plantation some 20 miles from the sea. On 28th September, one was picked up in an exhausted condition in the High Street of Moffat, as recorded by Mr. F. G. Murray in the "Field" of 24th October. The most easterly occurrence I have noted is that of a specimen picked up dead in a bog on the banks of the South Esk, eleven miles from Kirriemuir, Forfarshire (Mr. Sydney Peel, "Field," 3d October). All the examples I have examined were more or less in the moult and in a very emaciated condition. The Edinburgh bird had lost one of its legs. From the numbers that have been driven upon the north-west coast of Ireland we may form some idea of their whereabouts when overtaken by the storm.—William Evans, Edinburgh.

Occurrence of Triglops murrayi, *Günther*, on the East Coast of Scotland.—The first specimen of this fish for the east coast of Scotland was caught fourteen miles off Aberdeen, on 1st October 1890. Four more were obtained off Montrose, on 7th February 1891; and the sixth specimen was caught off the Kincardineshire coast, on 3d September 1891. These specimens were all caught in the ordinary trawl net, and kindly preserved for me by Mr. Geo. King, master of the trawl vessel "St. Oswin." This fish was first captured by Dr. John Murray while cruising in the "Medusa" in 1887-88 off the Mull of Cantyre and the Island of Sanda, and described as new by Dr. Günther, of the British Museum, from Dr. Murray's specimen. —Geo. Sim, Aberdeen.

[This species was described and figured, in 1889, by Dr. Günther in the "Proc. Roy. Soc. Edinburgh," xv. p. 209, Plate IV. Fig. A. —W. E. C.]

Note on Zeugopterus unimaculatus, *Risso*, and its Habitat.—One of the most elegant of the flat-fishes is this little Top-Knot, that has come to be very familiar to us. It differs from *Rhombus punctatus* mainly in having a brilliant second spot on the lateral line an inch or so above the tail. However markedly-different from the flounder or the dab, it does not seem to have been noted until lately, or when noted it was not looked up as specifically different from *Rhombus punctatus*. This was the view taken of it when, having captured and figured it in 1881, I showed the drawing to the late Dr. Day. He was wisely opposed to species-mongering, and looked upon this single external colouring mark as insufficient to constitute a species.

But if not specific it is a distinct variety, never to our knowledge reaching the size of its congener, and not being found in the West Highlands along with it. At least we have never taken any other Top-Knot in the Oban district, where this fish is comparatively common, not only in such enclosed lochs as Creran, but outside Mull. It is always taken on rocky tangle-covered ground, does not take a bait, and has all the richness of colouring that commonly pertains to fishes that frequent the tangle area. I am not disposed to look upon it as rare so much as frequenting ground whence it is seldom taken. I have taken it now over a wide area in the West, with the seine net, the dredge, and the trawl net, whenever these latter infringed upon the rough ground in question. I believe it to be an inshore fish, and consequently it has not such a quantity of ova as more pelagic species. It is always fat and in good condition, while it does not show great activity, so that I am disposed to look upon its Top-Knot as probably employed as a lure, like the angle of the Fishing-Frog (*Lophius piscatorius*), the very large mouth and head turned turbot-wise mark it from the ordinary flat-fishes. There is no reason why it should not take bait, if frequenting the ordinary fishing grounds, not having the very small gape that probably saves the Sole from the hook. The large brilliant spot that distinguishes this fish is not sexual, and consequently cannot come under the ordinary Darwinian explanation as if it had pertained only to the male.—W. Anderson Smith, Ledaig, Oban.

The Three-Bearded Rockling (*Motella tricirrata*, Bloch) in the Solway Firth.—A specimen of the Three-Bearded Rockling, captured at Carsethorn, was kindly given to me by Mr. Matthew Wood on the 2d of November last. I am not aware that this fish has ever been captured locally before. Our shores are too shallow and sandy to suit its tastes. In his well-known catalogue, prepared just about one hundred years ago, Dr. Heysham, of Carlisle, included it amongst Cumberland species, but without comment of any kind. The specimen measures 16 inches in length, and when fresh weighed 1½ lbs.—Robert Service, Maxwelltown.

Note on Rossia macrosoma, *D. Ch.*—This interesting little Cephalopod was formerly looked upon as being exceedingly rare, but within the last ten years I have supplied the principal museums with specimens. Mr. Alfred Brown took one specimen in the Clyde area, but its locale seemed very circumscribed. Of late, however, while I have not again taken full-grown specimens on the shore at low water as they struggled amongst the tangle, I have become more fully aware that they are neither very rare nor very local. At all depths, and wherever the ground was other than mud, I have taken them, sometimes in considerable numbers, during a day's operation. This refers to the whole West of Scotland, outside the Mull of Cantyre and up to the north of Skye. They appear possessed of considerable

intelligence, and the change of colour as apparently produced under passional excitement is always remarkable. When trawling two years ago in Loch Creran I came upon a small bunch of ova about the size of peas and opalescent, that appeared to me to belong to this species. Afterwards, outside Mull, a similar bunch came up attached to the roots of tangle, or rather deposited carefully in the interstices. These were so near maturity that we were able to hatch them out, when their character was clearly proved, the little Cephalopoda showing exact duplicates of their parents. I have not satisfied myself as to their food, for although I have kept them in confinement they did not seem to accommodate themselves to a restricted area. I should say that this is really the most common Cephalopod on our Western shores, for although *Loligo* may be more numerous at times, one may fish, trawl, and dredge persistently without ever obtaining a specimen or a sign of its presence. It is of course just possible that, during the season when we procured the greater number of *Rossia*, there may have been a special influx of this species. It is really impossible to judge from single seasons, as exceptionally favourable conditions occasionally produce remarkable quantities of otherwise comparatively rare forms. But the extremely widely dispersed habitats of the species would point to it as a really common West Coast species.—W. Anderson Smith, Ledaig, Oban.

Saperda carcharias, *L.*, in Elginshire.—On 3d September last, while staying at Cromdale, near Grantown, Strathspey, my son brought me a longicorn beetle which he had captured at rest on an aspen. Being unable to name it satisfactorily, I sent it to Canon Fowler, Lincoln, who has kindly informed me that it is a "small gray male of *Saperda carcharias*," which he adds is "very variable" and "extremely rare in Scotland." In Murray's "Coleoptera of Scotland," published in 1853, the only locality given for the species is Sutherlandshire. To this Dr. Sharp, after characterising the insect as "very rare," adds Moray (*vide* "Coleoptera of Scotland," "Scottish Naturalist," v. 375); and Canon Fowler in his recently completed "Coleoptera of the British Islands," merely copies Sharp.—William Evans, Edinburgh.

Monochammus sutor, *L.*, in Midlothian.—In September 1878, I obtained a longicorn beetle in Colinton Dell, near Edinburgh, which I could not find figured or described in any of the books on British Coleoptera to which I then had access. Not being at the time particularly interested in beetles, I took no further trouble in the matter beyond attaching a label, with locality and date, to the specimen, and placing it in my insect cabinet, where it remained unnamed till October last, when, on Mr. Eagle Clarke's suggestion, I sent it to Mr. C. O. Waterhouse of the British Museum, London, who kindly wrote me as follows: "Your insect is *Monochammus sutor*, a reputed British species; probably the specimens found from time

to time are imported, but there is no reason why it should not breed in Britain." Judging from the length of the antennæ it is evidently a male. On referring to Fowler's "British Coleoptera," in which, however, the insect is not figured, I find it described as "very rare, and probably an importation" (I presume from the Continent). Only six localities are given, all of them in England.—WILLIAM EVANS, Edinburgh.

Sphinx convolvuli, *L.*, at Dumfries.—This handsome moth is a scarce species in Scotland, yet hardly a season passes without one or more being captured in this district. I was presented with a specimen—unfortunately in a terribly battered condition—which had been caught in St. Michael Street early on the 7th of September last. It is somewhat remarkable that three-fourths of all the specimens that I and others have known of here have been caught in the immediate vicinity of the Dock Park. Many years ago Mr. William Lennon took the species in the larval condition in Castledykes grounds.—ROBERT SERVICE, Maxwelltown.

[Mr. Wm. Evans has shown me a specimen of this moth, in his possession, which was captured at Peebles about the same date as the above.—W. E. C.]

Sirex gigas, *L.*, in the neighbourhood of Dunbar.—On 16th August last, a specimen of this large Sawfly was captured here by Mr. T. Williams, and brought to me alive to name. Three days later, another was brought to me from Thurston, about five miles from here, by Mr. A. Denholm. The Thurston specimen I have shown to Mr. W. Evans, Edinburgh, who assures me it is an undoubted example of *Sirex gigas*.—G. POW, Dunbar.

BOTANICAL NOTES

Cauliflower Disease of Strawberry at Aberdeen.—In the last (fourteenth) of Miss Ormerod's valuable reports on Injurious Insects and Farm Pests a disease of strawberries is described and figured, which a good deal resembles the cauliflower head on a small scale. It is the work of eelworms or *Anguillulæ*, nearly related to the gall makers of this family already known, but of a distinct species, which has recently received the name *Aphelenchus Fragariæ* from Dr. Ritzema Bos. The malformation is composed of short flattened distorted inflorescences or stems, with many abortive flower and leaf buds. In the course of the past summer I observed in Old Aberdeen a few examples of this disease, not previously recorded from Scotland. They occurred on old plants only. Probably the disease will be found in other gardens when attention is drawn to their existence here. The best treatment in our present state of

ignorance appears to be the burning of all infested plants.—James W. H. Trail.

Scarcity of Oak-galls in 1891.—In my experience the scarcity of oak-galls in the vicinity of Aberdeen has been very marked this year. The "Currant-gall" (*Spath. baccarum*) was especially scarce, while its dimorphic condition — the common "Oak-spangle" (*Neuroterus lenticularis*) was even more uncommon, not one being observed on trees the leaves of which in former years were richly bedecked with them. Has anything similar been observed elsewhere?—J. W. H. Trail.

Euphrasia officinalis, L., form *paludosa*, Townsend, is a new form described and figured (*Journ. Bot.* 1891, pp. 161, 162, pl. 305) by F. Townsend, M.P., F.L.S., from marshy ground near Castleton, Braemar. It approaches nearest to *E. gracilis*, Fr.; but is rather larger and coarser, with broader and shorter calyx-segments, shorter middle-lobe of lower lip of corolla, emarginate capsule narrowing below only, and a dark green tinge (instead of dark purple) on the upper surface of leaves, bracts, and exposed parts of capsules.

The Biographical Index of British and Irish Botanists, compiled by James Britten, F.L.S., and G. S. Boulger, F.L.S., which has been in course of publication in the "Journal of Botany" during the past year or two, is approaching completion. It is to be reprinted with such additional information as has been gained during its publication, and will be issued in one volume. The list is of very great value for reference, and the opportunity of procuring it should not be lost.

The "Key to the genera and species of British Mosses," by the Rev. H. G. Jameson, also published in the "Journal of Botany" during 1881, and illustrated with a plate, has been issued as a separate paper at the price of 1s. 6d.—It will prove useful as an aid to students of this group of plants.

CURRENT LITERATURE

The Titles and Purport of Papers and Notes relating to Scottish Natural History which have appeared during the Quarter—October to December 1891.

[The Editors desire assistance to enable them to make this Section as complete as possible. Contributions on the lines indicated will be most acceptable and will bear the initials of the Contributor. The Editors have access to the sources of information undermentioned.]

ZOOLOGY.

The Mammalian Fauna of the Edinburgh District. By William Evans, F.R.S.E. *Proc. Roy. Phys. Soc. Ed.*, xi. part i.

(1890-1891), pp. 85-160.—Treats on the present and past history and distribution of forty-eight species, with original notes on the habits of some of them.

Some Further Notes on the Summer Birds of Shetland. By HAROLD RAEBURN. *Proc. Roy. Phys. Soc. Ed.* xi. part i. (1890-1891), pp. 67-73.—In addition to further notes on some of the species in the author's former paper (*op. cit.* ix. p. 542), Pernis apivorus, Motacilla lugubris, Passer montanus (?), Corvus monedula, Cotile riparia, Syrrhaptes paradoxus, Tadorna cornuta, Harelda glacialis, Colymbus glacialis, and Ardetta minuta—most of them not summer birds—are new to the list.

The Chief Fishing Grounds on the East Coast of Scotland, with Charts showing their Position and Extent. By Dr. T. WEMYSS FULTON, F.R.S.E. *Ninth Ann. Rep. Fishery Board for Scotland* (1890), Part iii. pp. 177-183 (Plates III. and IV.) [Issued 24th Sept. 1891.]—Contains much useful information on the Distribution of Food-Fishes.

Further Observations on the Life-Histories and Development of Food and other Fishes. By Professor M'INTOSH, LL.D., F.R.S. *Ninth. Ann. Rep. Fishery Board for Scotland* (1890), Part iii. pp. 317-342 (Plates X.-XIII.)—Pages 334-341 are devoted to a "List of some of the Pelagic Ova, Larvæ, and Young Fishes obtained by the 'Garland' in 1890-1891 in Scottish waters."

West Coast Fauna of 'Garland' Expedition. By W. ANDERSON SMITH. *Ninth Ann. Rep. Fishery Board for Scotland* (1890), Part iii. pp. 297-299.—Records the capture of Cepola rubescens (between Jura and Colonsay), Zeugopterus unipunctatus (Lochs Linnhe and Scridain), Rossia macrosoma, Brissopsis lyrifer, Balanoglossus (new to Scotland), Isocardia cor (Loch Sunart), and other species.

Notes on some Scottish Coleoptera. W. D. R. DOUGLAS. *Ent. Mo. Mag.* (2) ii. (Nov. 1891), p. 305.—Timarcha tenebricosa, Rhynchites cupreus, R. æneovirens, Corymbites holosericeus, Subcoccinella 24-punctata, Gyrophæna minima, and Phyllotreta nodicornis, in Kirkcudbrightshire; and Elater nigrinus, near Dumfries.

Coleoptera at Fort William. By ALFRED THORNLEY. *Ent. Mo. Mag.* (2) ii. (December 1891), p. 332.—Aphodius contaminatus, Nebria gyllenhali, Patrobus septentrionalis, Miscodera arctica, on Ben Nevis.

Melanism and Melanochroism in British Lepidoptera. By J. W. TUTT, F.E.S. (London, October 1891).—Contains much information on the numerous melanic and melanochroic forms found in Scotland, and their bearing upon the elucidation of the phenomenon.

Captures at Sugar in Argyllshire in September. T. M. CHRISTY. *The Entomologist*, xxiv. (October 1891), p. 246.—Epunda lichenea, Hydræcia micacea, Triphæna orbona, Calocampa vetusta, Anchocelis rufina, A. litura, Cerastis vaccinii, Orthosia macilenta, O. lota, Calymnia trapezina, Calocampa solidaginis.

Notes on Lepidoptera from Various Localities. By JOHN E. EASTWOOD. *The Entomologist*, xxvi. (December 1891), p. 299.—Aplecta occulta in Inverness.

Phibalapteryx lapidata, etc., in Stirlingshire. E. C. EGGLETON. *The Entomologist*, xxiv. (November 1891), p. 268.—Abundant near Fintry in September. The other species recorded are, Larentia cæsiata, Chesias spartiata, Celæna haworthii, Hydræcia nictitans, Charæas graminis, Tapinostola fulva, Emmelesia ericetata, Carsia imbutata, Agrotis lucernea, Plusia bractea, P. festucæ.

Micropteryx caledoniella: another new species, probably from Birch. By A. F. GRIFFITH, M.A. *Ent. Mo. Mag.* (2) ii. (November 1891), p. 300.—Described from specimens captured in Sutherland in April 1885.

Drepanopteryx phalænoides, *Linn.*, in Scotland. KENNETH J. MORTON. *Ent. Mo. Mag.* (2) ii. (November 1891), p. 308.—Captured at Cleghorn, on 5th October 1891.

The Invertebrate Fauna of the Inland Waters of Scotland, Part II. By THOMAS SCOTT, F.L.S. *Ninth Ann. Rep. Fishery Board for Scotland* (1890), Part iii. pp. 269-296 (Plates V., VI.)—Deals with the Invertebrata of Loch Leven, Raith Lake, Lochs Camilla and Gelly (Fifeshire); Loch Strathbeg (Aberdeenshire); Loch Achnacloich (Ross-shire); Lochs Ness, Oich, and Lochy (Inverness-shire); Lochs Balnagowan, Kilcheran, and Fiart (Lismore Island, Argyllshire); Lochs Hempriggs and Wester (Caithness); and Lochs Harray and Stennis (Orkney).

Additions to the Fauna of the Firth of Forth. Part III. By THOMAS SCOTT, F.L.S. *Ninth Ann. Rep. Fishery Board for Scotland* (1890), Part iii. pp. 300-310.—Records forty-two species of Crustacea and one of Mollusca as new to the Firth.

Notes on a Collection of Echinoderms and Molluscan Shells from the Moray Firth District. By THOMAS SCOTT, F.L.S. *Proc. Roy. Phys. Soc. Ed.* xi. part i. (1890-1891), pp. 81-84.—The species dealt with are: Asterias hispida, Hippasteria plana, Palmipes membranaceus, Luidia savignyi, Echinocardium flavescens, Isocardia cor, Scaphander lignarius, and Buccinum undatum var. paupercula.

The Land and Fresh-Water Crustacea of the District round Edinburgh. By THOMAS SCOTT, F.L.S. *Proc. Roy. Phys. Soc. Ed.* xi. part i. (1890-1891), pp. 73-81.—Treats on the Amphipoda

and Isopoda, of which there are ten species, with synonyms and descriptions when necessary.

Further Notes on the Medusæ of St. Andrews Bay (August 1890-May 1891). By the Rev. J. H. Crawford, F.L.S., Dundee. *Ann. and Mag. Nat. Hist.* (6) viii. (October 1891), pp. 295-297. —Deals with specimens of Anthomedusæ, Leptomedusæ, Trachomedusæ, Narcomedusæ, Acraspedæ, and Planulæ.

BOTANY.

The Cotyledonary Glands in some species of Rubiaceæ. By Thomas Berwick, *Trans. Bot. Soc. Ed.* (October 1891).—Describes these structures in Galium Mollugo, in G. Aparine, and in several exotic species.

On Temperature and Vegetation at the Royal Botanic Garden, Edinburgh, in June 1891. By Robert Lindsay, *l.c.*—The usual monthly list of plants in flower in the rock garden, and of meteorological notes.

The Phanerogamic Flora of St. Kilda. By Alex. H. Gibson, *l.c.*—An enumeration of species observed in August 1889.

Varieties of Phanerogams exhibited at Bot. Soc. Ed., meeting of 9th July, *l.c.*—Viz. hairy Silene maritima from near North Berwick; and two varieties of Matricaria inodora—*a*, with tubular ray flowerets; *b*, with densely hirsute stem and leaves.

Some British Hawkweeds. By Ed. F. Linton, M.A., *Journ. Bot.* (Sept. 1891).—Describes two new species, viz. Hieracium Marshalli, from Unich Water, Forfarshire, and H. Pictorum, from several localities in Aberdeenshire, Forfarshire, and Perthshire.

Armeria pubigera, var. scotica (Boissier) Mr. Britten, *l.c.*—Queries if this is accepted as a varietal form of A. maritima in Scotland. Boissier says, "in insula Staffa Scotiæ . . . legit ch. A. D. C."

The Algæ of the Clyde Sea Area (continued), with a map, *l.c.* By E. A. L. Batters, LL.B., F.L.S.—This valuable list is now to be obtained in separate form.

Notes on Mycetozoa. By A. H. Lister, F.L.S., with 5 plates, *l.c.*—Among numerous other forms two are described and figured from examples gathered at Moffat by Prof. Balfour, viz. Physarum Braunianum, De Bary, and Lamproderma echinulatum (Berk.), Rost.

British Tremellineæ. Revised by M. C. Cooke, *Grevillea* (Sept.)—Gives short descriptions of all known British species, but does not mention any localities.

REVIEWS

Melanism and Melanochroism in British Lepidoptera. By J. W. TUTT, F.E.S. (London: Swan Sonnenschein, and Co. October 1891), pp. 66.

We have perused with much interest this contribution to an important phenomenon, about which there is singularly little to be found in the literature of British Natural History. This is not a little remarkable because it is a subject that should especially demand the attention of our naturalists, since our islands appear to be the headquarters of melanic forms. This peculiarity is considered, by the author, to be due to the great humidity of our climate; and it is interesting to note that where the humidity is at its maximum with us—*i.e.* in Ireland and certain districts in Scotland,—melanism and melanochroism among the Lepidopterous insects are also at their maximum. As bearing upon this subject we may remark that there are two important cases of melanism among the mammalia which bear out these views. These are:—(1) the black form of the Common Rat, the *Mus hibernicus* of Thompson, which is fairly abundant throughout Ireland, and not unknown in the Hebrides, and yet practically absent from the mainland of Britain. (2) The black variety of the Water Vole (*Arvicola amphibia*), which is much commoner than, and, perhaps, replaces the type in some of the northern districts of Scotland. This animal is widely distributed in Britain—there are no voles in Ireland—but melanic forms are of exceptional occurrence out of Scotland. Though the little volume under consideration treats of the subject under the light afforded by the evidence relating to one order of the Insecta, yet it is a valuable contribution to an interesting subject, and it should be read not only by entomologists but by all interested in the peculiarities of our insular fauna. To the Scottish naturalist we have said enough to indicate that it is of especial value and interest.

British Edible Fungi, how to distinguish and how to cook them, by M. C. COOKE, M.A., LL.D., deserves hearty commendation as well fulfilling its aim of giving clear information regarding the edible Fungi of our country in a manner that can be understood by any one wishful to know how to recognise and how to make use of them. The admirable figures on the twelve plates, illustrating forty-three species, add much to the value of the book as a ready means of identifying the Fungi.

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THE OCCURRENCE OF THE HOODED SEAL (*CYSTOPHORA CRISTATA*, Erxleben) IN BENBECULA.

By J. MacNaught Campbell, F.Z.S.

That this rare species may have occurred more frequently than is recorded is very probable; the want of competent observers and the habits of the whole tribe are such as to prevent its appearance being noted more often than it has been. Semi-migratory in its nature, it is possible that in our outlying islands and skerries this well-marked species may be a more frequent visitor than we are aware of.

Although its appearance has been without doubt recorded on three different occasions on the shores of the United Kingdom, once in the Orwell in 1847 ("Zoologist" 1847), once at Frodsham on the Mersey in 1873 ("Proc. Zool. Soc." 1873), and at St. Andrews on the 22d July 1872; the latter record is the only one, so far as I am aware, relating to Scotland, and is fully described in the "Scottish Naturalist," vol. ii. pp. 1-8, by Mr. Robert Walker. In the Orkneys, although it is "said to have been killed there," no record is given of such a fact in the recently published and valuable contribution to our faunal literature the "Fauna of the Orkney Islands," by Messrs. Harvie-Brown and Buckley, the authors

remarking "that had a specimen of such a striking beast been procured, it is more than likely that some special notice would have been taken of it." The late Mr. Alston, in his "Mammalia of the Fauna of Scotland," published by the Natural History Society of Glasgow in 1880, states on the authority of Mr. Howard Saunders that the "Bladder Nose" is well known as a visitor to the Ve Skerries in Shetland. Under these circumstances, it is perhaps interesting to place another record of the occurrence on our Scottish shores of this rare seal.

In the summer of last year one of my correspondents, Mr. Ranald Macdonald, lately schoolmaster at Loch Uiskevagh, Benbecula, and to whom I am indebted for valuable assistance in other subjects, wrote me that he had secured "a very beautiful seal-skin" for me, and judging from the tone of his letter that it was not a common one, I wrote him to send it on together with the skull and any other bones which might be obtainable. The skin reached me in due course together with the skull, which was all that had been preserved of the animal, and on subsequent inquiry, I learned that it had been killed by a man about the end of May last, in Loch Uiskevagh. I was extremely sorry that it had not been skinned in such a manner as to fit it for a mounted specimen, the skin of the head and the flippers having been cut off, but from an examination of the skull it was evidently a young Hooded Seal. The skin as it stands measures 3 ft. 4 in. in length and 2 ft. 3 in. in breadth, so that the animal would probably be from 4 ft. 6 in. to 5 ft. in total length. The hair above is rather long, silky in texture, of a silvery-gray colour, and has a close underlying fur of a light brown shade, the sides and underparts yellowish white. The skull is $6\frac{1}{4}$ in. in length and $4\frac{1}{2}$ in. in greatest breadth, flat in appearance, the height of the cranium (exclusive of the lower jaw) being $3\frac{1}{4}$ inches. The dental formula is inc. $\frac{2-2}{1-1}$; can. $\frac{1-1}{1-1}$; molars $\frac{5-5}{5-5}=30$. The incisors and canines are slightly incurved, the surfaces of the former grooved or plaited, the two upper and outer ones being about one-third less than the canines, these latter having on their inner surfaces two strong ridges or plaits. The first and

third molars in the upper jaw are the smallest (at least on one side, as the last three are missing from the other), and all the crowns of the molar teeth are strongly plaited. The animal had evidently been clubbed, as the nasal bones and the left mandible of the lower jaw are broken, and that may also account for the missing molar teeth in the left side of the upper jaw. The skull with the skin, which, as I have stated above, were all that was preserved, are in my possession. The sex was not ascertained, the man who killed it having no idea of the rarity of his find, and having done so solely for the sake of its hide and oil.

REPORT ON THE GREAT SKUA (*STERCORARIUS CATARRHACTES*, LINNÆUS) IN SHETLAND DURING THE SEASON OF 1891.

BY WILLIAM EAGLE CLARKE.

THE attention which was called to the persecution of the Great Skua, at the close of the disastrous breeding-season of 1890, was undoubtedly the means of doing much good, since it aroused and secured the interest and influence of ornithologists and others on behalf of the bird's future welfare, and for its preservation as an indigenous British species. Then followed the wise and generous act of the Council of the Zoological Society of London in presenting its much-prized silver medals to the representatives of the families of Scott and Edmondston in recognition of their valued services as protectors of the Skuas on their respective domains in past years—a timely recognition which was well calculated to secure for the bird even greater attention in the future.

In the hope that the publication of the various particulars relating to the Skua in its British breeding-stations during the past year may be the means of furthering the much-needed protection which has been so recently renewed, I have been induced to prepare the following report. In addition to the information indicated, the report gives some particulars

of interest to naturalists, and touches upon questions bearing on the economy and life-history of the species which are worthy of elucidation.

For the facts and information afforded I am indebted to Mrs. Traill, an Edinburgh lady, who spent two of the summer months on Foula, and is well known for the kindly and practical interest she manifests in all that concerns the remote island and its inhabitants; and to Mr. G. E. Paterson, of New Kilpatrick. This indebtedness it now affords me much pleasure to fully acknowledge. For the information relating to the Unst Colony the excellent and satisfactory letter of Mr. Thomas Edmondston which appeared in "The Times" of 1st August 1891 is quoted.

FOULA.

Mrs. Traill reports as follows:—

Although we have not yet returned to the happy days when the man who killed a Bonxie was fined sixteen shillings and eightpence, there are indications that the kingly birds are not to be persecuted as they have been, at all events not in Foula.

About one hundred pairs arrived on the 27th of March, a full week earlier than is usual, and all had come by the 3d of April. Of the first-laying all the eggs were taken except six, and these hatched in due course. About forty nests of the second laying were noted. Of these one half contained a pair of eggs, and the other half a single egg each. From these sixty birds were reared. There was no third laying, or at any rate, no more birds were hatched. As no steamer came to the island this year, the number of strangers who landed was very small; and no skuas' eggs, so far as I could learn, were sold on the island. A Scalloway man who would have bought largely declined to give the price asked by the natives; and a tourist from Birmingham, who was inclined to be more liberal, was too late in the season to get anything, but promised to return in good time next year. A gentleman from Kent killed a full-grown Bonxie in June.[1] I give you his name and address, as well as that of the Birmingham visitor, for publication or otherwise. A pair of young birds were taken from the nest, kept for eight weeks, and taken alive in August to an eminent ornithologist in England.

As a ground-officer has now been appointed, whose duty it is to follow strangers wherever they go on the hills and to report those natives who take eggs, it may be expected that each year the birds will enjoy greater peace and safety and will multiply accordingly.

[1] This was done with the written permission of the proprietor, or his agents, who ought to know that the law cannot be set aside by them.

This report of Mrs. Traill's is a valuable and interesting one, and if it did not disclose the existence of a wholesale system of egg-taking by some of the natives it might be considered satisfactory. There is, however, in it much that is calculated to encourage us to hope for a better state of things in the now approaching season. It also throws important light upon the relative numbers of the breeding and non-breeding birds. This goes to prove that though we may fairly estimate the number of Skuas now resorting to Foula annually during the summer at not less than one hundred and twenty individuals—an estimate we can endorse the correctness of from personal observation—yet we must not conclude that all these visitors to the island of their birth are breeding birds, but it would appear now that two-thirds of them are to be reckoned as such. This is an important fact, and one upon which we have not hitherto, I believe, had any reliable data.

Mr. G. E. Paterson reports—

I received a letter from a Scalloway fisherman, whose name I give you, dated 3d August 1891, in which he says he had been to Foula, and that he had the chance of a lot of egg shells, and could get them and send on the lot to me when I could select them and send on the value at my own price, there being a lot of Bonxies among them. I wrote him to send on the eggs, which were sent off from Scalloway on 31st August. They arrived upon 5th September, and I found fifty-five Great Skua's eggs in the box. The following was written upon a slip of paper—"4 dozen and 7 bonxy egg shells, they are separated from the others by this line." I wrote in reply to this that I was sorry to see so many Great Skua's eggs, and that I did not know what to do with them, and also asked him what was the people's idea of price, and on 14th September he wrote me to the following effect.

"They came to me from Foula just as you got them, I was away when the box came. I told my wife to send them on to you, so I have never seen them. I am sorry if there are more than you may require, for I had either to take them all or none. Also I told them I would not price them as I knew nothing about them. Mr. ———— has not got many shells this year, for he has been wondering to me what has come of all the shells this year."

I wrote to Mr. ————, Scalloway, who deals in eggs and who is alluded to by the Scalloway fisherman, to ask him if he had any Great Skua's eggs for sale. On 21st September he replied :—

"I did not receive many eggs this year, in fact scarcely any, about a dozen Bonxies only, which are all gone."

Mr. Paterson's object in getting possession of these eggs was to prove the statement made by him after a visit to Shetland in 1890, viz. "The Great Skuas' nests are pillaged regularly and persistently by the inhabitants of Foula."

The above communications bear out Mrs. Traill's statement that practically all the eggs of the first-laying were taken. While this is greatly to be deplored, and it is hoped may be prevented in the future, it suggests a sinister question, namely—What would have been the result if an early and ready market for these first-eggs had been found? Would not the disasters of the season of 1890 have been repeated, when it is said not a single chick was reared by the whole of the Foula colony? The names of all concerned in this little less than shameful business have been placed in my hands, and I shall have to consider whether it is not my duty to inform Mr. Scott, the proprietor of Foula, what has been done against his expressed orders and desires, and give to him the names of those who are implicated.

UNST.

Regarding the welfare of the Great Skua in Unst Mr. Thomas Edmondston wrote as follows in "The Times" (of 1st August 1891).

At the beginning of May I engaged a special keeper to live for three months on Hermanness, and keep watch and ward by night and day over the Skua's home. Notices were published and extensively posted in the island, intimating that any person or persons found trespassing within the enclosure of Hermanness during the months of May, June, and July, would be prosecuted; but I am glad to say that no proceedings of this nature have been necessary. Early in May nine pairs of Skuas returned to the neighbourhood of their ancient nesting-place. One pair established themselves—an interesting fact—upon the hill at Saxavord, a promontory opposite Hermanness, and a former, but long-abandoned station of the Skua. Another pair selected as a domicile the heights of Sneuga, some distance to the south of Hermanness, and not on our land. Seven pairs sought again asylum within the territory of their old protectors. I grieve to say that both of the outlying nests were harried by egg-stealers, and that neither of the pairs succeeded in hatching their

young. The Hermanness birds had a different fate; for thanks to careful and zealous watching, the eggs in every one of the seven nests were hatched out, and the young birds were safely on the wing some weeks ago. This gratifying result is greatly owing to the personal supervision and unwearied care of my nephew, Mr. Laurence Edmondston, of Halligarth, from whose report to me I take the foregoing particulars.

"I may here repeat, what I had the honour of stating last April before the Zoological Society, that in my opinion the Skuas on Hermanness cannot be expected to increase much beyond the number now attained. In years gone by, when the colony reached 30 or 40 pairs, the two species of gulls on which the Skuas chiefly depend for their piratical system of living, the Lesser Black-Back and the Herring Gull, were far more numerous in and around Hermanness than they are now. Protection for the Skuas implies some measure of protection also for the gulls; but unless the latter greatly increase, the former cannot be expected to do so. In existing conditions, and pending a possible large increase in the number of gulls, it is nearly certain that the Skua colony can only be increased by enlarging the area of ground protected."

All naturalists will accord Mr. Edmondston their warmest thanks for his great, and happily successful, efforts to protect the birds upon his domain.

With regard to the views expressed by Mr. Laurence Edmondston as to the numbers of the birds at Hermanness being at about their maximum and the reasons he adduces in support of that belief, I would venture to question their correctness. Let us test the value of this theory by the aid of the evidence afforded by the Island of Foula, which, from the fact of its being *the* headquarters of the species, and also from its remarkably isolated position—it is 15 miles from its nearest co-island of the Archipelago—enables us to form conclusions of special value upon such a question as this. Now, at Foula there are not less than 120 Great Skuas to be provided for, and yet the numbers of the Lesser Black-backed Gull and the Herring Gull are, if anything, rather remarkable for their paucity, so far as my experience goes, and also that of my friends who have visited the island. Here it seems almost certain that the Skua must either levy toll upon other species—if on the Larinæ, on the Kittiwake—or it must procure food by other methods than by practising those characteristic piratical

propensities which render it and its congeners so remarkable.[1] Thus I am led to consider that Foula bears most important testimony against the soundness of Mr. Laurence Edmondston's views upon this subject; and I sincerely hope that the Skuas at Hermanness may multiply to such an extent as to become themselves witnesses against that gentleman; and I believe, indeed, from the Unst report, that they will soon not fail to do so.

The Great Skua would seem to be confined to the immediate vicinity of its chosen haunts during the nesting season, for during a month's cruise among the Shetlands in the season of 1890, when our attention was devoted to birds, Mr. Harvie-Brown and the writer never observed this species except in the proximity of its stations.

ON MALFORMED TROUT FROM SCOTTISH WATERS. No. I.

By R. H. Traquair, M.D., F.R.S.
Keeper of the Natural History Collections in the Museum of Science and Art, Edinburgh.

Plates III., IV., V.

It is now twenty-one years ago since the late Mr. C. W. Peach[2] drew attention to a peculiar malformation of the caudal fin occurring abundantly in trout *Salmo fario*, L., from Loch-na-Maorachan, a small lake in Islay. In these fish, which have since that time been popularly called "Tailless Trout," the caudal fin, instead of showing a large broad triangular expansion of the usual form in this species, is stiff, abortive in development, and rounded posteriorly, looking indeed at first sight as if some one had with a pair of

[1] Dr. Edmonston, of Unst, informed Macgillivray ("British Birds," 1852, v. p. 483) that this bird "does not possess the habit of his congener, the Arctic Gull, that of making some other water-birds not only cater fish but cook it for his table. He has a good beak and pinions of his own, and he disdains to *sorn* for the disgorgement of others." This is an important statement by one who had unusual opportunities for observation; but it would seem not to be the experience of later authorities.

[2] "Brit. Assoc. Rep." Aug. 1871, Transactions of Sections, p. 133.

scissors cut off a large portion of the fin, and trimmed it into the peculiar and abnormal shape which it now presents.

In the following year (1872) Mr. James Thomson, F.G.S., published a paper[1] in which he minutely described the position of the lake, both geographically and geologically, giving also two woodcut figures of the trout themselves, in one of which the tail-fin appears simply rounded, in the other rounded-acuminate, as it shows a little point projecting from the middle posteriorly. In this paper Mr. Thomson states that he had not found any of the fins save the caudal affected by this peculiar abnormality, and gives to the fish the distinct name of *Salmo Islayensis*.

About the same time I published a brief anatomical description, with figures, of the "Tailless Trout of Islay,"[2] taken from two specimens given to me by Professor (now Sir William) Turner and Mr. Peach. Here, besides giving an account of the essential nature of the malformation of the caudal fin, I demonstrated that a similar condition was also present in the anal and pectoral fins of the larger specimen, the dorsal and caudal remaining alone unaffected.

On the occasion of the "Tailless Trout" of Islay being first exhibited to the British Association by Mr. C. W. Peach, the late Dr. Grierson of Thornhill in Dumfriesshire mentioned that he had heard of similar "docked" trout having been taken near Wanlockhead, but I have never seen any specimens from that locality, nor have I heard of any such having been described or figured. It was not until the year 1882 that Mr. Harvie-Brown afforded me ocular proof of the occurrence of this malformation in trout from a locality in Scotland far distant from Islay, by presenting to the Museum of Science and Art two specimens from Loch Enoch in Kirkcudbrightshire, which he had obtained from Mr. Adam Skirving of Croys. Of these I published a description in the same year,[3] in which I showed that not only was the malformation of the caudal fin of precisely the same nature as in the Loch-na-Maorachan fish, but that here also the anal

[1] "Science Gossip," April 1872.
[2] "Journ. Anat. & Physiology," vol. vi. 1872, pp. 411-416, pl. xix.
[3] "Proc. Roy. Phys. Soc. Edinburgh," vol. vii. 1882, pp. 221-223.

and pectoral fins had not escaped participation in this singular condition.

Mr. Harvie-Brown likewise informs me that he had about the year 1856 or 1857 been in the habit of catching similar trout in the Gonar Burn at Abington in Lanarkshire, and I quote the following from a note with which he has kindly supplied me,—"As is well known, the trout of Gonar Burn, as is remembered by me personally, were (or are, if they are not now extinct) invariably deformed and had tails as in the Islay specimens and those also from Loch Enoch, and quite as pronounced. These little trout were very fat and otherwise in prime condition." It is to be regretted that none of these trout from Gonar Burn have been preserved, if they are now extinct, as Mr. Harvie-Brown thinks is probable, whether from poisoning by washings from lead-mines or otherwise.

But from Mr. Harvie-Brown I have acquired the knowledge of yet another locality for trout with deformed tail-fins, of which he had fortunately procured specimens, for the possession of which the Museum is now indebted to his generosity, as it has been in so many other instances. This is the River Carron near Larbert in Stirlingshire, though it will presently be seen that the condition of the caudal fin in these specimens, though somewhat resembling that in the Islay and Kirkcudbrightshire fish, is nevertheless not precisely the same.

Mr. Harvie-Brown having greatly interested himself in these peculiarly malformed trout, for which the term "Docked-tailed," is altogether more appropriate than "Tailless," has been at very great trouble not only to obtain specimens of the fish themselves, but also to procure analyses of some of the waters in which they existed, in order to put to test the validity of a wide-spread notion that the quality of the water may have something to do with the causation of the malformation in question. And in inviting me to return to the subject once more, Mr. Harvie-Brown has not only presented to the Museum all the specimens of deformed trout in his possession, but has also placed at my disposal a quantity of correspondence and other documents relating to the matter. The following is a description of the specimens—

i. Trout from Loch-na-Maoraehan.

The notion is widely spread that all the trout which occurred in Loch-na-Maorachan, for I understand they have now altogether disappeared from the lake, were docked-tailed, but this is not the case, however abundant the malformed examples may have been. I have now two specimens from this locality before me, which have been given to the Museum by Mr. Harvie-Brown, in both of which the caudal fin is perfectly normal. The larger of these measures sixteen inches in length, and in general appearance resembles the so-called *Salmo ferox*. All its fins are exceedingly well developed and normal in their structure; the ray-formula is,—*D.* 14, *A.* 12, *P.* 13, *V.* 9. The smaller specimen, represented in Plate III, Fig. 1, reduced to one-half, measures twelve inches in length, and in the development and structure of its fins presents nothing in the least abnormal, save that their rays are rather fewer than usual, and those at the anterior margin of the left pectoral show a peculiar twist, suggestive of some injury sustained at an earlier period of the life of the fish. The fin-ray formula is here—*D.* 12, *A.* 10, *P.* 11, *V.* 7.

In Plate III, Fig. 2, is represented, reduced to three-fifths, a typical specimen of the Docked-tailed Trout from Loch-na-Maorachan, the same individual of which in 1872 I gave a small outline figure. The specimen is now in the Museum of Science and Art.

The length of this specimen is ten inches. All the fins look rather small, but the most striking feature is the conformation of the caudal, which is very short, rounded off above and below, and with the hinder border thick and stiff. In this specimen there is also a slight angular projection or blunt point rather below the middle of the posterior margin, as in the acuminate form figured by Mr. Thomson. In Plate V, Fig. 3, a dissection of the left side of the tail is shown, slightly enlarged, which renders the real nature of the abnormal condition perfectly clear. The tail fin here is seen to be composed in all of 42 rays, of which 13 above and 11 below are as usual short, and except the hinder two in the upper, and the hinder one in the lower series destitute of transverse articulations. One of them, near the middle of the fin, is evidently composed of two ordinary rays fused together at their proximal ends. The 18 long middle rays, forming the mass of the caudal expansion, proceed in the usual straight and diverging manner to near the hinder border of the fin, when the extremities of the rays above and below become suddenly bent downwards and upwards respectively, thus converging towards the angular projection of the posterior margin already noticed. Nor do these rays end in the fine and slenderly dichotomising manner characteristic of the normal fin, but their bent and somewhat contorted extremities are thick and coarse, and their transverse articulations are much reduced in number. In some cases one of the branches resulting from the

primary bifurcation of the normal portion of the ray stops altogether short where the stunting of the fin commences; in other cases the two branches unite once more at their abnormal extremities, and still more remarkable is the fact that at three different portions of the margin of the fin the extremities of several rays are actually seen to become fused together into one piece.

The *anal* fin in this specimen is also seen to be rather stunted in its dimensions, and, instead of presenting the normal somewhat triangular figure, is rather rounded acuminate in shape. It is composed of 13 rays as shown in Fig. 4, of which the third to the ninth inclusive, counting from the front, are abnormal. The apex of the fin, directed downwards and backwards, is supported by the extremity of the eighth ray, towards which the ends of the third, fourth, fifth, sixth, and seventh rays converge backwards, and that of the anterior division of the ninth converges forward. The extremities of these rays are thick and coarse, and those of the fifth and sixth are fused together.

The *pectoral* of the right side is small for the size of the fish, measuring only $1\frac{1}{4}$ inch in length, and being contained $2\frac{1}{2}$ times in the distance between its origin and that of the ventral of the same side, and $1\frac{1}{9}$ time in that between the posterior margin of the orbit and the angle of the gill-cover. It is acuminate in form, and contains only 13 rays, 14 being the usual number in normal trout. The second ray is here the longest; the third has a coarse extremity, in which the branches originating from its primary bifurcation again unite; the fourth and fifth rays have also abnormal extremities, which bend in towards each other and nearly fuse. After the sixth ray, which is also slightly affected, the rest are normal in structure and aspect. The pectoral of the left side is also very similarly affected, there being a strange convergence towards one point of the abnormal extremities of the second, third, and fourth rays.

The *ventral* fins were in this specimen normal as regards the nature of the rays, but showed a very remarkable want of symmetry as to size. That of the right side was perfectly normal in size and development, measuring $1\frac{1}{6}$ inch in length, and containing the usual number of 9 rays. But the left measured only one inch in length, and in it only 5 rays could be counted.

The *dorsal* fin presented nothing unusual in its appearance, and contained the very common number of 13 rays.

In Plate V., Fig. 2, is represented the caudal extremity of another and smaller specimen from Loch-na-Maorachan, in which, as will be seen, the maldevelopment of the extremities of the fin-rays has not gone to so great an extent. In all the trout from Loch-na-Maorachan with malformed tails which I have seen, the condition of this fin is essentially the same. The rays are abnormally shortened, are coarse at their terminations and deficient as to

amount of dichotomisation: besides which they show also a tendency to coalesce at their terminations, then by the convergence downwards of the upper long rays, and upwards of the lower ones, the fin comes to present a rounded instead of the usual broad fanshaped form. I have examined one species in which all the fins but the caudal are normal as regards the development of the rays, but in others, as in the specimen described above, the pectoral and anal fins are also more or less affected in the same way. Nevertheless in no case have I seen any such affection of the rays in either the dorsal or the ventral fins, though the latter indeed sometimes appear smaller than usual.

ii. Trout from Loch Enoch.

The three specimens from this lake which I have examined resemble each other very closely in general appearance. They are small, measuring respectively $5\frac{3}{8}$, 6, $6\frac{1}{6}$ inches; they are dark-coloured and closely spotted; the head is rather large in proportion to the body. In Plate V, Fig. 1, is represented one of the original specimens given to the Museum by Mr. Harvie-Brown in 1881. Here the caudal fin presents an abnormal condition of exactly the same nature as in the Loch-na-Maorachan specimens,—only the stunting of the development of the fin seems to be carried to a still greater extent. Of the other fins the anal is distinctly stunted in development and abnormal in its shape, being low and rounded instead of triangular-acuminate; the pectorals and ventral are rather small, the dorsal is normal.

In one specimen, not figured, the malformed caudal has assumed a slightly oblique unsymmetrical contour, while the anal has become most remarkably stunted in its development. None of the other fins save the dorsal are normal in their development, and the principal rays of the right pectoral are coarse, stiff, and slightly contorted.

iii. Trout from the River Carron.

Two specimens of Trout with malformed tail fins from the River Carron near Larbert have been given by Mr. Harvie-Brown to the Museum of Science and Art, and are now before me.

The first (Plate IV. Fig. 1) measures 11 inches in length, and resembles an ordinary river trout in everything save the condition of the caudal fin, and to a small extent also of the anal. The tail fin is not broadly expanded, nor can it be expanded by pulling it with the fingers; its upper and lower margins are nearly parallel, the greatest depth of the fin being $1\frac{1}{20}$ inch. The posterior margin is truncated, and slightly emarginate, so that the posterior inferior angle projects a little further back than the posterior superior. The rays which should form the upper and lower angles of the fin are abnormally short, and, along with the rays forming the middle of its expanse,

show a peculiar subparallel wavy contortion for a good part of their length. Nevertheless as usual they dichotomise twice, the dichomisations being fine and closely jointed, and the posterior margin of the fin thin and delicate, and in those points the condition of the fin essentially differs from that in the Docked Trout already described. The anterior rays of the anal are not quite so long as is usually the case.

The second specimen (Plate IV. Fig. 2) is 12 inches in length, and has a strikingly large head, the length of which from the point of the snout to the posterior angle of the opercular flap is contained only about $3\frac{3}{4}$ in the total. The caudal fin is oval, stiff, not expansive; the rays show a peculiar unparallel wavy contortion as in the last specimen, but as the upper rays converge downwards and the lower ones upwards a rounded contour is given resembling superficially that of the caudal fin of the docked fish from Loch-na-Maorachan and Loch Enoch. But the condition here again differs by the fact that the rays are finely dichotomised, while the posterior margin of the fin, though reduced to being only half an inch in extent, remains thin and delicate.

It is only necessary to compare the figures on Plates IV. and V. to perceive the difference, and to observe that the rays of the caudal fins of the Carron specimens have a peculiar "frizzled up" appearance not present in the others.

Nevertheless it is interesting to find that in this malformed trout (Fig. 2) from the Carron, the anal and pectoral fins are affected by a condition resembling that in the Islay fish, while again the ventrals and dorsal remain unaffected. In the anal the anterior rays are stunted in growth, and deficient in dichotomisation, so that an appearance is produced as if a large piece had been cut off from the anterior part of the fin.

Summary of Facts.

1. Actual specimens are preserved, figured, and described, of the Docked-tailed condition in trout (*Salmo fario*, L.) from Loch-na-Maorachan in Islay, Loch Enoch in Kirkcudbrightshire, and the River Carron in Stirlingshire.

2. There is credible testimony as to trout showing the same or a similar malformation having occurred in the Gonar Burn, Lanarkshire, near Wanlockhead, and in the Water of Leith,[1] but no specimens have been preserved or described.

[1] The following passage occurs in Stoddart's "Art of Angling" 1836, p. 75.—"On the Water of Leith we saw a friend capture three successively out of one stream during spring, all of which wanted the tail: this defect was probably occasioned in winter, the water from which they were taken happening to be extremely shallow, and the frosts shortly before somewhat severe." It is now of course hardly possible to ascertain whether the defect in these fish was, or was not, of a nature similar to the stunting of the fin-rays characteristic of the Docked Trout of Islay.

3. The Docked-tailed condition consists in a malformation of the caudal fin-rays. The condition of these rays is not quite the same in the Carron specimens as in those from Islay and Kirkcudbrightshire, inasmuch as in the latter the minute dichotomisation of the fin-rays is destroyed, whereas in the former it largely persists.

4. The caudal is not the only fin liable to be affected by this condition. It is generally shared in by the anal fin, frequently also by the pectorals, more rarely by the ventrals.

5. The dorsal fin is normal in every specimen I have seen.

Theories as to Causation.

The theories which have been hazarded regarding the cause of the docked-tailed condition may be enumerated as follows :—

1. That it may be caused by impurities contained in the water in which the fish live.

2. That it may be the result of mechanical injury ; either by the fish nibbling each other's tails, or by friction against rocks or stones.

As regards the first of these supposed causes, the late Mr. F. Day in his "Fishes of Great Britain and Ireland" (vol. ii. p. 102), observes that the "tailless" condition "in some streams has been traced to be due to the action of deleterious matter in the water (see 'Angler's Note Book,' 1880, p. 66)." Further, quoting from an unpublished note by Mr. Harvie-Brown, he goes on to say that this gentleman "observed about 1876, in the River Carron, that a contraction of the rays of the tail fins of the trout commenced, due it was universally believed to the action of deleterious matter in the water, through the agency of paper mills." I see from Mr. Harvie-Brown's notes, to which he has so kindly given me access, that he was also at one time inclined at least to suspect that the docked condition of the Gonar Burn trout was due to the stream having been poisoned by washings from lead mines. As to the pollution of the River Carron below Denny, there is unfortunately no room for doubt, though, unless corroborated by numerous other similar instances, it does not follow that this is the cause of the malformation of the trout-tails. Accordingly, with a view to testing the Gonar Burn case, Mr. Harvie-Brown had an analysis of the water made by Mr. J. Falconer King, Edinburgh City Analyst, the results of which, expressed in grains per imperial gallon, are as follow :—

Carbonate of Lime	2.06	Lead, etc.	trace
Carbonate of Magnesia	0.55	Arsenic	none
Sulphate of Lime	0.68	Zinc	none
Sulphate of Magnesia	1.17	Phosphoric Acid	trace
Sulphate of Soda	0.17	Silica	0.80
Chloride of Sodium	0.92	Loss by Ignition	0.32
Nitrate of Soda	trace	Saline Ammonia	trace
Nitrites	none	Albumenoid Ammonia	0.0016
Oxide of Iron	none		

Commenting upon this analysis, Mr. Falconer King says in a letter addressed to Mr. Harvie-Brown, and dated 23d June 1891,—

"I am perhaps not very competent to speak of the effect of lead on fish, but I am inclined to think that the very small amount in the sample sent to me could have very little influence one way or another. The quantity of impurity present was so little that it is difficult to say whether it existed originally in the water in solution or suspension."

Even if we supposed that the "trace" of lead in the water of the Gonar Burn were sufficient to affect the fish injuriously, corroboration would have to be forthcoming before we could accept the theory that it was the cause of this special malformation of the fin-rays. What then of the waters of the two lakes, Loch-na-Maorachan and Loch Enoch, from which the most typical examples of Docked-tailed Trout have been taken?

Mr. Harvie-Brown having in 1888 sent a small quantity of water from Loch-na-Maorachan to Mr. Falconer King for analysis, the last mentioned gentleman reported as follows in a letter dated 15th November of that year:—

"I have examined the sample of water you sent me so far as the quantity of material at my disposal would allow. As the result I have to inform you that the water is chiefly remarkable for its purity. I have not been able to detect anything which by its presence would so far as I know affect fish in the way you describe. A possible explanation, however, may be that as the water is so very destitute of mineral matter (lime and other substances) containing only about one part in 60,000 parts of water, the fish are suffering from something akin to rickets."

A larger quantity of water having been subsequently forwarded to Mr. King, the following is his detailed analysis, the results being expressed in grains per imperial gallon:—

Carbonate of Lime	traces	Chloride of Magnesium	0.130
Carbonate of Magnesia	0.045	Chloride of Sodium	2.608
Sulphate of Lime	0.080	Silica	0.060
Sulphate of Magnesia	0.478	Loss by Ignition	0.320

Now as to Loch Enoch. Mr. Harvie-Brown having procured a sufficient supply of the water of this lake and entrusted it to Mr. Falconer King for analysis, it was found to contain per imperial gallon the following substances expressed in grains:—

Carbonate of Lime	0.04	Nitrate of Soda	traces
Carbonate of Magnesia	0.19	Nitrites	none
Sulphate of Lime	0.08	Phosphoric Acid	trace
Sulphate of Magnesia	0.15	Iron oxide, etc.	0.52
Sulphate of Soda	0.08	Loss by Ignition	0.54
Chloride of Sodium	1.01		

I extract the following passage from a letter from Mr. King to Mr. Harvie-Brown commenting on this analysis, and dated 29th August 1890 :—

"The results you will notice come out very much as they did before, showing the water to be one of great purity. It hardly contains anything except a very small quantity of common salt.

There is a little Iron Oxide present, but this I am afraid has arisen from the tin vessels in which unfortunately the sample was sent."

Again, three days later, Mr. Falconer King writes to Mr. Harvie-Brown :—

"As to the comparison between this Galloway water and the Islay one, the great point seems to be their similarity as regards freedom from lime and magnesia compounds. They both contain a little common salt, but they are both exceptionally free from all other salts. A man when he eats takes lime from his food, but perhaps a fish is more dependent on lime in the water than in its food."

Here then we have the impure water theory refuted at once by the fact that the waters best known for the production of Docked-tailed Trout are, on the contrary, of most remarkable purity. And we have the new theory suggested that it is this very purity which is the cause of the malformation.

But in the first place, if *impurity* of the water will not account for the presence of Docked-tailed Trout in Loch-na-Maorachan and Loch Enoch, neither will *exceptional purity* account for the occurrence of a similar malformation in the River Carron and in Gonar Burn. This is the first hitch in the theory.

In the second place, I rather think that this paucity of lime will be found more or less characteristic of all our lakes whose bed is formed by ancient crystalline rock such as the quartzite and granite in which Loch-na-Maorachan and Loch Enoch are respectively embasined. The docked condition ought therefore to be characteristic of the trout in very many more lakes in Scotland than these two solitary tarns, but as yet we know of no others in which they occur.

In the third place, these fish do not suffer from rickets or any disease akin to rickets so far as I can see. The extremities of the rays of certain fins are *malformed*, but the skeleton is as well ossified as in any other trout which I have ever dissected. Lime of course enters into the system of the fish in some way, and what can be more natural than to suppose that it exists in their food, just as it exists in our own.

I venture therefore to submit that there is as yet no evidence that the chemical composition of the water has anything to do with the occurrence of the Docked-tailed condition in trout.

We now turn to theories of mechanical injury. It has been suggested that this abnormal condition may have been caused by the fish nibbling each other's tails, and I must own that I have once, in the small aquarium attached to the Museum, seen a trout, which was subjected to some persecution by his neighbours, succeed in getting his caudal fin nibbled into a tolerably good imitation of that of a Loch-na-Maorachan trout. But it is pretty certain that simple nibbling would not produce the appearance of the extremities of the rays as depicted in Pl. V. Fig. 3, and moreover, when we consider that this abnormal condition is liable to attack every fin, even to the pectorals, with the one strange exception of the dorsal, the "nibbling" theory must fall utterly to the ground. A pugnacious trout would much more easily get at his neighbour's dorsal than his pectoral fin!

Again, it has been suggested that mechanical friction by contact with or rubbing against hard rocks or stones in the bottom of the lake may have something to do with the production of the Docked-tailed condition. It is pointed out that Loch-na-Maorachan is shallow with a rocky bottom of hard quartzite; while Loch Enoch, though very deep, has a floor or at least shore of fine hard granite sand; and there is a certain attractiveness in the idea that the delicate extremities of the fins may be injured or worn by coming roughly in contact with such hard rocks, stones, or sand. It is indeed not inconceivable that such friction might set up an inflammatory process, which might result in the arrestment of the normal development of the fin-rays and the distortion of their extremities. It is remarkable that besides the caudal, the affected fins are those on the *under* surface of the body, the dorsal remaining normal. But the upper lobe or half of the caudal fin is affected in the same manner as the lower, so that Mr. Adam Skirving remarks in a letter to Mr. Harvie-Brown,—"Had it been only the lower part of the tail that was defective, I should have accused the fine white sand of wearing it." Moreover, one would suppose that the ventral fins were more exposed to such friction than either the anal or the pectorals, and yet they are comparatively rarely affected by this condition.

It has also been suggested by some of my friends that injury to the fins originally inflicted in the way referred to above might become hereditary, and this, if true, would be a most startling refutation of the Weismannian doctrine of the non-transmissibility of acquired characters! But I fear it has still to be proved, and that the mystery of the phenomenon which has formed the subject of this paper has not yet been penetrated.

One word in conclusion. Not having seen the Gonar Burn specimens, I do not know the special nature of the affection of their caudal fins. The Carron specimens are not quite the same as those from Islay and Galloway, and in them the malformation may be

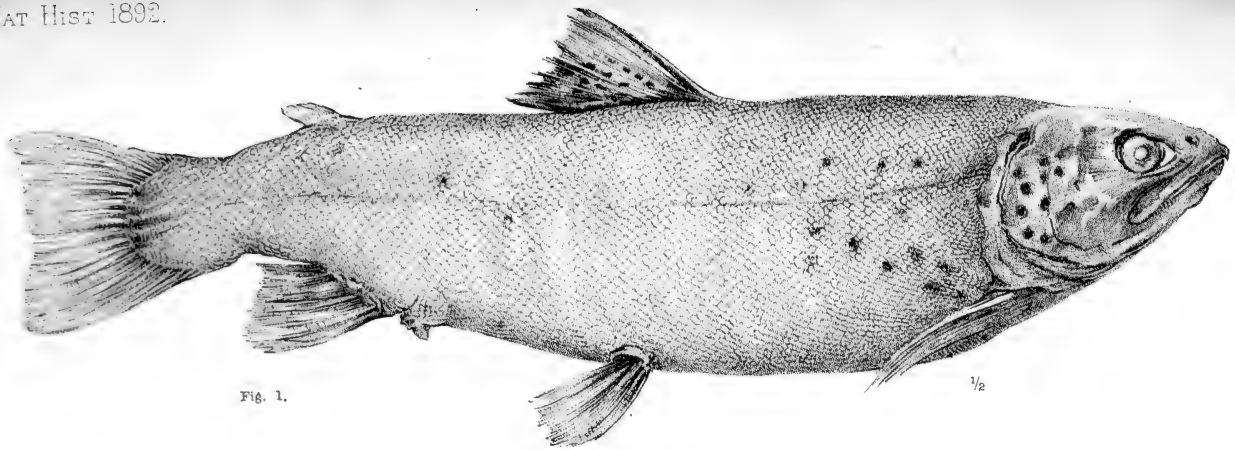


Fig. 1. 1/2

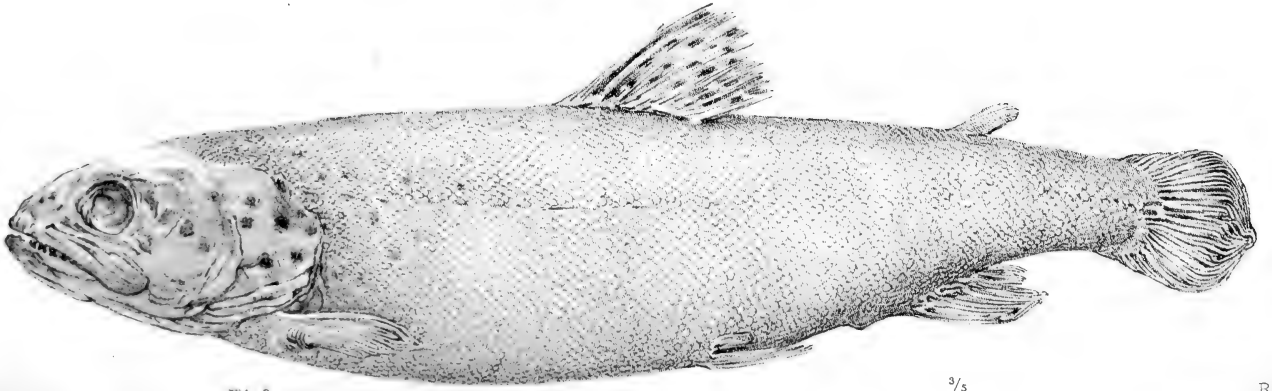


Fig. 2. 3/5

W. Smith & R. Brough, del.

R & R. Clark, imp

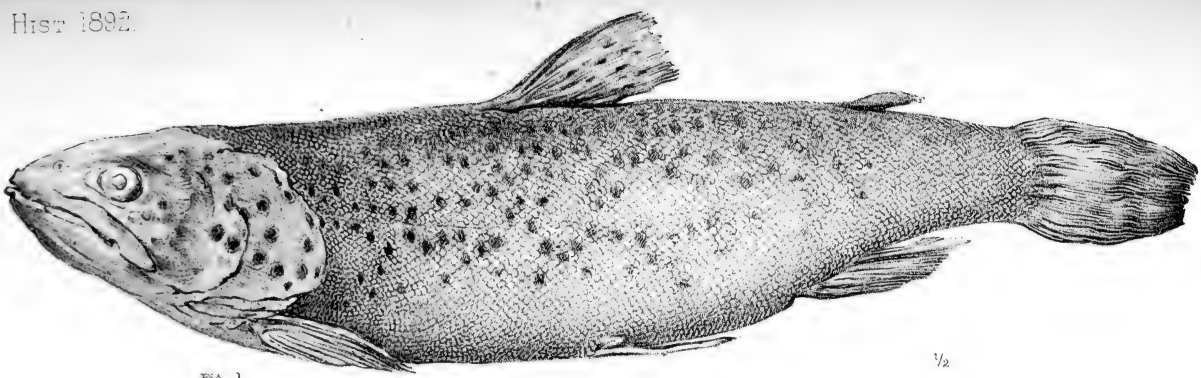


Fig. 1.

½

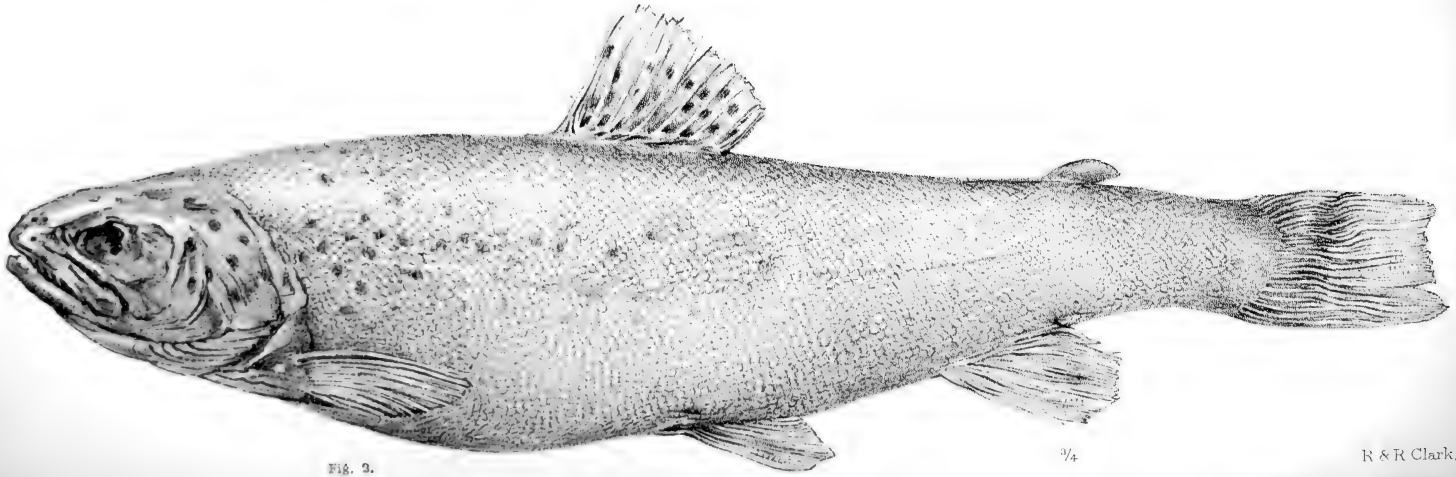


Fig. 2.

¾

R & R Clark, imp

W. Smith & R. Brough, del.

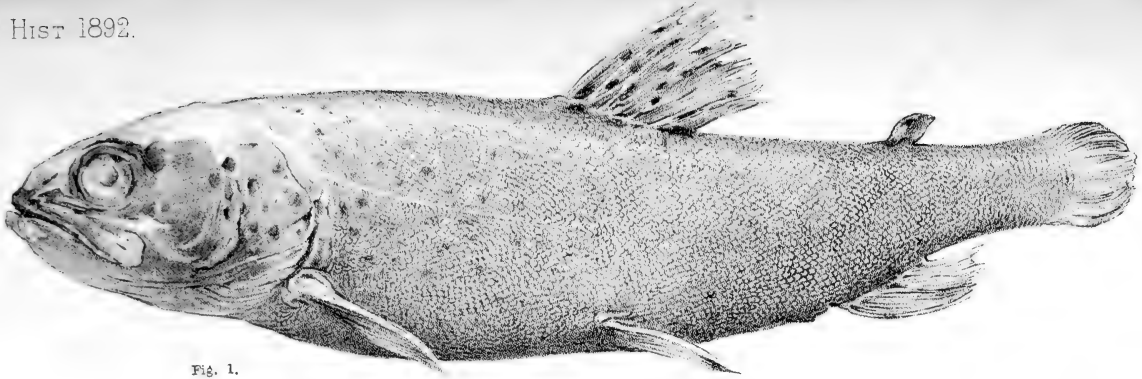


Fig. 1.

Fig. 2.

Fig. 4.

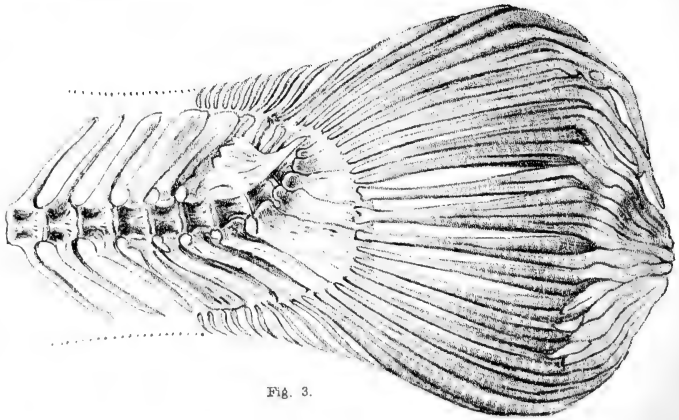


Fig. 3.

R & R. Clark, imp.

sporadic or accidental. But in the case of the trout now living in Loch Enoch, and those which formerly lived in Loch-na-Maorachan, the affection seems of a truly endemic nature, and is pretty sure to be in some way connected with the environment, though not traceable either to the softness of the water or the roughness of the bottom.

Explanation of the Plates.

PLATE III.

Fig. 1. — Normally developed trout from Loch-na-Maorachan. Reduced to $\frac{1}{2}$. In this and in the other specimens the colour is faded by light and preservation in spirit.

Fig. 2.—Docked-tailed example from the same lake. Reduced to $\frac{3}{5}$.

PLATE IV.

Fig. 1. — Trout from River Carron with distorted caudal fin. Reduced to $\frac{1}{2}$.

Fig. 2.—Another specimen with the fins still more malformed. Reduced to $\frac{3}{4}$.

PLATE V.

Fig. 1.—Docked-tailed trout from Loch Enoch. Natural size.

Fig. 2.—Outline of posterior extremity of body in a small specimen from Loch-na-Maorachan.

Fig. 3.—Skeleton of caudal extremity of the specimen represented in Plate III. Fig 2. Magnified.

Fig. 4.—Structure of anal fin in the same specimen.

NOTES ON THE FRESHWATER FISHES OF THE SOLWAY AREA.

By Sir HERBERT MAXWELL, Bart., F.L.S.

PERMIT me to add the following notes to Mr. Service's interesting paper in your first number.

Cyprinus carpio.—THE CARP.—Inhabits a small piece of water called Laggan Loch, in Glasserton Parish, Wigtonshire, where it grows to a large size. It was introduced to this lonely lake, far from any house, by Admiral Stewart, early in the century.

Leuciscus rutilus.—The Roach.—Is abundant in the White Loch of Inch, near Stranraer.

Leuciscus phoxinus.—The Minnow.—Is not found in any streams in Galloway, west of the Cree, except where it has recently been introduced in Glasserton parish.

Salmo ferox.—Mr. Service follows other icthyologists in distinguishing *Salmo ferox* as a distinct species. Is there any true specific difference between the Great Lake Trout and large *Salmo fario*? The largest trout I can remember being killed in Galloway was one of 13 lbs. in Loch Dee, about the year 1870. There is a plaster cast of it at Galloway House. In 1890, I killed five trout in Loch Arkaig in the course of one afternoon. They weighed 17½ lbs., 8 lbs., 5 lbs., 2½ lbs., and 2 lbs. As they were all taken by trolling they were all called *ferox*; but I doubt not had the smaller ones been taken with the fly, they would have been regarded as ordinary loch trout.

[Dr. Günther ("Study of Fishes," 1880, p. 633) remarks that a "wide spread species, however, like *S. fario*, when it inhabits a small mountain pool with scanty food, may never exceed a weight of eight ounces, whilst in a large lake or river, where it finds an abundance and variety of food, it attains to a weight of fourteen or sixteen pounds. Such large River-trout are frequently named and described as Salmon-trout, Bull-trout, etc." Dr. Day ("British and Irish Salmonidæ," 1887, p. 193) considers *Salmo ferox* simply a large, probably an old, common trout (*S. fario*), and treats it as a variety of that species. —Eds.]

ADDITIONS TO THE AUTHENTICATED COMITAL CENSUS OF THE LAND AND FRESHWATER MOLLUSCA OF SCOTLAND.

Wm. Denison Roebuck, F.L.S.

Since the publication of my "Census of Scottish Land and Freshwater Mollusca" in 1891 by the Royal Physical Society of Edinburgh, and of a further paper by myself in the *Scottish Naturalist* for July 1891, I have received specimens from various friends, to whom, and particularly to my indefatigable helper Mr. William Evans, F.R.S.E., of Edinburgh, the Rev. George Gordon, LL.D., and Mr. Robert Service, I am much indebted for the material here incorporated.

I propose to continue my notes from time to time in *The Annals of Scottish Natural History*, regularly if possible, at all events as often as the kindness of Scottish naturalists will keep the recorder and referees of the Conchological Society supplied with material for authentication. It is to be understood that these papers will not deal (unless in very exceptional cases) with any records except such as have been authenticated by the submission of the actual specimens to the society's referees.

The present instalment is mainly devoted to slugs. I have some testaceous species to report in a future paper, but at present their examination is not completed.

1. **Limax flavus in Kirkcudbrightshire.**—On the 20th July of 1891 I received from Mr. Robert Service a nearly adult example of *Limax flavus*, which is an additional species for the county and brings up its authenticated total to 54. He also sent a small example of *Limax maximus* var. *ferussaci*. Both were from a damp cellar in his house at Maxwelltown, where the two species occur very commonly. *L. flavus* is a species which (although it occurs abundantly enough in cellars) is very seldom sent me, and as yet I have seen it from but five Scottish counties, viz., Kirkcudbright, Renfrew, Edinburgh, Fife, and Elgin.

2. **Limax cinereo-niger, etc. in Elginshire.**—I am indebted to Mr. William Evans for the sight of a couple of examples of this rarity from Cromdale, Elginshire, on the 25th August of this year. One was about three-fourths grown and with the trifasciated footsole which is one of the distinguishing characters of the species. The other was a small one, and had not the coloured side-bands of the keel, but it was nevertheless unmistakably of the same species. From the same locality Mr. Evans sent me *Limax arborum*, several of the typical form and pale in colour, an adult *Arion subfuscus*, and *A. ater*, also adult, all of these being additions to the authenticated county list, which now numbers 52 species. A fine adult *A. ater* from near the old heronry on the Findhorn, was also sent me in verification of its existence in the county by the Rev. Dr. Gordon, on the 7th September. Mr. Evans's Cromdale gatherings also included an adult

Arion minimus, but this has already been recorded in my census.

3. **Banffshire Slugs.**—I have to report four additional species of slugs for Banffshire, making its total list amount to 23, a small figure as yet. These are *Arion ater*, represented by a couple of immature examples; *A. subfuscus*, several adult, some deeply and richly coloured; *A. minimus*, in great abundance and of all ages to adult; and several *Limax arborum*, adult and young. Specimens of the already recorded *Limax agrestis* and *Arion bourguignati* accompanied the newly recorded species. All these were found by Mr. Wm. Evans on the banks of the Avon, above Ballindalloch.

On the 11th September Mr. Evans sent me a consignment of slugs from Tomintoul, a very out-of-the-way place, the slugs of which it is well worth while to record. They were a fine adult and a young specimen of *Limax maximus*, var. *fasciata*, a half-grown *Arion ater*, several fine *A. hortensis*, and several not quite mature examples of *A. bourguignati*.

On the 17th of July 1891 I had the pleasure of receiving from the Rev. George Gordon an example of *Limax cinereoniger*, about three-quarters grown, with the keel-line dull ochre and a pale stripe down each side, together with a small and very dark *L. arborum*, var. *alpestris*, which he had found under the decayed and loosened bark of an old fallen birch-tree, some hundred yards south of the Duke of Richmond and Gordon's shooting lodge at Glenfiddich, Banffshire, and about 800 feet above sea-level. This fine species, which is in these islands a particularly northern and western form, is an important addition to the Banffshire list.

4. **The Tree-slug in the Outer Hebrides.**—It is to my old friend, Mr. W. Eagle Clarke, F.L.S., that I am indebted for the next record that I have to make, viz. that of a very dark example of *Limax arborum* from the Shiant Islands, an outlying group of the Outer Hebrides, which brings the Hebridean authentications up to 16 species.

5. **Faunal Status of Limnæa stagnalis in Scotland.**—Since the publication of my paper on the introduction of this species into Lanarkshire, I have had placed in my hands two letters bearing on the topic addressed to Mr. Clarke. The

first is from Mr. James Bennie, to whose vigilance it is that we were indebted for showing that the Possil Marsh specimens were introduced and thereby setting my census right on the point. In justice to our Glasgow friends, it is but right to say that in their West of Scotland list, which I had occasion to consult since my paper was published, it is distinctly stated that the species was "introduced." Mr. Bennie mentions that having found an old letter of date 4th January 1863, for which he had been in search, he can give the date of introduction as New Year's day of 1863, and that the specimens, some two hundred in number, were sent from Liverpool for the purpose, and were scattered throughout the Possil Marsh.

The other letter is from Mr. W. Grant Guthrie of Hawick with reference to the occurrence of *L. stagnalis* in that district. He does not think there are any grounds for supposing it to have been introduced there, as he took three specimens of it in one of the neighbouring lochs on the 15th August this year, quite a different locality from where he had taken it before.

SOME ADDITIONS TO SCOTTISH COLEOPTERA, WITH NOTES ON SPECIES NEW OR RARE IN THE "SOLWAY" DISTRICT.

By W. Lennon; and W. D. R. Douglas, M.A., F.L.S., F.E.S.

The following notes on Coleoptera taken in the "Solway" district in Scotland, may not, we think, be without some interest appearing after the completion of Canon Fowler's most recent work on British Coleoptera. We have included those species taken by us, which seemed most worth recording, either because they are new to Scotland or new to "Solway" (though some are common species), or because, though not new, they are generally rare in Scotland. We have taken Dr. Sharp's Catalogue, "The Coleoptera of Scotland," as our basis, since Canon Fowler has apparently made use of it for most of his Scottish localities. A good deal of Dr. Sharp's collecting in Scotland was done in this "District" some time

ago, about Thornhill and Dumfries, and the Rev. W. Little, of Kirkpatrick Juxta, also worked in days of yore very carefully and energetically within the limits of the "District," about Moffat; so that during a period of very many years it has been comparatively well explored.

It only remains to add that the species to which the initials (W. L.) are appended are chiefly from the immediate neighbourhood of Dumfries, collected in one or two well wooded spots, or by the banks of the River Nith: and that those with initials (W. D. R. D) are, with very few exceptions, from a limited area (which includes some high moorland, low arable and rough ground, a considerable amount of wood, and a seashore), lying on the Solway Firth: the two collecting grounds being some twenty miles apart. We subjoin three lists:—

A. Containing those which seem new to Scotland.

B. Containing those which are additions to the "Solway" list.

C. Containing those which, though not new, are rare, and yet turn up in fresh localities from time to time.

List A. Species New to Scotland.

Amara similata, *Gyll.*—Rare. Orchardton. W. D. R. D.

Hydroporus granularis, *L.*—Not uncommon. Maxwelltown Loch, Dumfries. W. L.

Berosus spinosus, *Stev.*—Occasionally taken in small numbers in brackish water on Caerlaverock salt-marshes. W. L.

Helephorus tuberculatus, *Gyll.*—Very rare. One specimen in flood refuse from the Nith, near Kelton. W. L.

Falagria thoracica, *Curt.*—Rare. Orchardton. W. D. R. D.

Quedius tristis, *Grav.*—This species, considered doubtfully Scottish by Dr. Sharp, is common at Orchardton. W. D. R. D.

Oxyporus rufus, *L.*—Very rare. One specimen in a fungus close to the house. Orchardton. W. D. R. D.

Cercus rufilabris, *Latr.*—Rare. Near Orchardton. W. D. R. D.

Meligethes difficilis, *Heer.*—On bracken, at Burnfoot, near Langholm. W. D. R. D.

Rhizophagus cribatus, *Gyll.*—Rather common (on fungi, or in carrion) in one wood close to Orchardton. Once found (as

recorded in "Entom. Month. Mag." vol. xxvi.) in abundance, on a dead hedgehog. W. D. R. D.

Geotrupes Typhœus, *L.*—One ♂ in May 1890, near Orchardton. Not strictly new to the Scottish list (see "Murray's Catalogue"), but omitted in Dr. Sharp's list. W. D. R. D.

Hoplia philanthus, *Füssl.*—Very rare. One specimen by sweeping in Dalskairth Wood near Dumfries. W. L.

Elater elongatulus, *F.*—Very rare. A single specimen beaten off an old birch tree in Dalskairth Wood. W. L.

Telephorus oralis, *Germ.*—Common in one or two places on the banks of a stream, where it falls into the Solway, but very local. Orchardton. W. D. R. D.

Malthinus fasciatus, *Ol.*—Not common. Woods about Orchardton. W. D. R. D.

Timarcha tenebricosa, *F.* (lævigata, *Duft*).—Already recorded in "Scottish Naturalist" for October 1891, and indeed not without a previous—but precarious—position on the Scottish list; but perhaps worth prominence again now that its place is assured. Potterland Hill. W. D. R. D. and W. L.

Longitarsus anchusæ, *Payk.*—Orchardton. W. D. R. D.

Phyllotreta nodicornis, *Marsh.*—Apparently rare. One ♂ specimen by sweeping near the shore. Orchardton. W. D. R. D.

Heledona agaricola, *F.*—Four specimens beaten off old oaks. Carnsalloch Wood; Dumfries. W. L.

Apion Bohemanni, *Thoms.* (ononidis, *Gyll.*)—Once, by sweeping near Dalskairth. W. L.

Apion simile, *Kirby.*—Rare; on birch. Orchardton. W. D. R. D.

Trachyphlœus alternans, *Gyll.*—Very rare. One specimen in flood refuse near Kelton; Dumfries. W. L.

Hypera pollux, *F.*—Rare; taken by sweeping. Orchardton, 1888. W. D. R. D.

Hypera alternans, *Steph.* (Julini, *Sahl.*)—Very rare; by sweeping. Orchardton, June 1890. W. D. R. D.

Cænopsis Waltoni, *Schön.*—Very rare. One specimen in flood refuse near Kelton. Dumfries. W. L.

Erirrhinus (Thryogenes) Nereis, *Payk.*—Maxwelltown Loch. W. L.

Bagous frit, *Herbst.*—Rare, and very local. By sweeping wet places, on the west side of Maxwelltown Loch. W. L.

Anthonomus pomorum, *L.*—Not infrequent on wild crab-apple trees. Orchardton and Almorness. W. D. R. D.

Ceuthorynchus setosus, *Boh.*—Rare. Orchardton, August 1891. W. D. R. D.

Rhinoncus perpendicularis, *Reich* (subfasciatus, *Gyll.*) — Not common. Orchardton, 1891. W. D. R. D.

Balaninus pyrrhoceras, *Marsh.*—Rare. Orchardton, 1891. W. D. R. D.

Xylocleptes bispinus, *Duft.*—Very rare. A few specimens at Carnsalloch. W. L.

Tomicus typographus, *L.*—Very rare. By beating old trees at Carnsalloch. W. L.

List B. Additions to the Solway List.

Carabus glabratus, *Payk.*—Summit of Cairnsmore-of-Fleet. W. L. On Screel; at a comparatively low altitude. W. D. R. D.

Blethisa multipunctata, *L.* Very local. Lochrutton. W. D. R. D.

Amara curta, *Dej.*—Rare. Flood refuse. Orchardton. W. D. R. D.

Amara trivialis, *Gyll.*—Common. Orchardton. W. D. R. D.

Amara lunicollis, *Schiöd.*—Near Dumfries. W. L.

Haliplus obliquus, *Er.*—Not common. Glenmill Burn; Dumfries. W. L.

Haliplus fluviatilis, *Aubé.*—Very rare. One specimen in a clear running stream above Moffat Well. W. L.

Hydroporus pictus, *F.*—Not uncommon in lochs and ponds. W. L. and W. D. R. D.

Hydroporus Davisii, *Curt.* Very abundant in all clear streams above Moffat Well; also near Carsethorn. W. L.

Hydroporus rufifrons, *Duft.*—Very rare. One specimen in Maxwelltown Loch. W. L.

Agabus biguttatus, *Ol.* Common. Orchardton. W. D. R. D.

Agabus paludosus, *F.*—Not uncommon in all clear streams near Moffat. W. L.

Laccobius alutaceus, *Th.* Orchardton. W. D. R. D.

Hydrochus angustatus, *Sturm.*—Very rare. Once by dredging at the head of Maxwelltown Loch. W. L.

Ischnoglossa prolixa, *Grav.*—Not common; under bark of old beech trees; near Dumfries. W. L.

Oxypoda hæmorrhoa, *Sahl.*—Occasional, near Dumfries. W. L.

Myrmedonia collaris, *Pk.*—Rare. In moss and sphagnum (usually along with ants); occasionally by banks of Glenmill Burn, Dumfries. W. L.

Conosoma lividum, *Er.*—Common. Orchardton. W. D. R. D.

Quedius puncticollis, *Thoms.*—Not common; in wet moss, Broomrigg Wood, Dumfries, and once near Moffat. W. L.

Philonthus laminatus, *Creutz.*—Common. Orchardton. W. D. R. D.

Lithocharis ochracea, *Grav.*—Not common; in rubbish heaps. W. L. and W. D. R. D.

Stenus impressus, *Germ.*—Not infrequent. Orcharton. W. D. R. D.

Lathrimæum melanocephalum, *Marsh*; (atrocephalum, *Gyll.*)—Orchardton. W. D. R. D.

Homalium punctipenne, *Thoms.*—Orchardton. W. D. R. D.

Agathidium nigripenne, *Kug.*—At oozing sap on an old ash. Carnsalloch, Dumfries. W. L.

Anisotoma cinnamomea, *Panz.*—Very rare. One specimen in flood refuse, Kelton. W. L.

Choleva angustata, *F.*—Not rare. Orchardton. W. D. R. D.

Olibrus æneus, *F.*—Rare; in flood refuse. Kelton. W. L.

Anatis (Halyzia) ocellata, *L.*—Rare. Potterland Hill. W. D. R. D.

Hister purpurascens, *Herbst.*—Rarely in flood refuse. Kelton. W. L.

Gnathoncus nannatensis, *Marsh.*—One specimen in a bird's nest near Dumfries. W. L.

Saprinus maritimus, *Steph.*—Rare. Whiteport Bay, Almorness. W. D. R. D.

Micropeplus staphylinoides, *Marsh.*—Not common. Orchardton. W. D. R. D.

Micropeplus margaritæ, *Duv.*—Occasionally; by sweeping near banks of the Nith and Cairn. W. L.

Soronia punctatissima, *Ill.*—Rare. Orchardton. W. D. R. D.

Poecadius ferrugineus, *F.*—Bred somewhat freely from puff-balls. Orchardton. W. D. R. D.

Lathridius lardarius, *Deg.*—Rather common. Dumfries and Orchardton. W. L. and W. D. R. D.

Corticaria pubescens, *Gyll.* Not common; near Auchencrieff Loch. W. L.

Antherophagus nigricornis, *F.*—Not common; by sweeping along railway banks near Dumfries. W. L.

Cryptophagus cellaris, *Scop.*—Not common; in haystack refuse, Dumfries. Common, Orchardton. W. L. W. and D. R. D.

Byrrhus fasciatus, *F.*—Not common. Orchardton. W. D. R. D.

Onthophagus nuchicornis, *L.*—Extremely local, but not uncommon where found. Craigrow and Parkbrae's, Orchardton. W. D. R. D.

Aphodius fœtens, *F.*—Very rare. Moffat. W. L.

Aphodius constans, *Duft.*—Rare. Dungarry Hill. W. D. R. D.

Lacon murinus, *L.*—Common. Dumfries and Orchardton. W. L. and W. D. R. D.

Elater nigrinus, *Payk.*—Very rare. One specimen in Dalskairth Wood. W. D. R. D.

Corymbites pectinicornis, *L.*—Rare; in meadows near Moffat. W. L.

Corymbites holosericeus, *F.*—Not uncommon; off Scots Fir, Orchardton. W. D. R. D.

Corymbites æneus, *L.*—Very rare. One specimen beaten out of a clump of *Silene maritima*, Rascarrel. W. D. R. D.

Ragonycha elongata, *Fall.*—Not common. Taken at Moffat by sweeping in meadows; there were no fir-trees near the place where the specimens were taken. W. L.

Malachius bipustulatus, *L.*—Very rare; by sweeping long grass along banks of Nith, close to Dumfries. W. L.

Priobium castaneum, *F.*—Rare; on old trees. Dumfries and Orchardton. W. L. and W. D. R. D.

Ernobius mollis, *L.*—Very rare. Once taken in Carnsalloch Wood, Dumfries. W. L.

Ernobius nigrinus, *Sturm.*—Rare; on Scots Fir, Dumfries. W. L.

Octotemnus glabriculus, *Gyll.*—Abundant in *boleti*. Orchardton. W. D. R. D.

Pogonochærus fasciculatus, *De G.*—Rare. Two specimens beaten from a bundle of dead branches in a wood, near Glencaple. W. L.

Cryptocephalus bipunctatus, *L.*; **Var. lineola**, *F.*—Very rare. Three specimens beaten off some clumps of birch and sallow. Dalskairth. W. L.

Longitarsus luridus, *Scop.*—Not common. A few specimens by sweeping nettles along the Caerlaverock shore. W. L.

Tenebrio obscurus, *F.*—One found in a decayed willow stump at New Abbey. W. L.

Lagria hirta, *L.*—Extremely local, but abundant in one or two places, among *Iris pseudacorus*, near Orchardton. W. D. R. D.

Cistela murina, *L.*—By the Solway shore. Rare. Orchardton. W. D. R. D.

Rhinosimus viridipennis, *Steph.*—Rare. Four specimens under bark of a decaying beech-tree, Carnsalloch Wood, Dumfries. W. L.

Anthicus floralis, *L.*—Very abundant in heaps of cut grass or garden rubbish. W. L. and W. D. R. D.

Apion virens, *Herbst.*—Common. Orchardton. W. D. R. D.

Apion punctigerum, *Payk.*—Rare, on *Vicia cracca*. Orchardton. W. D. R. D.

Apion striatum, *Kirby.*—Not common, in broom about Dumfries and Orchardton. W. L. and W. D. R. D.

Pissodes pini, *L.*—Very rare. In a fir-wood, near Tinwald Downs, Dumfries. W. L.

Nanophyes lythri, *F.*—Rare, near Orchardton. W. D. R. D.

Cionus blattariæ, *F.*—Very rare. One specimen in flood refuse from the Nith, near Kelton. W. L.

Acalles roboris, *Curtis.*—Rare. A few specimens by beating old trees, Carnsalloch Wood. W. L.

Ceuthorynchus marginatus, *Payk.*—Rare, by beating in Dalskairth Wood. W. L.

Ceuthorynchus rugulosus, *Herbst.*—Rare. Old meadow lands near Dalskairth. W. L.

Hylastes ater, *Payk.*—Common. Dumfries and Orchardton. W. L. and W. D. R. D.

Hylastes cunicularius, *Er.*—Very rare; beaten off old fir trees, in Carnsalloch Wood, Dumfries. W. L.

Phlæophthorus rododactylis, *Marsh.*—One specimen beaten off Scots Fir, near Dumfries. W. L.

Pityogenes chalcographus, *L.*—Two specimens beaten off old branches, in Carnsalloch Wood, Dumfries. W. L.

List C. Rare and Local Species.

Pogonus chalceus, *Marsh.*—Near Orchardton Bay. W. D. R. D.

Lebia chlorocephala, *Hoff.*—Occasionally near broom, also in flood refuse near Dumfries. W. L.

Aleochara mœrens, *Gyll.*—In fungi. Orchardton. W. D. R. D.

Oxypoda spectabilis, *Maek.*—Flood refuse. Orchardton. W. D. R D.

Tachyusa atra, *Grav.*—Orchardton. W. D. R. D.

Gyrophœna minima, *Er.*—In some numbers in fungi. Orchardton. W. D. R. D.

Quedius longicornis, *Kr.*—Once at Orchardton. Two or three specimens near Dumfries. W. L. and W. D. R. D.

Quedius auricomus, *Kiesw.*—In moss near waterfalls. Screel, and by Dumfries. W. L. and W. D. R. D.

Philonthus fumigatus, *Er.*—Broomrigg Wood, Dumfries. W. L.

Philonthus nigrita, *Nord.*—Orchardton. W. D. R. D.

Lathrobium multipunctum, *Grav.*—Orchardton. W. D. R. D.

Scopæus Erichsoni, *Kol.*—Flood refuse. Kelton, near Dumfries. W. L.

Stenus bimaculatus, *Gyll.*—Orchardton, and Dumfries. W. L. and W. D. R. D.

Bledius atricapillus, *Germ.*—Very local; near Dumfries. W. L. and W. D. R. D.

Deleaster dichrous, *Grav.*—In a tuft of moss and grass, in a fir wood; near Dumfries. W. L.

Silpha tristis, *Ill.*—Moffat, and Orchardton. W. L. and W. D. R. D.

Lasia globosa, *Schneid.*—In flood refuse, and by sweeping; near Dumfries and Orchardton. W. L. and W. D. R. D.

Halyzia 16-guttata, *L.*—Orchardton, and Dumfries. W. L. and W. D. R. D.

Hister neglectus, *Germ.*—In flood refuse. Orchardton. W. D. R. D.

Omosita depressa, *L.*—Near Dumfries. W. L.

Cryptohypnus maritimus, *Curtis.*—Not uncommon under small stones, on banks of the Ae, Nith, and Cairn. W. L.

Cryptohypnus sabulicola, *Boh.*—Very rare; banks of Nith and Cairn (in flood refuse). W. L.

Telephorus Darwinianus, *Sharp.*—Among seaweed; near Dumfries, and Orchardton. W. L. and W. D. R. D.

Telephorus thoracicus, *Ol.*—Very local. Found on the bog-thistle, *Lythrum*, and other plants; at Maxwelltown Loch. W. L.

Phlærophilus Edwardsi, *Steph.*—A small series by beating old oak trees, in Carnsalloch Wood, Dumfries. W. L.

Cryptocephalus moræi, *L.*—Near Maxwelltown Station. W. L.

Chrysomela marginata, *L.*—In flood refuse; banks of the Nith at Kelton. W. L.

Phædon concinnus, *Steph.*—Salt-marshes. Orchardton and Dumfries. W. L. and W. D. R. D.

Cassida hemisphærica, *Herbst.*—In flood refuse; near Dumfries, and at Orchardton. W. L. and W. D. R. D.

Brachytarsus varius, *F.*—Near Orchardton. W. D. R. D.

Rhynchitis cupreus, *L.*—By beating rowan-tree blossom; also off black-thorn. Orchardton, and Glen Mill and Mabie, Dumfries. W. L. and W. D. R. D.

Rhynchitis æneovirens, *Marsh.*—Off oak trees; at Orchardton. W. D. R. D.

Rhynchitis minutus, *Herbst.*—Orchardton. W. D. R. D.

Polydrusus chrysomela, *Ol.*—By cutting turf near the Solway, Dumfries: by sweeping along the shore, Orchardton. W. L. and W. D. R. D.

Erirrhinus æthiops, *F.*—Four specimens, by sweeping round Maxwelltown Loch. W. L.

Magdalis carbonaria, *L.*—On birch. Dalskairth Wood. W. L.

Trypodendron domesticum, *L.*—Once in some abundance under the bark of a decayed beech. Orchardton. W. D. R. D.

Supplementary note on species taken in the "Moray" District, near Huntly, by W. Lennon.

I SHOULD like to add to the above list the following species taken last autumn near Huntly, Aberdeenshire.

Clinochara (Orchesia) undulata, *Kr.*—Three specimens, under bark of a decayed beech tree near Huntly. This species is new to Scotland. W. L.

Blitoochara lucida, *Grav.*—Three specimens; amongst moss in a fir wood, near Huntly. W. L.

Sphœrites glabratus, *F.*—One taken upon a fungus. W. L.

Hypera suspiciosa, *Herbst.*—One specimen was found in moss in a fir wood near Huntly. W. L.

W. LENNON, 11 Brooke St., Dumfries.

W. D. R. DOUGLAS, Orchardton, Castle-Douglas.

POTAMOGETON UNDULATUS, WOLFGANG, IN STIRLINGSHIRE.

By ALFRED FRYER.

THIS little-known species, only recognised as a British plant in the "Journal of Botany" for October 1891, has already been added to the Flora of Scotland by the joint industry of Mr.

R. Kidston and Col. J. S. Stirling, who found this critical plant in the Union Canal near Falkirk. Their attention was first arrested by abnormal forms of *P. perfoliatus*; on further examining these a series of variable forms was found, which they were unable to place under any species described in British Floras. These doubtful forms, although of widely different facies, they grouped together, and with excellent judgment labelled "*P. perfoliatus* × *crispus?*":—which, with little doubt, is exactly the parentage of the hybrid named *P. undulatus* by Wolfgang.

The two supposed parents were the only Potamogetons found growing with the hybrid form; except some of the linear-leaved species, which, as Mr. Kidston remarks, "do not affect the plant in question." Messrs. Stirling and Kidston sent all their specimens of the new form to me for examination; and that no available help might be lacking, they kindly added the whole of their Stirlingshire collection of this genus—a very necessary addition for the investigation of a critical Potamogeton.

The *undulatus* forms I found to agree fairly well with my own very extensive series from Mr. E. F. Cooper, collected in Leicestershire, and from Mr. C. R. Billups, collected in Cheshire (described in "Journal of Botany" as *P. undulatus*, Wolfg. *v. Cooperi mihi.*), but presenting a sufficient amount of difference to make a further comparison desirable. With this object I then compared the Stirlingshire plant with Wolfgang's type of *undulatus* in the National Herbarium at the British Museum, and with the series of "*P. perfoliatus v. Jacksoni*" (= *P. undulatus* var.) in the same collection. Specimen-matching, always difficult in the genus Potamogeton, and especially so in the case of a form which simultaneously produces states resembling *crispus*, *perfoliatus*, and *nitens*, is not altogether satisfactory; and is apt to be very misleading. In this instance I found one specimen of the Yorkshire *P. Jacksoni* to exactly agree with one of the Stirlingshire plant; but the earlier and the barren states of the two plants did not well correspond. Ultimately I thought it better to refer the new form to the *type* rather than to either of the already known British varieties. This decision was afterwards confirmed by further comparison with a specimen of *P. undulatus*

gathered by Wolfgang himself, and given to me by my generous friend Dr. Tiselius for the furtherance of this investigation. This latter specimen fortunately presented both the *crispus* and *perfoliatus* states of the species, and more closely resembles the Stirlingshire specimens than any of the English forms do. Hence I think we may safely add typical *P. undulatus*, Wolfg., to the British Flora.

P. undulatus may be easily recognised in its ordinary states in living specimens by its compressed stem, like that of *P. crispus*, with foliage somewhat resembling that of *P. perfoliatus*; but the stem-character disappears to a great extent when the plant is dried, and then, in most cases, is only to be detected by the most careful examination. Hence the examination of the fresh stems of doubtful *perfoliatus*-forms is advisable to collectors who wish to find the species in their own localities. It should always be borne in mind, however, that hybrid forms such as *undulatus*, *decipiens*, and *nitens* are never clearly-defined species like *natans* and *densus*, but vary to a considerable extent according to the variation of the species they are bred from, whether induced by local conditions, or inherent variation in the parents themselves. Therefore it will be better for botanists to depend upon a general *specific* resemblance than upon matching their specimens with others gathered in distant, and often widely different, localities.

To enable students to recognise the present species, they would do well to consult the original description of Wolfgang in Roemer et Schultes, "Syst. Veget. Mant.," ed. 3, p. 259 (reprinted in my note in "Journ. Bot."), and also the excellent note in the "Report of the Botanical Record Club," 1880, p. 150, on "*P. perfoliatus v. Jacksoni*," by Mr. F. A. Lees. With these and the accurate plate by Mr. R. Morgan which illustrates the paper in the Journal, no difficulty will be found in naming the species correctly.

P. undulatus, like many of Wolfgang's proposed species, seems to have escaped the attention of botanists until recently, when the re-discovery of the form by Messrs. Cooper and Billups led to its recognition as a distinct species, and to a knowledge of its true place in the genus. It had hitherto been placed by many good botanists under *P. prælongus*, as an extreme variety. And as this view is entertained to some

extent by one of the most eminent authorities on the genus of the present day, it will be well, in the first place, to note the dissimilarities by which the two species may be most readily separated, especially in the dried state, when the stem characters are not readily available.

In *P. prælongus* the leaves are more distinctly hooded at the tip, 13-21-ribbed, translucent, with numerous distinctly visible transverse reticulations; the peduncles are stout, slightly swollen upwards, and always considerably exceeding the subtending foliage. In *P. undulatus*, the leaves are but slightly hooded, or even flattened at the tip, 5-7-ribbed, with few widely separated transverse reticulations which are often hidden in the opaque substance of the leaf; and the peduncles are slender, equal, and much shorter than the subtending foliage.

Rœmer and Schultes placed *undulatus* under *P. crispus* as a variety or subspecies; guided, no doubt, by the compressed stem and by the early foliage, which often closely resembles that of *crispus*. From this, however, the entire margins of the leaves, like those of *perfoliatus*, afford a clear distinction at all times. Although, as in the latter species, the margin is furnished towards the tip with minute spines, it is never serrulate like that of *crispus*.

Mr. Lees provisionally placed his "var. *Jacksoni*" under *P. perfoliatus*, apparently not having attached much importance to the compressed stem; and possibly, also, from not having characteristic examples of the early states of the plants submitted to him. However this may be, *P. undulatus v. Jacksoni* has found its place into our lists as "*P. perfoliatus v. Jacksoni*" and it is necessary to point out the best way of separating all *perfoliatus*-like states of *P. undulatus* from the older species of Linnæus. *P. perfoliatus* has amplexicaul, cordate, *many-ribbed* leaves, and the stipules are rarely to be met with except with the youngest shoots and leaves, and the lowest one is very rarely expanded into an ear-like imperfect leaf; whilst in *P. undulatus* the leaves are semi-amplexicaul, not cordate at the base, and few-ribbed, and the stipules are more persistent, with the lowest, on both stem and branches, frequently furnished with a small distinct leaf on the back, resembling the ordinary leaves. Practically this distinction

will be little needed, because states of the plant composed entirely of *perfoliatus*-like shoots rarely, or never, occur.

Although I have examined many hundreds of fresh stems of this species, I have never found a single instance in which the terete stem of *perfoliatus* was approached even in the slightest degree; nor any instance in which the flowers were not abortive; yet both terete stems and fertile spikes may occur, and should be carefully sought for. Again, individual specimens of the two species now in question may have a greater or less number of ribs in some of the leaves than is usual, or some other character may disappear, or be present, in one or more branches; but these need never mislead the youngest student if care be taken in observing the *aggregate characters* of such doubtful specimens. For instance, a cultivated plant, grown for three years, has produced a single branch with leaves indistinctly serrulated somewhat towards those of *P. crispus*; but in this case the stem was quite typical, and the hundreds of other specimens from the same rootstock are all normal *undulatus*.

The Potamogetons collected by Col. Stirling and Mr. Kidston during the past two summers present many remarkable forms, more than one of which seem new to our Flora. A rich harvest in this genus lies awaiting the hands of Scottish naturalists to gather it, a task that can only be successfully accomplished by resident workers.

RECORDS OF SCOTTISH PLANTS FOR 1891, ADDITIONAL TO "TOPOGRAPHICAL BOTANY," Ed. 2.

By Arthur Bennett, F.L.S.

Again these records tell up to a larger number (320) than could have been anticipated; I must therefore be as brief as possible in my remarks.

I wish most earnestly to impress on any botanist seeing these records, that I shall esteem the rectification of any errors even more than additional records.

I hardly like to mention the fact that some records are not made with that truth-seeking spirit that ought to animate all botanists. Some are compelled to be "weighed" as to their truth, etc., and I regret to say are found "wanting."

The sequence of the counties and the abbreviations are the same as in last year's list; *i.e.*, "Scot. Nat." = Scottish Naturalist: "J. B." Journal of Botany. Specimens seen are marked with "!" Introduced species are marked with "†"

72. DUMFRIES.

[1890 Report. Transfer *Hordeum pratense* to 73; also several records should be under Mr. J. T. Johnson's name, viz., *Saxifraga nivalis*, *Hieracium sparsifolium*, *Senecio viscosus*, and *Salix ambigua*.]

Fumaria confusa, *M'Andrew.*

Fumaria densiflora, *J. T. Johnstone.*

Nasturtium officinale, *Scott Elliot* records this at 2000 ft. "1080 ft." was highest habitat known to Watson.

Lepidium campestre, *Scott Elliot.*—Confirmed.

Rubus cordifolius, *Bab.*
Rubus amplicatus, *Lees.*
Rubus infestus, *W. and N.*
} *Fingland.*—Determined by Mr. J. G. Baker.

Rosa spinosissima.—At 1250 ft.

Hieracium‡ buglossoides, *Arv.-Touvet; Linton.* !

Vaccinium uliginosum, *J. T. Johnstone.*

Arctostaphylos Uva-ursi, *J. T. Johnstone.*

Salix undulata; S. viridis, *Fr.*; **S. laurina; S. Smithiana; S. rubra.**—All *Fingland.* Determined by F. B. White.

73. KIRKCUDBRIGHT.

Records by Mr. J. M'Andrew.

Thalictrum alpinum.
Ranunculus heterophyllus.
Ranunculus Lenormandi.
Aquilegia vulgaris.
Spergularia rubra.
Radiola millegrana.
Hypericum Androsæmum.
Rhamnus Frangula.
Vicia lathyroides, *Rev. J. Fraser.*
Vicia Orobus.
Rubus suberectus, Ball herb. at Kew.—*J. B.* 1891. p. 162.
Saxifraga hypnoides.
Cicuta virosa.
Æthusa Cynapium.

Apium graveolens.
Centaurea Cyanus.
Carduus heterophyllus.
Filago minima.
Sonchus asper.
Convolvulus Soldanella, *Rev. J. Fraser.*
Mertensia maritima.
Scrophularia aquatica.
Pinguicula lusitanica.
†Plantago media.
Plantago Coronopus.
Lamium amplexicaule.
Salsola Kali.
Suæda maritima.
Euphorbia Peplus.
†Salix fragilis.
Salix Caprea.
Salix herbacea.
Salix purpurea.
Listera ovata.
Scirpus multicaulis.
Carex pauciflorus.
Carex paniculata.
Carex curta.
Carex glauca.
Agrostis canina.
Avena strigosa.
Melica nutans.
Festuca Myurus.
F. elatior.
Asplenium viride.
Nephrodium Oreopteris.

74. WIGTON.

Arabis hirsuta, *Coles*, 1882.—*Scott Elliot, Fl.*

75.

Salix phylicifolia, *Fingland.*—Determined by F. B. White.

76. RENFREW.

Trientalis europæa, *J. Wood.* !

77. LANARK.

Carlina vulgaris, *P. Ewing!*

86. STIRLING.

[Under 86 in 1890 Report delete *Potentilla alpestris*, *Alchemilla vulgaris*, and *Rumex nemorosus*. Transfer *Atriplex* (*patula*) *erecta* to 96. *Carex lævigata* is in "Top. Bot." !]

Col. Stirling and R. Kidston, all. !

Ranunculus Lingua.
†Helleborus fœtidus.
†Lepidium ruderale.
Silene noctiflora.
Stellaria aquatica.
Stellaria palustris (glauca).
Lepigonum neglectum.
Elatine hexandra.

Hypericum dubium.
Anthyllis Vulneraria.
†Prunus domestica.
†Spiræa salicifolia.
†Rosa arvensis.
†Pyrus Aria.
†Ribes rubrum.
†Sedum reflexum.
Callitriche autumnalis.
†Carum Carui.
†Carum petroselinum.
†Cornus sanguinea,
†Crepis biennis ?
Hieracium lingulatum.
Hieracium anglicum.
Hieracium prenanthoides.
Hieracium Friesii, *Hartm.*
Hieracium crocatum.
Hieracium gothicum.
Calystegia sepium.
Linaria minor.
†Mimulus luteus.
†? Nepeta Cataria.
†Lamium maculatum.
†Borago officinalis.
Salix viminalis.
Rumex domesticus.
Rumex viridis.
†Daphne Laureola.
†Humulus Lupulus.
†Populus nigra.
Sparganium affine.
Sparganium simplex.
Typha latifolia.
Carex paniculata.
Carex teretiuscula, var. Ehrhartiana.
Carex aquatilis, var. elatior, *Bab.*
Carex Œderi, *Ehrh.* (*non auct.*)
Carex riparia ?
Phleum arenarium.
Alopecurus agrestis.
Avena pubescens.
Glyceria maritima.
†Sclerochloa procumbens.
Sclerochloa loliacea.
Chenopodium album, *P. Ewing.* !

[*Orobus tuberosus*, mentioned in a former Report for Stirling, had better be deleted.]

87. PERTH, W.

Hieracium holosericeum, *E. S. Marshall.*

88. PERTH, M.

Pyrola minor.—"2500 ft, barren." *Marshall* in "J. B." 1891, p. 113.

Carex alpina, *Groves.*

Eriophorum alpinum.—Mr. Holt has sent a fragment of this from "Craig Challiach, Perthshire, Mr. Henry Stansfield." Mr. Holt writes, "I do not know the date of this, but it was

collected by Mr. S. some 20 years ago." I sent it to Dr. F. B. White, so that it might be looked for again.

Equisetum pratense, "2700 ft.," *Marshall.*

96. EASTERNESS.

Mr. A. SOMERVILLE.!

Rubus fissus, *Bab.*; **fide,** *J. G. Baker.*

Hieracium argenteum.

Hieracium Friesii, *Hartm.*

Hieracium Schmidtii, *Tausch.*

Hieracium auratum, *Fries.*

Mentha arvensis.

†Salix alba (cœrulea).

Drosera intermedia, *Grieve.*—In "Edin. Nat. Field Club," 1881. "Badenoch."

97. WESTERNESS.

To avoid repetitions the records are placed under the names of the recorders.

Rubus rhamnifolius, *Macvicar*, sp.; **fide** *Baker.*

Rubus umbrosus, *Macvicar*, sp.; **fide** *Baker.*

Phragmites communis, *Rev. E. F. Linton.* By *Mr. Bruce.*

†Aquilegia vulgaris.
†Berberis vulgaris.
†Acer pseudoplatanus.
Vicia angustifolia.
Orobus tuberosus.
Prunus spinosa.
†Prunus Avium.
Prunus Padus.
Rubus "suberectus."
Rubus "plicatus."
Rubus "mucronatus, *Blox.*"
Rosa tomentosa.
Pyrus Malus.
Epilobium parviflorum.
Circæa "alpina."
Saxifraga "sponhemica."
Callitriche hamulata.
Scleranthus annuus.
Sonchus arvensis.
Hieracium melanocephalum.
Hieracium senescens.
Hieracium anglicum.
Hieracium boreale.
Centaurea Cyanus.
†Convolvulus sepium.
Mentha arvensis.
Polygonum lapathifolium.
Polygonum "maculatum."
Rumex domesticus.
Rumex conspersus.
Rumex acutus, *L.*
Rumex conglomeratus.

†Humulus Lupulus.
Ulmus montana.
Quercus sessiliflora.
†Populus canescens.
†Salix alba.
†Salix purpurea.
Orchis incarnata.
Carex flava, *agg.*
Carex xanthocarpa, *Deg.*
Phleum pratense.
Phleum alpinum.
Agrostis nigra.
Avena pubescens.
Bromus racemosus.
Triticum repens.

Mr. MACVICAR, all. !

Draba verna.
Hieracium gracilentum.
Centunculus minimus.
Carex arenaria.
Hymenophyllum tunbridgense.
Viola Curtisii.
†Tanacetum vulgare.
Utricularia vulgaris ? (may be neglecta.)
Plantago intermedia.
Koeleria cristata.

98. ARGYLE.

[Delete "Sparganium affine," as already on record !]

Thalictrum majus *Crantz, E. S. Marshall.* !

Mr. P. EWING, all. !

Cardamine amara.
Lepidium Smithii.
Arenaria trinervia.
Pimpinella Saxifraga.
Arctium majus.
Jasione montana.
Veronica Anagallis.
Scutellaria minor.
Briza media.

99. DUMBARTON.

Mr. L. WATT, all. !

Raphanus maritimus.
Cerastium tetrandrum.
Spergularia marginata.
†Centaurea Cyanus.
Tanacetum vulgare.
Jasione montana.
Anagallis tenella.
Lycopsis arvensis.
Utricularia vulgaris.
Potamogeton Zizii.
Ruppia rostellata.
Alisma ranunculoides.
Schœnus nigricans.
Scirpus acicularis.
Carex aquatilis, *var.* elatior, *Bab.*
Kœleria cristata.
Equisetum maximum

104. HEBRIDES, N.

Mr. P. EWING, all. !

Barbarea vulgaris.
Sisymbrium officinale.
Raphanus maritimus.
Lychnis Githago.
Spergularia marginata.
Geranium dissectum.
Geranium lucidum.
Potentilla Sibbaldi.
Mertensia maritima.
Carex Œderi Ehrh., (not *auct. Angl.*)
Hieracium buglossoides, *Arv.-Touvet; Linton,* "Ex. Club Report," 1890.

105. ROSS, W.

Mr. P. EWING, all. !

Spergularia marginata.
Spergularia media.
Vicia hirsuta.
Daucus Carota.
Stachys arvensis.
Salicornia herbacea.
Plantago Coronopus.
Urtica urens.
Carex filiformis.
Aira caryophyllea.
Isoetes echinospora.

106. ROSS, E.

Rev. E. S. MARSHALL, all. !

Ranunculus Lingua. Confirmed.
Teesdalia nudicaulis.
Viola canina.
Cerastium tetrandrum.
Spergularia marginata.
Geranium pratense.
†Trifolium agrarium.
Oxytropis uralensis. New station. Reported extinct in the old one.
Rubus fissus.
Rubus corylifolius.
Rosa rubiginosa. "Certainly wild."
Potentilla reptans.
Geum intermedium.
Galium erectum.
Hieracium anglicum.
Myosotis palustris, strigulosa.
Anagallis tenella.
(Utricularia neglecta?)
Salsola Kali.
Atriplex patula.
Salix phylicifolia.
Habenaria chlorantha.
Potamogeton prælongus.
Potamogeton pectinatus. Confirmed.
Ruppia rostellata.
Carex pilulifera.

Carex distans.
Carex extensa.
Avena flavescens.
Ammophila arundinacea.
Milium effusum.
Catabrosa aquatica.
Bromus sterilis.
Bromus commutatus.
Asplenium Adiantum-nigrum.
Athyrium Filix-fœmina.

Mr. C. Bailey, in "Ex. Club Rep.," 1890.

Rubus plicatus.
Rubus Schlechtendalii.
Rubus mucronatus,
Rosa involuta,
Veronica Buxbaumii,
} *Marshall* and *Hanbury*. In "J. B." 1891, p. 112.

Mr. P. Ewing. !

Myriophyllum spicatum.
Carduus nutans.
Carduus crispus.
Salix fragilis.
†Hippophae rhamnoides.
Scirpus Savii.
(Rhinanthus major (1890 Rep.) must be deleted, fide *Rev. E. Marshall.*)

107. SUTHERLAND, E.

Rubus plicatus, *Marshall* and *Hanbury*. In "J. B." 1890, p. 111.

Rubus mucronatus, *Marshall* and *Hanbury*. In "J. B." 1890, p. 111.

108. SUTHERLAND, W.

Spergularia marginata, *Marshall* !

Hieracium flocculosum, *Marshall* and *Hanbury*.—In "J. B.," 1891.

Callitriche hamulata.—At 2300 feet on Ben More of Assynt. *Marshall.* In "J. B." 1891, p. 113.

110. OUTER HEBRIDES.

Mr. W. S. Duncan, all. !

Ranunculus trichophyllus, *A. Somerville*, sp.; 1888.
Arabis hirsuta.
Orobus tuberosus.
Rosa canina (lutetiana).
Alchemilla vulgaris.
Rubus incurvatus, fide *Baker*.
Epilobium alpinum, *var.*
Helosciadium inundatum.
Hieracium iricum.
Carduus heterophyllus.
Arctostaphylos Uva-ursi.

Ilex aquifolium.—Confirmed.
Veronica scutellata.
Orobanche rubra.
Lysimachia nemorum.
Polygonum Hydropiper.
Listera cordata.
Habenaria bifolia.
Habenaria chlorantha.
Potamogeton pusillus.
Carex pauciflora.
Lastrea æmula.—Confirmed.
Pilularia globulifera.
Equisetum variegatum, *Sch.*; var. **majus,** *Syme.*

111. ORKNEYS.

Potamogeton lucens, f. *W. Irvine Fortescue.*

112. SHETLAND.

Mr. BEEBY, in "Annals," *et. sp.*

Lapsana communis.
Hieracium zetlandicum, *Beeby.*
Hieracium oreades, *Fr.*
Hieracium Farrense, *Hanb.*
Hieracium protractum, *Lindb.*
Hieracium Friesii, *Hartm.*
Hieracium auratum, *Fr.*
Hieracium truncatum, *Lindb.*
Hieracium crocatum, *Fr.*
Matricaria maritima, *L.*

PLANTS OF GLEN SPEAN, WESTERNESS.

By G. CLARIDGE DRUCE, M.A., F.L.S.

THE following list of plants was made by myself and E. H. Robertson, Esq., of Burnside, Forfar, during a week's botanising of the hills from Roy Bridge, and the Bridge of Spean. Lord Abinger and Mr. J. K. Cross kindly gave us permission to go over their forests. The weather was showery, and the season rather too far advanced to allow of a larger list being made. It will be observed that several alpines gathered by "The Camp" of the Scottish Alpine Club were not seen: but these were not especially sought after (nor was their list seen till afterwards), nor was the summit of Aonach Mòr itself reached. The cliffs of that mountain were, however, pretty thoroughly explored. Some critical plants are yet under consideration. I am indebted to the Rev. W. Moyle Rogers, the Rev. E. Marshall, Mr. Arthur Bennett, and Mr. F. J. Hanbury, for

critical assistance. The plants which are believed to be new records are marked with *. Introductions are marked †.

Numerous common species were noted in addition to those enumerated below; but as they had already been recorded from the district their names have been omitted for the sake of brevity. The total number of species of Phanerogams noted was 373, including introductions; made up of 277 Dicotyledons, 2 Conifers, and 94 Monocotyledons.

Thalictrum alpinum, *L.*—Common in the corries.

Ranunculus Flammula, *L.*—Common; also the var. **pseudo-reptans,** *Syme.* **R. acris,** *L.*; common in at least three forms. None of the montane plants were quite identical with the var. **pumilus,** *Wahl.*, from the Cairngorms. **R. acris** was noticed at over 3800 feet on Aonach Mòr.

Caltha palustris, *L.*—Common. The var. **minor,** *D.C.*, occurred by the springs in the corries, and was very common on Beinn Chaoruinn.

Trollius europaeus, *L.*—Aonach Mòr.

*† **Aquilegia vulgaris,** *L.*—On the north bank of the Spean between Roy and Inveroy. It was away from houses; but the seeds may have been washed down from gardens at Roy. The plants were much above the summer level of the river, and were associated with *Hieracium corymbosum*, and *Vicia sylvatica.*

† **Berberis vulgaris,** *L.*—As a relic of cultivation about dismantled cottages, etc.

Cardamine pratensis, *L.*—As the form **C. palustris,** *Petermann*, in Glen Spean; **C. hirsuta,** *L.*, Roy; **C. flexuosa,** *With.*, Aonach Mòr.

Nasturtium officinale, *Br.*—Gairlochy.

Cochlearia officinalis, *L.*; var. **alpina,** *Bab.*—Aonach Mòr. With this were other montane forms, which are not apparently named.

Brassica Sinapistrum, *Boiss.*—Roy. This is an earlier name for *Sinapis arvensis* than that of *B. Sinapis* adopted in the "London Catalogue"; since Visiani, in the "Flora Dalmatica," quotes Boissier for *Brassica alba* of the same date, but does not adopt his name for this plant. It occurred only in cultivated fields about Roy.

Helianthemum Chamæcistus, *Miller.*—Very rare; on a rock near the western end of Loch Laggan.

Viola arvensis, *Murr.*—At Roy, etc. **V. lutea,** *Huds.*—Rare; Moy.

This was the var. **V. amœna,** *Symons*, which Watson in "Cyb. Brit." (vol. i., p. 181), 1847, reduced to a variety of *V. lutea.*

***Polygala vulgaris,** *L.*—North bank of Spean between Roy and Inveroy.

P. serpyllacea, *Weihe.*—Common.

Silene maritima, *With.*—On river shingle near Gairlochy.

Cerastium triviale. var. **alpestre,** *Syme.*—Stob Coire-an-Easain and Aonach Mòr. **C. alpinum,** *L.*; Aonach Mòr, Creag Meaghaidh; var. **pubescens,** *Syme.* To this name Rev. E. Marshall would refer a tall erect plant which occurred on Aonach Mòr. Mr. Arthur Bennett was induced to call it var. *alpestre* of *C. triviale.* My own impression at the time of gathering it, and now, is that it is a hybrid *C. triviale* × *alpinum.* **C. arcticum,** *Lange*; cliffs of Aonach Mór and Stob Coire-an-Easain.

C. trigynum, *Vill.* (= **C. refractum,** *All.*)—Common in the corries on the talus slopes; rarely as the glabrous, usually as the pubescent form, *i.e.* **C. nivale,** *Don.* Very fine by the ridge connecting Beinn Chaoruinn and Creag Meaghaidh.

Stellaria media, *Cyr.*—Also as the var. **major,** *Koch* (= **S. neglecta,** *Weihe*).

Arenaria serpyllifolia, *L.*—Near Moy bridge, very rare. Not quite the type form, but nearer to it than to *leptoclados.*

Sagina Linnei, (1835), so spelled by Presl. Probably it is the *S. Spergella,* Fenzl. (1833). Aonach Mòr.

***Spergula sativa,** *Boenn.*—Common.

Montia fontana, *L.*; * var. **major,** *All.*—Spean side.

Hypericum humifusum, *L.*—Rather rare, near Inveroy.

Geranium sylvaticum, *L.*—The * var. **parviflorum,** *Blytt,* occurred by the Spean near Inveroy. **G. molle,** *L.*; local. **G. dissectum,** *L.*; rare, and perhaps only casual, near Unachan. **G. Robertianum,** *L.*; local, by the Spean near High Bridge.

† **Acer Pseudo-platanus,** *L.*—Seedling plants occurred on the banks of the Spean near Roy.

Ulex europæus, *L.*—Spean.

Trifolium medium, *L.*—Spean bank, Inveroy, etc.

† **T. hybridum,** *L.*—Common as a relic of cultivation. *† **T. agrarium,** *L.*—Roy, in cultivated fields. * **T. dubium,** *Sibth.*; Gairlochy.

Anthyllis Vulneraria, *L.*—Rare; on the shingle at Gairlochy, and as an entire-leaved plant on the Spean banks near Inveroy.

Lotus corniculatus, *L.*—Also a lax form near Roybridge.

Vicia hirsuta, *Koch.*—Rare, Auchnabobaune. **V. sylvatica,** *L.*; on the Spean banks. Very beautiful between Roy and Inveroy. * **V. angustifolia,** *L.*; Spean. † **V. sativa,** *L.*; only in corn crops.

* **Lathyrus montanus,** *Bernh.* (**L. macrorhizus,** *Wimmer*). — Near Roy.

* **Prunus spinosa,** *L.*—Spean.

† **P. domestica,** *L.*—Roy. * **P. avium,** *L.*; Roy, near the bridge.

* **P. Padus,** *L.*—Loch Laggan side, and also by the Spean.

† **Spiræa salicifolia,** *L.*—As a garden relic on the south bank of Spean.

Rubus Idæus, *L.*—Roy, etc. * **R. nessensis,** *Hall* (*R. suberectus, And.*)—Near Roy bridge, near Spean, Coneachan, etc. * **R. plicatus,** *W. & N.*; Roy, Spean. * **R. villicaulis,** *Koehl.* Roy. * **R. mucronatus,** *Blox.*; near the Roman Church, Roy; near Roy; and near High bridge. **R. saxatilis,** *L.*; near the Roman Church, Roy. **R. Chamæmorus,** *L.*; on the peaty places of Aonach Mòr, and Stob Coire-an-Easain.

Geum rivale, *L.*—Ascending to 3000 feet on Aonach Mòr.

Potentilla Sibbaldi, *Hall. f.*—Aonach Mòr, etc. **P. Fragariastrum,** *Ehrh.*—Spean banks near Inveroy.

Rosa involuta, *Sm.*—Roy, Inveroy, etc.; not uncommon; * var. **Nicholsoni,** *Crèpin.*; Near Roy. **R. villosa,** *L. hb.* (**R. mollis,** *Sm.*); common; also as * var. **cœrulea,** *Woods.*

R. tomentosa, *Sm.*; common; var. **scabriuscula** (*Sm.*)—Spean; * var. **subglobosa** (*Sm.*); Inveroy. **R. canina,** *L.*; * var. **lutetiana** (*Lem.*), Roy.; var. **dumalis** (*Bechst.*); also intermediate forms, and sometimes with a few setæ on the peduncles, about Roy; * var. **dumetorum** (*Thuill*); a small-leaved form, at Spean; * var. **urbica** (*Lem.*); common. A very pretty rose was not unfrequent from Roy to Docharty. It answers fairly well for **pruinosa,** *Baker,* except in its leaf serration. It was rather backward, as the petals had only recently fallen; and it may belong to the *subcristata* group. It is a very distinct-looking plant. * **R. glauca,** *Vill.*; a common rose from Roy to the Great Glen. * var. **R. coriifolia,** *Fries.*; Roy, Inveroy, Inverlair, etc. * var. **suberistata,** *Baker,* Roy, Blairour, etc. †* **R. arvensis,** *Huds.*; A curious form in an old hedge by a garden on the south side of Spean nearly opposite Roy.

* **Pyrus Malus,** *L.*—Roy.

Saxifraga oppositifolia, *L.*—Rare, or gone over; Stob Coire-an-Easain.

S. nivalis, *L.*—Aonach Mòr. **S. stellaris**, *L.*; Common. On Aonach Mòr occurred a curious form. It grew at the base of high and steep cliffs, down which water was dripping, among Bartramia and Epilobium alpinum, the latter of which it somewhat mimicked. Instead of the usual rosette of leaves with a leafless erect scape, this had procumbent flower stalks along which the leaves were scattered. The stalks and leaves were more fleshy than usual and the leaves less cut. Whether these marks are permanent or not cultivation may decide. The form might be provisionally distinguished as var. **fontana**.

S. aizoides, *L.*—Common; also with the leaves ciliate, *i.e.* **S. autumnalis**, *L.* **S. rivularis**, *L.*; Abundant at the base of the high cliffs in the corries, as on Aonach Mòr, Stob Coire, etc.

S. hypnoides, *L.*—Aonach Mòr, and as a condensed state. ***S. quinquefida**, *Haworth* (**S. sponhemica**, *Gmel.*); rare; Stob Coire-an-Easain.

† **Ribes Grossularia**, *L.*; † **R. nigrum**, *L.*; † **R. rubrum**, *L.*—All as relics of cultivation about ruins of crofters' houses.

Sedum roseum, *Scop.*—At Lochan Uaine, and the higher rocks.

† **Sempervivum tectorum**, *L.*—On a cottage roof.

Drosera anglica, *Huds.*—Inveroy, Moy, etc.

***D. obovata**, *Mert. et Koch.*—Moy.

Myriophyllum alterniflorum, *D.C.*—Loch Laggan, Gairlochy.

Callitriche stagnalis, *Scop.*; ***C. hamulata**, *Kuetz.*—Gairlochy.

Epilobium montanum, *L.*; *f.* **minor**, *Haussk.*—Near Highbridge, Spean. **E. obscurum**, *Schreb.*; Common. **E. palustre**, *L.* ***E. alsinefolium**, *Vill.*; rather rare; Creag Meaghaidh, not observed on Aonach Mòr. **E. alpinum**, *L.*, and as the form **scapoides**, *Hausskn.*; on Beinn Chaoruinn.

Circæa Lutetiana, *L.*—Near Highbridge, in the woods. ***C. alpina** *L.*; south side of Spean near Dalnabie.

† **Ægopodium Podagraria**, *L.*—Roy.

(*To be continued.*)

ZOOLOGICAL NOTES.

Mole (*Talpa europæa*, L.) **in the Island of Ulva.**—Mr. P. C. Mackenzie, of Calgary, informed me to-day (24th February 1892), *ex ore*, that the first Mole ever seen in the Island of Ulva, on the

west coast of Mull, was captured a few days ago. It would be interesting to know how this species was introduced into the island, for His Grace the Duke of Argyll, to whom I mentioned this subject, informs me that the Mole cannot swim. His Grace tells me that he once threw a mole into a river and expected it to swim, but although it floated, it was perfectly helpless and could not move an inch across the stream.—J. A. HARVIE-BROWN.

Hedgehog (*Erinaceus europæus*, L.) **in Shetland.**—I was somewhat astonished to be informed, when staying at Tingwall Manse in October last, that the Hedgehog was well known along the shores of the freshwater loch at Tingwall. Mrs. Bain told me that they were introduced into Shetland by the farmer at Veersgarth, and that he planted whins for their protection. This took place about thirty years ago. They are supposed to have been introduced into the Island of Burra by means of a cargo of empty casks, or the ballast of a vessel. From Veersgarth they soon spread over the parish of Tingwall. Mrs. Bain put them on several occasions into the walled garden, but they soon died.—J. A. HARVIE-BROWN.

Varieties of the Otter (*Lutra vulgaris*, L.) **in Jura.**—White and cream-coloured Otters are not uncommon in Jura, and perhaps half-a-dozen have been killed of late years to my knowledge.—HENRY EVANS, Jura Forest.

Wild Cat (*Felis cattus*, L.) **in Sutherland.**—On 22d September 1891, whilst beating Gruambeg Wood, on the north side of Loch Naver, the keeper and one of the gillies saw a Wild Cat. The wood is a large rough wood of natural-grown birch, and part of it is a huge mass of fallen rock and debris. The cat was within gunshot of the gillie, and he had plenty of time within which to identify it. I may add, that I have heard that two Wild Cats were trapped in the same wood, some seven or eight years ago, by a man of the name of Campbell.—E. T. BALDWIN, Altnaharra, Sutherland.

On the Appearance of the Brown Rat (*Mus decumanus*, Pallas) **on Ailsa Craig.**—There is perhaps no animal that has so persistently followed man in his migrations, or has so adapted itself to the varied nature of climate or habitation, as the rat; and there are few places, indeed, in the occupancy of the human race where it has not obtained a footing. Given suitable surroundings—and where is the place not suitable?—the rat will increase and spread its boundaries wider and wider in spite of all the efforts made to extirpate it. Considering these circumstances and its well-known fecundity and omnivorous appetite, there are few situations in our islands that are free from its ravages. One such, Ailsa Craig, in the Firth of Clyde, has quite recently been conquered by the enemy. Up till the year 1889, rats were unknown on the Craig, but in that year (the exact date is not

certain) one of the dogs belonging to the lighthouse keeper killed one at the head of the jetty, which was the first seen or heard of on the island. At the time there was a lighter lying there discharging coal for the Light Station, and it was supposed the rat had come from her. On 11th December 1889, Mr. Dawson, the second keeper at the station, wrote me, saying, "It was said at one time that rats would not live here, but we find that to be a mistake; for of late 48 have been killed, and as yet there seems to be plenty more about the place." From this, it will be seen that at that date they had obtained a firm footing on the island, which, being a favourite breeding-place of sea-fowl, and with a fringe of rough boulders and masses of rock round the base of its steep cliffs, had all the essential requisites as a suitable home for the rat. In the following year, Mr. Dawson (*in lit.* 3d March 1890) says, "The rats are commencing to be a perfect nuisance here. Mr. Ross, the keeper of the lighthouse station, killed one a few days ago which weighed 18 ozs.;" and again, a few months later, "it is not safe to put your hand into a hole for a puffin, for the chances are that you get a rat instead." So serious were matters beginning to appear that, on 17th November, Mr. Dawson wrote me, saying, "Rats are on the increase: last Sunday, 59 were killed by one dog at the west side of the island. We are going to have a regular field day amongst them, all hands are to turn out with their dogs." From this time on, constant warfare was waged against the vermin by the tenant who rents the island, he being the chief sufferer, as the rabbits were eaten in the traps and the strings cut by them. The eggs and young of the sea-fowl also paid large tribute to the omnivorous rodent, so much so, that fewer young, I believe, were reared than has ever been the case before. On 2d November last, Mr. Ross wrote, saying, "last year from the 1st October till the end of December [*i.e.* in 1890], while the keeper was catching rabbits, he killed over 900, and I am sure my dog killed over 100 about the doors; since then we have not been keeping count of the numbers we have killed until the first of last month, and since then there has been over 300 killed, and yet they seem as plentiful as ever. They are all over the island, from the very top down to the water's edge. Meat is getting very scarce for them now since the birds have left, so that they have started to eat the ones that have been killed. There is bound to be a good number poisoned as well, as the tenant mixes up arsenic with all the rabbit offal, and it all disappears. We thought last year, seeing they were getting so much poison and eating one another, that they would all disappear, but now they are thicker than ever." As this was the state of matters within three years after the introduction, or rather the invasion of the rat, it is not difficult to see that Ailsa Craig will, like Puffin Island, on the Welsh Coast, and the Copeland Islands in Belfast Bay, be ruined as a

rabbit producing island, and the effect on the other fauna will also be disastrous. It is difficult, if not impossible, to suggest a cure, but if any such can be found there is no more favourable spot on which to operate, for the Craig, lying as it does about eight miles from the nearest point on the mainland, the vermin cannot, unless by a chance similar to their introduction above noted, receive any outside accession to their numbers. In the meantime, the vermin are masters of the situation, against the united efforts of the inhabitants and their canine assistants.—J. MacNaught Campbell, Kelvingrove Museum, Glasgow.

Melanic Variety of the Rat (*Mus decumanus*, Pallas) in North Uist.—I send you a Black Rat which was caught in the larder here, Sponish House, Loch Maddy, on the 12th of November last. We caught altogether five in about a week, so that a party of them must have come in.—James Gray Webster, Loch Maddy.

[We have examined the specimen and find it to be the melanic form of the Common Rat described by Thompson (P.Z.S. 1837) as the Irish Rat (*Mus hibernicus*). This form is not uncommon in Ireland, and was first recorded for the Outer Hebrides from Benbecula in 1888. It appears to be extremely rare on the mainland of Britain.—Eds.]

Notes on the Vole Plague.—I do not blame the destruction of vermin for the great and *sudden* increase of Voles (*Arvicola agrestis*, Schreber), otherwise they might have been as numerous as they now are at any period, and all the time during the past thirty years other micro-mammalia have not unduly increased. During the period between early in 1889 and up till August 1891, the weather throughout this district was much below the average in rainfall, and wells, springs, burns, and rivers were getting abnormally low. The hills hereabouts hold water like a sponge. The long continued dry weather reduced this moisture so much as to permit (on the hills only) quite a luxuriant crop of herbage in 1890 and 1891, which covered up the nests of young voles from the crows and rooks—the latter are their most effective natural enemy. It is amazing how greedily they hunt up and devour the young "blind mice." Then the dry weather in the earlier months of the summer allowed the voles comfortable healthy nests. So you have only to figure up what can be done in the way of fecundity by one single pair of voles and their offspring in one single breeding season to realise how difficult it is for the bucolic mind to believe the voles did not drop from the clouds. I have found nests of young blind voles at the end of March, even in damp meadows, and again about the last week in September, and they—the same pair—would have young numbering from six to eight or sometimes ten in each intervening month. The voles are spreading westward—that is, were doing so at close of last breeding season.—Robert Service, Maxwelltown.

The Squirrel (*Sciurus vulgaris*, L.) **in Wigtonshire.**—The Squirrel is the latest spontaneous addition to the fauna of Wigtonshire. I heard of one or two being seen in the woods at Monreith about ten years ago; but it was not till 1889 that I saw one myself. They are now becoming pretty abundant.—HERBERT MAXWELL, Monreith, Wigtonshire.

Occurrence of the Chiff-Chaff (*Phylloscopus rufus*, Bechst.) **in Banffshire.**—On the 8th of October last, I heard the unmistakeable note of the Chiff-chaff, and followed the bird for some time in the birchwoods of Dell, Strathavon, about eight miles below Ballindalloch. The strong southerly winds prevailing at the time—that of the autumnal migration—probably account for the presence of this bird in a part of Scotland where I believe it has rarely been observed.—LIONEL W. HINXMAN, Edinburgh.

Dipper (*Cinclus aquaticus*, Bechst.) **in North Uist.**—Sheriff Webster informs me that he has seen a Dipper or Water Crow in North Uist, but adds that the bird is not common. This is the first time I have been able to record the Dipper in any of the islands of the Outer Hebrides, south of Harris.—J. A. HARVIE-BROWN.

Great Grey Shrike (*Lanius excubitor*, L.) **in Solway District.**—A specimen of this bird, shot on 25th February at Drumclyre, Kirkcudbrightshire, by Mr. Smith, gamekeeper there, has been presented to me. This is the only bird of the species I have heard of this winter.—ROBERT SERVICE, Maxwelltown.

Red-backed Shrike (*Lanius collurio*, L.) **at the Pentland Skerries.**—I saw two Red-backed Shrikes here on the 4th of September 1891, and captured one of them, a female, so that there is no mistake about the bird. I have since got it stuffed. This is only the second time I have seen this bird here for the last ten years.—J. GILMOUR, Pentland Skerries.

Waxwing (*Ampelis garrulus*, L.) **in Berwickshire.**—A fine adult female Waxwing was found dead on 11th December 1891, at Mordington, near Berwick-on-Tweed, and being in a perfectly fresh condition, was forwarded to me for preservation.—ROBERT SMALL, Edinburgh.

Waxwing (*Ampelis garrulus*, L.) **in Caithness.**—A female of this very rare bird in Caithness was shot at Shurrery, on the estate of Thomas Pilkington, Esq., Sandside, on the 3d of November 1891. —LEWIS DUNBAR, Thurso.

Rook (*Corvus frugilegus*, L.) **singing.**—This morning (25th February 1892) as I was walking through the grounds of Loretto, Musselburgh, my attention was attracted by a bird-note that was

entirely unknown to me. On looking about to ascertain what bird it might be I saw a common rook (*Corvus frugilegus*) sitting on the top of a large isolated lime-tree, and indulging in a most unmistakable song, that resembled a bass or guttural reproduction of the varied and spluttering song of the starling, and accompanied, like the starling's, by a *fluttering* of the wings, besides the usual bowing and spreading of the tail and wings of the rook. The most remarkable part of the song was a peculiar deep single whistling note, repeated three or four times in succession and coming every now and then in the middle of the other notes, of which there were, so far as I could tell—and I was standing within 25 yards of the tree—some three or four different kinds, varying in both pitch and quality. The song was continuous and lasted the whole time—about three minutes or a little more—that I was watching the bird. The song was only brought to an end by the bird flying off and joining a flock of its own species that passed over the tree. As to the nature of the song, it is just possible, with the well-known imitative qualities of the Corvidæ, that this bird may have actually copied the song of the starling.—Norman Maclachlan, Loretto, Musselburgh.

Rollers (*Coracias garrulus*, L.) **in Caithness.**—On the 1st of October 1891, a Roller, a male, was found dead near Mey. Three specimens of this bird have come under my notice for the county during the past twenty-six years. One of these, also a male, was killed at Watten on the 21st May 1890.—Lewis Dunbar, Thurso.

Dichromatism in the Tawny Owl (*Syrnium aluco*, L.)—I have been engaged for the last eight months in making careful investigations upon the subject of Dichromatism, and having arrived at a certain stage in the work regarding the common Screech-Owl (*Megascops asio*), am desirous of obtaining information concerning the Tawny Owl in various parts of Europe. I shall deem it a special favour if any one will kindly furnish information in answer to the following. (1) How many specimens have come under your notice, and what proportion of them were in the gray? (2) Which is the prevailing colour in your locality? (3) What forest trees are most uncommon in your locality —deciduous or coniferous? (4) If you have observed a pair of old birds with young, state the character of young as to plumage, and also that of the parents; whether both red, both gray, or one red and the other gray. Any additional information will be very acceptable. —E. M. Harbrouch, 1610 15th Street, Washington, D.C., U.S.A.

[We have pleasure in making the above known to our readers, and shall look forward with interest to the conclusions to be deduced from Scottish data.—Eds.]

Hen Harrier (*Circus cyaneus*, L.) **in Caithness.**—This species is now becoming scarce in this county owing to the persecution to which it is subjected by keepers. I received a very fine female

which had been killed at Dalnawillan, on the 24th of June; and a male changing from the young to the adult plumage, and nearly blue, was obtained at Westfield, near Thurso, on the 8th of January 1892.—Lewis Dunbar, Thurso.

Rough-legged Buzzard (*Archibuteo lagopus*, Gmel.) **near Kingussie.**—On the 18th of December a Rough-legged Buzzard was trapped on a low part of the moors at Bellville. It had been causing great annoyance for some considerable time by hunting the ground most systematically and clearing whole beats of birds. My keeper says that he generally sees birds of this species in September, and that they remain until April.—C. B. Macpherson, Whitechurch, Salop.

Albino Cormorant (*Phalacrocorax carbo*, L.) **in Orkney.**—An Albino Cormorant was shot by Mr. Jas. M'Lauchlan at Kettletoft Pier, Sanday, Orkney, in February 1891, which I purchased, and have now in my possession. It is full-grown, slightly flecked with brownish feathers on neck, back, and thighs, elsewhere white. Curiously enough the eyes, instead of being of the pinkish tint generally found in albinos, were yellow, the feet, legs, and bill, horn white. A slight ring of dark brown feathers surrounds the eyes, and edges the gape. It was got in good condition, and had been observed in company with its normally coloured brethren on several occasions before it was shot, so in all probability it was bred in the neighbourhood. I do not recollect seeing or reading of an albino Cormorant being previously obtained in this neighbourhood, and should like very much if any of your correspondents can inform me if they are common anywhere.—T. S. Peace, Kirkwall.

[One is figured in Graham's "Birds of Iona and Mull," p. 130; and acording to Saxby ("Birds of Shetland," p. 319) two pure albino cormorants with light-coloured feet and bills, were observed in Unst during the years 1869 and 1870.—Eds.]

The Bittern (*Botaurus stellaris*, L.) **in Wigtonshire.**—I regret to have to record the destruction of a fine specimen of the Common Bittern (alas! there is a melancholy irony in the adjective) on the White Loch of Myrton, Monreith, Wigtonshire, in January last. Is there no hope of arousing a feeling of interest in harmless species annually becoming more rare; and of inducing sportsmen to limit their operations to game birds?—Herbert Maxwell, Monreith, Wigtonshire.

Bittern (*Botaurus stellaris*, L.) **at Moffat.**—I shot a Bittern on the 23d of January last in a small marsh situated about a mile below Moffat. The ground is generally wet and covered with long grass, rushes, and at one spot some reeds. The bird got up about the reeds, and I did not recognise it, as I had not seen one before.—Adam Fyfe, Moffat.

The Shoveller (*Spatula clypeata*, L.) **Nesting in Sanday, Orkney.**—As I think it will be somewhat interesting to record the breeding of the Shoveller in Orkney, I may now state that during the spring of 1891 I observed four pairs of these ducks frequenting a small loch on my farm; I therefore purposed to watch them in order to find out whether they would remain to breed. About the second week of June I frequently missed the females, but always found the males on the loch. I then searched through a marshy place near the loch for nests, but did not find any. However, on the 19th of June, as I was walking round a cornfield near the loch, I observed a duck rise from the side of the field about fifteen yards off, and on going to the place, I found the nest with six eggs, neatly concealed in a tuft of long grass, the nest being lined with withered grass. On 22d June, along with Messrs. W. T. Dennison and W. Muir, I again visited the nest, which now had eight eggs, the full number laid. The female rose when we were at a distance, and continued very shy. Mr. Dennison took one egg for preservation. The eggs are much smaller than those of the common Stock-Duck, and rather darker in colour. I visited the nest again on the 18th July, but the young had left, the egg shells only remaining. The males left the loch during the time of incubation, the females alone appeared to bring out the young brood. The young broods—for I saw above thirty young ones altogether—kept well out of sight during the daytime, hiding among the rushes (locally called "stowers") until they could fly. They remained at this small loch until September, but whether they removed to larger lochs or left the island, I cannot tell. Parties shooting at them, without doubt, scared them away.—Wm. Harvey, Sanday, Orkney.

[This species has not hitherto, so far as we are aware, been recorded to have nested in Orkney.—Eds.]

Great Bustard (*Otis tarda*, L.) **in Orkney.**—On the 8th February last, Mr. D. H. Learmonth, farmer, Honsebay, Stronsay, a very enthusiastic sportsman, was informed by some of his men that a strange bird, a sort of goose they thought, had been feeding about the centre of one of his fields since the preceding Saturday (6th). He took his gun, and going to the field mentioned, a thirty-eight acre turnip field, observed it immediately. There was no chance of stalking it, so he approached in a contracting circuit, and when about seventy yards distant it got up, and he fired. It fell, just one pellet having struck it on the head. It was a fine female, and though in poor condition I am informed that it weighed exactly $9\frac{1}{2}$ lbs. The weather had been wet and stormy for some time. The bird was quite alone. It seems to have frequented the same field all the time, as it was not observed elsewhere. It is noteworthy that a Bustard obtained in Stronsay in 1876, was shot by Mr. Wm. Stevenson on the contiguous farm of Holland.—T. S. Peace, Kirkwall.

Oystercatcher (*Hæmatopus ostralegus*, L.) **Incubating under Difficulties.**—A pair of Oystercatchers breed annually on a small patch of shingle on an island in the river Teith. This spring the first hatch of eggs was destroyed by a spate, and a second nest was made which I discovered on the 5th June: the bird was then sitting on three eggs. On the 9th June, the river being extremely low, a contractor came across the water, with his carts, to remove gravel from the island. It was a long business, and every day (except Sundays) from 8 a.m. till 6 p.m., the carts passed backwards and forwards, and the work of sifting the gravel was carried on within fifteen yards of the Oystercatchers' nest; so that the birds, during those hours, had no opportunity of sitting on the eggs. I showed the nest to the men, who promised to safeguard it, and we placed a mark close to the spot as a guide to the carters not to drive over it. At 10 p.m. on the 23d June, when all was quiet, I visited the nest, the old bird stole off, and I found the eggs chipping. The next morning, the three young chicks were all out, and running about with their parents. During the whole time between the dates specified, viz. 9th and 23d June, the weather was exceptionally warm and sunny, which must, I suppose, account for the fact that the eggs were kept alive, without the aid of the bird's warmth during the daytime.—W. H. M. Duthie, Doune, Perthshire.

The Gray Phalarope (*Phalaropus fulicarius*, L.) **in Barra.**—On the 26th of September last, I found a specimen of this pretty bird in the possession of some boys at Castlebay, on the south-east of this island. They had caught it in an exhausted state near the village shortly before I met them, and as they had been using it rather roughly it soon died, but I got it preserved. On the same day, another bird was caught on the west side of the island by Mr. MacVean of the Crofters' Commission, but he allowed it to go again. I think this is the first record of its occurrence in the Outer Hebrides. The day on which these birds were caught was very stormy, and for some days previously there was a strong gale from the west and south-west, so that they were probably blown on the island from their line of migration, which Mr. Harvie-Brown thinks is west of the Outer Hebrides.—John MacRury, Barra.

Ruff (*Machetes pugnax*, L.) **in the Outer Hebrides.**—In August 1888 I sent a record to Mr. Harvie-Brown from Benbecula, of which he makes mention in Appendix D of the "Fauna of the Outer Hebrides." In May 1889 I got a Ruff in full plumage in the same island, and on the 20th September following, I saw another bird—either a ruff or reeve—in the bird-of-the-year plumage, on the west side of Barra. From my own observation, and from what I have learned from others in the place, I am inclined to think that a pair or two of these birds may have nested in Benbecula within the last few years.—John MacRury, Barra.

Whimbrel (*Numenius phæopus*, L.) **Wintering in Barra.**—During the whole time, from the summer of 1889 (when I came to Barra) up to the 17th of September 1891, a Whimbrel was seen by me on the west side of this island. It was always to be seen in the same bay, generally accompanied by curlews, oyster-catchers, and small shore-birds, and was not a wounded bird, being strong and active, and as wary and wild as any of the curlews. During the summer migrations, I saw numbers of other Whimbrels in the same place, but after these had left, one always remained, and I concluded it was the same bird. I have not seen it since the 17th of September last, when I met it about a mile farther south, near the shore; but as I have not lately visited the place it may still be there. Barra seems to be a favourite place with stragglers, as about the middle of July last I observed a long-tailed duck (*Harelda glacialis*)—a male in full breeding plumage—diving on the west side of the island, at a spot frequented by large flocks in the winter. On going back to the place in a few days it was gone.—John MacRury, Barra.

Occurrences of the Iceland Gull (*Larus leucopterus*, Faber) **on the West and North Coasts of Scotland.**—Inveraray.—I got a glimpse, a week or ten day ago, of what appeared to be, at a distance, a very pale Herring Gull. Since then, my keeper found it out, and this morning (23d February 1892) he shot it feeding near a dead sheep on the shore. It is nearly adult—a slight brown spotting appears on the back and scapulars.—Argyll.

Poltalloch.—An immature specimen of the Iceland Gull was shot here yesterday, 4th February 1892. The bird had frequented a grass field below the house for more than a week. Attention was drawn to it by its apparently perfectly white colour, and by its keeping entirely aloof from the Black-headed Gulls, which frequent the house in great numbers, as I am in the habit of feeding them.—J. W. Malcolm, Poltalloch.

Lewis.—Early this year tons of Razor-fish (*Solen siliqua*) were cast ashore at Broad Bay, about two miles north of Stornoway, after an unusually severe gale from the north. Great quantities of this shell-fish were carted away for food and bait; and thousands of Gulls of various species were attracted to the spot. Among them I noticed three or four Icelanders, one of which I shot and send you for inspection.—D. Mackenzie, Stornoway.

[We received the Gull, which is a specimen of *Larus leucopterus* in immature plumage.—Eds.]

Caithness.—On the 23d of January 1892, Mr. M'Nicol, Sandside, shot an Iceland Gull.—Lewis Dunbar, Thurso.

[Iceland Gulls have been somewhat abundant during the late winter on the west coast. Mr. G. E. Paterson examined an immature specimen which had been killed at Fort William. Mr. Robert

Warren, of Ballina, informs us that there has been a visitation of this species to the N.W. coast of Ireland.—EDS.]

Glaucous Gull (*Larus glaucus*, Fabricius) **in the Solway.**—One of these fine gulls, in what I take to be the third winter's plumage, was shot on Netherwood Merse, near the mouth of the Nith, in Dumfriesshire, on 6th February. So far as I know, it is some six or seven years since this species has been noted in "Solway." This specimen is being mounted for the Observatory Museum.—ROBERT SERVICE, Maxwelltown.

Great Crested Grebe (*Colymbus cristatus*, L.) **in the Tay.**—A young male Great Crested Grebe was shot on the 22d of February, on the estuary of the Tay, about six miles below Dundee. This species is very rare on the Tay.—W. A. BROWN, Dundee.

Occurrences of Labrus mixtus, L., on the West Coast of Sutherlandshire.—A specimen of this fish was brought to me by a fisherman in the month of September 1891, having been taken in the bay of Lochinver, and was identified for me by Col. Drummond Hay as the *Labrus mixtus* of Linnæus, the Blue-Striped Wrasse of Yarrell, or the Cook Wrasse of Fleming. During the same month, while fishing with long lines for haddocks in about thirty fathoms, close to the edge of the seaweed I took three more specimens, one, however, varying considerably in colour. Having found no record of this fish being taken on the west coast of Sutherlandshire, while, according to the local fishermen, a few have been taken every year for the last ten or twelve years, I think it of interest to record this as a locality. The specimens taken coincide exactly with the description given by Yarrell. The first specimen measured 10½ inches in length and weighed half a pound, and was in good condition. The specimen, which varied in colour, coincided with Yarrell's description, but was uniformly of an orange-red colour, darker on the back, lighter on the belly. Yarrell mentions that this species varies much in colour, and probably this was the same species.—ARTHUR BEVERIDGE, Lochinver.

[This species has been recorded for Loch Carron, and for several of the Hebrides.—EDS.]

Deilephila galii, *Schiff.*, **and Macroglossa bombyliformis**, *Och.*, **in Jura.**—It may interest your entomological readers to know that both these species have occurred in Jura during the past five years. I was much surprised to find the latter species just emerged from the pupa; and the former was captured by Miss Campbell, of Jura. —HENRY EVANS, Jura Forest.

Is Amphithopsis latipes, *M. Sars*, **a Commensal?**—I have obtained this species, which is the *Calliope ossiani* and *fingalli* of Bate and Westwood, in the Firth of Forth on two different occasions, and several specimens were obtained each time. On both occasions

they were found associated with *Antennularia antennina*, and were clustered about and adhering to the zoophyte when brought up in the trawl net. They continued to cling to the *Antennularia* after being removed from the net, and had to be forcibly detached with the aid of forceps, or by plunging the zoophyte into spirit. I have not been able to ascertain whether *Amphithopsis* is usually found associated with the *Antennularia* by other observers, but its occurrence in the Forth in the manner described seems to indicate that such is its habit, and if so, it forms an interesting example of commensalism, or semi-parasitism.—THOMAS SCOTT, Leith.

Hæmobaphes cyclopterina, *Fabr.*, in the Firth of Forth.—This species was added to the British fauna in 1891, and is recorded in the "Ninth Annual Report of the Fishery Board for Scotland," Part III. p. 310. It was obtained by Mr. Peter Jamieson, Assistant Naturalist to the Fishery Board, adhering to the gills of a Pogge (*Agonus cataphractus*) taken from a Cod (*Gadus morrhua*), captured off Dunbar by Mr. Jamieson, who kindly handed over the *Hæmobaphes* to me. I gave it a place in my Report to the Fishery Board, as an addition to the Forth fauna. Its claim to be considered a member of the fauna of the Forth was, however, liable to be questioned, for though the cod had been captured by a fisherman in the vicinity of Dunbar, it does not follow that the pogge had been captured by the cod near the same place. When trawling between the Bass Rock and Fidra, during February this year (1892), several living specimens of pogge were captured, and an examination of them brought to light a second specimen of *Hæmobaphes*. The body of the parasite is swollen but somewhat compressed, and of a blood red colour, each ova-sac resembles a coiled-up rope—one coil over the other. The ends of both ova-sacs were partly unwound. The parasite was attached to the gills of the pogge by a slender but firm chitinous-like rod, the extremity of which was doubly barbed The occurrence of *Hæmobaphes* on a living fish in the locality named gives the parasite a better claim to be included in the Forth fauna. —THOMAS SCOTT, Leith.

The Food of Sagitta.—Sagittæ are sometimes very abundant in our tow-net collections, and occasionally when time permits they form a subject of special study. The food of the Sagitta has engaged my attention for a considerable time; but, so far, the result has not been very encouraging. The living Sagitta is transparent, or nearly so, and the outline of any organism it may have swallowed, if not too small, can therefore be readily made out, whilst dissection of the Sagitta, so as to set free the organism, renders assurance doubly sure. I have ascertained in this way that Sagitta lives on small larval and post-larval fishes, on Copepoda—as *Calanus finmarchicus*—and on small Amphipoda. Quite recently I obtained a Sagitta with a small specimen of *Phoxus plumosus* (*Harpina plumosa*)

inside it; the amphipod was somewhat imperfect, no doubt due to it having been partly digested. I have never seen more than one organism in a Sagitta, nor have I been successful in observing the manner in which it attacks its prey.—THOMAS SCOTT, Leith.

BOTANICAL NOTES AND NEWS

Linaria minor, *L.*, in Stirlingshire.—Replying to Dr. F. Buchanan White's note in the October number of the Scottish Naturalist, p. 193, as to the occurrence of *Linaria minor* in other parts of Scotland, this plant has suddenly appeared at Gargunnock Station in considerable quantity. It has also been reported to us as having been found on the railway near Kippen, about three miles west of Gargunnock. These are the first occurrences of the plant in the county as far as we know. Is it not the case that in England it is also very partial to railway banks?—R. KIDSTON and F. S. STIRLING.

Mr. James M'Andrew has favoured us with reprints of papers published recently by himself in the "Transactions of the Dumfriesshire and Galloway Nat. Hist. and Antiquarian Society," on the Mosses, Hepaticæ, and Lichens of S.W. Scotland. Mr. M'Andrew's researches have added largely to what was on record previously; and in these papers he sums up the results of his own labours and of those of other botanists in the same district. Excluding varieties, of which many are recorded in these lists, the species reach the following numbers;—From Dumfriesshire and Kirkcudbright,—Mosses 234, Hepaticæ 102. (To these should be added *Dicranum spurium*, from Moffat, *Barbula vinealis* from Kenmure Castle, *Cephalozia multiflora*, from Dumfries, *Harpanthus Flotovianus*, from Glenlee and Glenkens, *Scapania umbrosa* from Dalry and Moffat, *Nardia densiflora* from Black Craig, New Galloway, and *Aneura latifrons* from Bennan Hill, discovered in the district by Mr. M'A. since the publication of the above lists.) The Lichens collected in the S.W. counties of Scotland (mostly by himself in the Glenkens), including some from Rerrick collected by the Rev. G. M'Conachie, reach the number of 217 species, with very many varieties. The papers will be found very helpful to all local students of the groups treated of, and they should be consulted by all who interest themselves in the Cryptogamic Botany of Scotland.

In *Grevillea*, for March, is a paragraph which will be read with regret by all British botanists, announcing that Dr. M. C. Cooke has resolved, because of "fickle health, increasing years, and diminished vigour," to withdraw from the editorship after the issue of the next number, which will complete the twentieth volume. He adds "Whether some more enterprising proprietor can be found

is yet uncertain; our only concern now is to make known our determination to stand open to any proposal whereby our pecuniary interest shall cease, so that we may rest from the periodical anxieties of the past two decades."

Dr. Cook's volume on *British Desmids*, published in 1887, is offered at the reduced price of £2, including postage, in order to dispose of a small number of copies still in hand. Upwards of 1600 coloured figures are given on the 66 coloured plates. The present opportunity should be taken advantage of by Natural History Societies and libraries not already possessed of the work to procure it at so low a price. Communications should be addressed to Dr. M. C. Cooke, 146 Junction Road, London, N.

CURRENT LITERATURE

The Titles and Purport of Papers and Notes relating to Scottish Natural History which have appeared during the Quarter—January to March 1892.

[The Editors desire assistance to enable them to make this Section as complete as possible. Contributions on the lines indicated will be most acceptable and will bear the initials of the Contributor. The Editors will have access to the sources of information undermentioned.]

ZOOLOGY.

Polecat in Aberdeenshire. G. MACKAY. *The Field*, 5th March 1892, p. 313.—"Recently killed" in the Forest of Glenmuick.

On the occurrence of Hybrids between the Red Grouse and Ptarmigan. By WALTER CHAMBERLAIN, F.Z.S. *The Zoologist* (3), Vol. xvi. (February 1892), pp. 41-51.—No unimpeachable record of such a hybrid, and only one probable example—a specimen shot at Kintradwell, in Sutherland, on 1st September 1878, by Captain Hauston, and now in the University Museum, Cambridge.

Hybrid Blackcock and Red Grouse. G. M. *The Field*, 2d January 1892, p. 2.—Shot at Sandside, Caithness, in November 1891.

Bernicle Goose at North Berwick. F. COBURN. *The Zoologist* (3), Vol. xvi. (Jan. 1892) p. 33.—Female shot on 8th Oct. 1891.

An Investigation into the Variations of the Viper in Great Britain. By G. A. BOULENGER. *The Zoologist* (3), Vol. xvi. (March 1892), pp. 87-93.—Several Scottish specimens are alluded to, and their peculiarities described. Its distribution is also sketched.

Note on a New Species of Onychodus from the Lower Old Red Sandstone of Forfar. E. T. NEWTON, F.G.S. *Geol. Mag.* (3), Vol. ix. (February 1892), pp. 51-52.—Description and figures of the

teeth of a species of Onychodus, obtained from the Old Red Sandstone of Forfar. The author compares it with O. anglicus, and O. arcticus, and regards it as a new species, Onychodus scoticus.

Butterfly Notes. C. W. Dale. *Ent. Mo. Mag.* (2), Vol. iii. (February 1892), p. 49.—Pieris napi, female, at Lairg, on 14th June 1890, of a cream ground colour, resembling some examples of P. rapæ.

Notes on Lepidoptera Bred or Captured in 1891. W. M. Christy. *The Entomologist*, xxv. (January 1892), pp. 18-19.—Sphinx convolvuli captured at Rannoch.

The British Noctuæ and their Varieties. By J. W. Tutt, F.E.S. Vol. ii. (January 1892).—This volume, of 180 pages, deals with the Family Noctuidæ, and contains many descriptions of Scottish specimens.

The Paisley "Pug" (*Eupithecia castigata*, var.) By W. H. Tugwell. *The Entomologist*, Vol. xxv. (February 1892), pp. 41-42.—This form, which has long puzzled entomologists, is determined a melanism of E. castigata.

Notes on British Lepidoptera. By Richard South. *The Entomologist*, Vol. xxv. (February 1892), pp. 29-36.—Scottish varieties of Noctua brunnea and Noctua festiva are described.

Annotated List of British Tachiniidæ. By R. H. Meade. *Ent. Mo. Mag.* (2), Vol. iii. (March 1892).—At p. 77 Miltogramma punctata, Mgn., is mentioned for Arran, *fide* Curtis.

Exorista apicalis. C. W. Dale. *Ent. Mo. Mag.* (2), Vol. iii. (February 1892), p. 50.—Mr. Dale captured this rare fly at Vallay, North Uist, on 18th June 1883.

The Hemiptera Heteroptera of the British Islands. By Edward Saunders. Part i. (January 1892); Part ii. (March 1892).—The Scottish species of the families Pentatomidæ and Berytidæ are treated of.

[Cicadæ captured near Edinburgh.] G. B. Buckton, F.R.S. *Monograph of the British Cicadæ*, Vol. ii. Part viii. p. 194.—Euacanthus interruptus, Eupteryx auritus, Bythoscopus flavicollis, and Limotettix virescens.

A List of Earthworms known to occur in the North of England and South of Scotland, with habitats for each species. By Rev. Hilderic Friend, F.L.S. *The Naturalist* (March 1892), p. 90.—Lumbricus purpureus, for Annan; Allolobophora celtica, for Langholm, are the only species for which Scottish habitats are given.

A Revision of the British species of Fresh water Cyclopidæ and Calanidæ. By George Stewardson Brady, M.D., LL.D., F.R.S.

Nat. Hist. Trans. Northumberland, Durham, and Newcastle-upon-Tyne, Vol. xi. Part i. pp. 68-120. With fourteen plates.—Information concerning many species from various districts in Scotland has been contributed by Mr. Thomas Scott, F.L.S.

[**Reophax scottii** (*Chaster*) **in the Firth of Forth.**] Mr. G. W. Chaster in his Report upon the Foraminifera of Southport District (*1st Rep. Southport Soc. Nat. Sci.* 1890-91), at p. 57 describes Reophax scottii, a new species, and mentions the Firth of Forth as a habitat. The species is figured on Plate I. Fig 1.

BOTANY.

In *Transactions of the Edinburgh Botanical Society*, December 1891.

On Temperature and Vegetation in the Royal Botanic Garden (Edinburgh), during July, August, September, and October, 1891. By ROBERT LINDSAY.

On Temperature and Vegetation in the Royal Botanic Garden, Glasgow, during July, August, September, and October, 1891. By ROBERT BULLEN.

The Roots of Grasses in relation to their upper growth. By ANDREW P. AITKEN, D. Sc. (with plates II. and III.); illustrates the root growth between June 1889 and June 1890, of 14 pasture-grasses; and gives a table of the weights of the hay and stubble and of the roots, distinguishing the quantity produced in the upper 8 inches from that produced in the 16 inches below.

New Zealand Veronicas fit to be grown out-of-doors in Scotland. (In the Presidential Address to the Botanical Society of Edinburgh, November 1891, by ROBERT LINDSAY), enumerates 18 hardy species that can stand the climate of Edinburgh, and 11 half hardy, and gives hints with regard to their cultivation and value as ornamental plants.

Excursion of the Scottish Alpine Botanical Club to Tyndrum in 1891. By WILLIAM CRAIG, M.D. The localities visited were Beinn Laoigh on west, north, and east sides (very rich in Alpine plants); Crom Allt on Beinn Odhar; Lochan Bhe (in which a "very remarkable variety" of *Scirpus fluitans* was found growing entirely under water at a considerable distance from the edge); and the Corrie in Cruach Ardran.

(In *Journal of Botany*, January, February, and March 1892.)

First Records of British Flowering Plants. Compiled by WILLIAM A. CLARKE, F.L.S. "An attempt to extract from printed botanical works published in Great Britain the earliest notice of each distinct species of our native and naturalised flowering plants. The following are noted from Scotland: *R. reptans*, L., 1777, at the

west end of Loch Leven. *Caltha radicans*, T. F. Forster, in *Linn. Soc. Trans.* 1807; recorded by G. Don, as found in 1790 by himself in a ditch near the farmhouse of Haltoun. *Nuphar pumila*, Hoffm., discovered in 1809 by Mr. Borrer in a pool near the farm of Corrie Chastel, at the foot of Ben Chonachan. *Fumaria densiflora*, D.C., 1843, near Edinburgh. *Draba rupestris*, Br., "found by James Dickson in 1789 on Ben Lawers." *Erophila inflata*, Hook, f. 1830, on Ben Lawers, above the Lake."

A new British Hieracium (*H. anfractiforme*). By Rev. EDWARD S. MARSHALL, M.A., F.L.S. Description of a new species, found beside "rocky subalpine streamlets of the Western Breadalbanes, on granite and mica-slate, from 1400 to 1800 feet" (by Mr. Marshall in Glen Etive and in Corrie Ardran near Crianlarich, by Dr. Buchanan White on Ben Laoigh, and by Dr. W. A. Shoolbred between Glen Lyon and Tyndrum). "Occasionally *H. anfractiforme* has a certain look of *H. argenteum*, Fr., from which, however, it differs in many essential points." "It has been well tested by two or three seasons' cultivation." (*J. B.*, January.)

Microchæte æruginea, *sp. n.* By E. A. BATTERS;—On *Rhodochorton Rothii*, Nag., from Berwick-on-Tweed. It is "closely allied to *M. tenera*, but differing from it in the greater thickness of the filaments, the shortness of the articulation, and the marine habitat." A diagnosis in Latin follows.

REVIEWS

British Fungi (*Phycomycetes and Ustilagineæ*). By GEORGE MASSEE. (L. Reeve and Co. 1891. Cr. 8vo. 232 pp. 8 plates.)

Of making of many books there is no end; yet on various great groups of British Fungi there is not only room, but very great need, for monographs. But to justify their existence such works must give proofs of care in execution and of full acquaintance with the subject treated of. It is to be regretted that the work under review is not such as might have been looked for from the author. The inclusion of so widely different groups as the *Mucoraceæ*, the *Peronosporeæ*, and the *Ustilagineæ* in the same small volume is scarcely convenient. There scarcely seemed need to include the *Ustilagineæ* at all, in view of the recent excellent monograph on them by Dr. Plowright; and, in fact, there is little, if any, real addition made in the new work to our knowledge of this group in Britain.

There was room for a manual on the two other groups, had the object of the book as stated in the preface "to bring up to date the British species of Fungi included" been fulfilled. A pretty long

list of names of "literature quoted" gives promise of careful research. But it requires no great labour to detect that the references to that literature are most incomplete, and to prove that the book as it stands is utterly misleading in its profession of being up to date. Leaving it to others to indicate deficiencies for the English flora proper, we shall instance in support of the above criticism only the old genus *Peronospora* (now broken up into several genera), as regards the species recorded in the "Scottish Naturalist" some years since. As that journal appears among the "Literature quoted" we might have assumed that all records in it of species new to Britain would have been noted, yet there is no mention in the monograph of the following species recorded in the journal:—*P. obovata*, Bon., *P. Potentillæ*, De Bary, *P. Chrysosplenii*, Fckl., *P. leptosperma*, De Bary, *P. Radii*, De Bary, *P. Valerianæ*, Trail, *P. alta*, Fckl., *P. Rumicis*, Corda. Nor is there any reference to *P. Alsinearum*, Casp., and *P. Scleranthi*, Rabh., even to show that they are sunk as synonyms. As the total number of species of *Peronospora*, in the widest sense, mentioned in the book is twenty-five, the above omissions are very noteworthy. The host plants enumerated are also very defective.

Space will not permit of naming the omissions of records from Scotland in the other groups of fungi included in the work. Monographs are rendered considerably more useful when they give references to earlier notices of the species treated of in them; but this has been attempted only as regards a few writers (*e.g.* Berkeley) in this work; nor has any attempt been made to indicate distribution. The book also bears signs of want of care in the numerous printer's errors that disfigure its pages.

A Monograph of the Myxogastres. By GEORGE MASSEE. (Methuen and Co. 1892. Ry. 8vo. 367 pp. 12 coloured plates.)

It is with great pleasure that we turn to this important and careful monograph (just issued), in which the author does justice alike to himself and to his subject. There has for several years been much need of a revision of the curious organisms included in the group of Myxogastres, whether these be regarded as plants or as animals, a question, indeed, rather of words than of vital significance so far down in the scale of organised beings. Mr. Massee shows evidence of having brought to the work much personal investigation, and a thorough acquaintance with the work of others among these plants, and with the extensive materials for study contained in the Herbarium at Kew and obtained from his correspondents. The numerous excellent coloured figures from Mr. Massee's brush add to the value of the book, which will be indispensable to every student of the Myxogastres. A few Scottish localities are referred to under certain species; but we have not observed any new records among these.

The Annals
of
Scottish Natural History

No. 3] 1892 [July

ON NEW AND RARE CRUSTACEA FROM THE EAST COAST OF SCOTLAND.

By Thomas Scott, F.L.S., and Andrew Scott.

Plates VI. and VII.

Lichomolgus aberdonensis, n. sp. (Plate VI. Figs. 1-12).

Length, exclusive of tail setæ, 1.46 mm. (about $\frac{1}{18}$ of an inch). The cephalo-thorax is composed of five segments, the first of which is longer than the combined length of the other four, rounded in front, and not produced into a rostrum; the fifth segment is rather longer than, and little more than half the breadth of, the preceding segment. Abdomen in both sexes composed of five segments, the first segment nearly twice the breadth of the next one, and as long as the second and third together. In the male the lateral distal angles of this segment are furnished with two small unequal spines (Fig. 12). The fourth segment of the abdomen in both sexes is shorter than either of the other segments. The whole length of the abdomen (exclusive of the caudal stylets) is scarcely half the length of the cephalo-thorax. Caudal stylets about half as long again as the last abdominal segment and furnished with six setæ, the fourth seta (counting from the outside) is considerably longer than the entire length of the abdomen and caudal stylets combined. Anterior antennæ seven-jointed, alike in both sexes, and

provided with numerous setæ; the proportional length of the joints are nearly as shown by the annexed formula:—

$$\frac{5 \cdot 5 \cdot 2 \cdot 7 \cdot 6 \cdot 5 \cdot 6}{1\ \ 2\ \ 3\ \ 4\ \ 5\ \ 6\ \ 7}.$$

Posterior antennæ four-jointed; the first and second joints are elongate, the third and fourth very short (Fig. 3). Mandible short and moderately stout, armed at the extremity with two processes and two spiniform setæ; one of the processes is conical and tooth-like, and serrate on the inner edge, the other is somewhat cylindrical, and rounded at the end—the margin that is opposed to the tooth-like process, and also the end, being hispid (Fig. 4). Maxillæ stout, broad, and bearing a number of terminal spiniform setæ. Anterior foot-jaws stout, with a proportionally large marginal setiferous lobe, and several terminal spines (Fig. 5). Posterior foot-jaws two-jointed, those of the male armed with a strong, uncinate, and sinuous terminal claw, which is considerably longer than the stout broad joint from the end of which it springs, and with which it forms a powerful grasping organ. At the base of the claw, on the inside, there is a stout, short, and blunt spine. The inner edge of the last joint of the foot-jaw is furnished with a double (? or treble) row of elongate blunt-pointed teeth. Two long stout plumose setæ spring from the inner margin, and near the distal end of the first joint. The terminal claw probably passes down between these two setæ, and forms with them an interlocking apparatus (Fig. 7). The posterior foot-jaws in the female, are also moderately stout, but the terminal claw is feeble; the last joint is not so broad, and its inner margin bears two setiferous spines instead of the double row of teeth possessed by that of the male. The first, second, third, and fourth pairs of swimming-feet are nearly alike; both branches are short (the outer being rather shorter than the inner) and three-jointed. The outer branch is armed exteriorly with a number of dagger-like spines, as shown in the figures (Figs. 8 and 9). The inner distal angle of the first basal joint of all the four pairs bears a spiniform seta. The inner distal angle of the second basal joint of the first pair bears also an elongate dagger-like spine, while a moderately long and stout seta springs from the outer margin of the same joint. The fifth pair of feet are

broad and foliaceous—more so in the female than the male, as shown in the figures (Figs. 10 and 11).

Habitat.—Aberdeen Bay. Several specimens were obtained in bottom-townet material collected in 1891, but only a few of them were mature.

Lichomolgus aberdonensis resembles in general form and structure the species described in the "Tenth Annual Report of the Fishery Board for Scotland" under the name of *Lichomolgus littoralis*, but differs from it in several important points, as in the proportional length of the joints of the anterior and posterior antennæ, in the form of the posterior foot-jaw and fifth pair of feet, and in the proportional length of the segments of the abdomen.

Lichomolgus arenicolus, Brady (Plate VII. Figs. 1-10).

1872. *Boeckia arenicola*, Brady, "Nat. Hist. Trans. of Northumberland and Durham," vol. iv. p. 430.

1880. *Lichomolgus arenicolus*, Brady, "Mon. Brit. Copep." vol. iii. Plate LXXXVII. Figs. 1-7.

Female.—Length, exclusive of tail setæ, 2·3 mm. Anterior antennæ not more than half the length of the first body segment, and composed of six joints, which are all more or less setiferous; the proportional length of the joints are nearly as in the formula :—

$$\frac{11 \cdot 18 \cdot 6 \cdot 14 \cdot 12 \cdot 17}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6}.$$

Posterior antennæ stout, four-jointed; the first two joints short, the third about twice the length of the second, and the last about two-thirds the length of the preceding one. The last joint is armed with three stout terminal clawed spines, which are elongate, and distinctly articulated and swollen near the middle—the distal half being strongly curved and claw-like. There is a fourth terminal articulated spine, but it is more slender and less curved than the other three (Fig. 3). Mandibular stylets two, the upper one provided with a row of marginal teeth, the first two of which are large, while the others gradually decrease in size towards the distal end. The lower stylet bears a number of fine hairs on its upper margin (Fig. 4). The maxillæ consist of a broad laminar plate rounded at the end, and

furnished with a moderately long terminal spine; there is also a small marginal bifid process on the one side, while a small seta springs from the margin on the other side (Fig. 5). The last joint of the anterior foot-jaw terminates in four moderately large subequal sub-marginal spines, and a small lateral spine springs from near the proximal end of the joint (Fig. 6). Posterior foot-jaw rudimentary, moderately broad and stout, and having a very small subterminal tooth-like process (Fig. 7). The first, second, third, and fourth pairs of swimming-feet nearly alike; both branches short (the inner rather longer than the outer one), and three-jointed (Figs. 8 and 9). The armature of the inner branches differs to some extent, especially in the following manner: the last joint of the inner branches of the first pair is provided with one submarginal short and stout dagger-shaped spine, and round the distal end with five moderately long setæ, as shown in Fig. 8. In the second pair the last joint bears one terminal and two submarginal dagger-shaped spines, which are rather longer than that of the first pair, and three submarginal setæ. In the third pair the last joint bears two terminal and two submarginal spines, and two marginal setæ. In the fourth pair the last joint is armed with the same number of spines as in the third pair, but with only one marginal seta, as shown in Fig. 9. Fifth pair elongate, foliaceous, furnished with one short seta on the external margin and near the distal end; immediately anterior to the seta is a number of small marginal teeth. The somewhat truncate extremity of the foot bears three setæ, the middle one of which is very small, while the other two are moderately long and stout, and nearly of equal length (Fig. 10). Abdomen four-jointed, the first segment about twice the length of the next, and somewhat dilated; the other three segments are subequal, the last being rather longer than either of the other two. Caudal stylets rather longer than the last abdominal segment, and about three times as long as broad; each stylet is furnished with several terminal plumose setæ, and with one seta near the middle of the exterior margin.

Habitat.—Off St. Monans, Firth of Forth. One specimen only (a female) of this interesting species was obtained, and is recorded (but not described or figured) in

the "Tenth Annual Report of the Fishery Board for Scotland" (1892).

Lichomolgus arenicolus appears to be a rare species. Some important details of structure not noticed in "British Copepoda" are here described and figured, as are also several others, to illustrate the description of the species, viz.: the posterior antennæ with its remarkably articulated and clawed terminal spines, the rudimentary female posterior foot-jaw, and the fourth pair of swimming-feet, which, like the other three pairs, has both branches three-jointed, and which in this respect forms, with *Lichomolgus aberdonensis*, *Lichomolgus littoralis*, and *Lichomologus sabellæ*,[1] a distinct group — the other species of *Lichomolgus* being distinguished from these three by having the inner branches of the fourth pair of swimming-feet one- or two-jointed. The one- or two-jointed inner branches of the fourth pair of feet constitute one of the characters of the genus *Lichomolgus*, while a second character is that of the mandible, which has the form of "a slender stylet, dilated at the base, but excessively slender and filiform beyond the middle." In *Lichomolgus arenicolus* there are two mandibular stylets, and in *Lichomolgus aberdonensis* and *littoralis* the mandible, which is moderately stout and broad, has no stylets, but is armed at the extremity with one or two tooth-like processes and a few setæ. In consequence of this divergence from some of the generic characters of *Lichomolgus*, it may become necessary to institute one, or possibly two, sub-genera for the reception of these aberrant forms, or otherwise to alter the generic definition of *Lichomolgus* so as to include them.

Should it be found desirable, for the reasons stated, to remove *Lichomolgus littoralis* and *aberdonensis* into a different genus or sub-genus, we would suggest *Platycheiron* as an appropriate generic name,—being descriptive of the remarkably broad ultimate joint of the male posterior foot-jaws of the two species referred to.

[1] A species described by I. C. Thompson in "Proc. Liverpool Biol. Soc.," vol. ii. p. 68. He also records *L. albens*, Thorell, from Liverpool Bay, but we have not as yet seen any description of this species. Another species (apparently new), having the inner branches of the first four pairs of swimming-feet three-jointed, has just been obtained by us, and will be described and figured later.

TABLE, showing some of the more important points of difference between the British species of *Lichomolgus*, including those described here, and in the Fishery Board's "Tenth Annual Report" (1892).

Name of Species.	Anterior antennæ.	Posterior antennæ.	Mandibular stylets.	Last joint of the posterior foot-jaw (male).	Inner branch of fourth pair of swimming-feet	Foot of fifth pair (male).
Lichomolgus fucicolus .	7-jointed	3-jointed	One	Ovate, with a terminal falciform claw	2-jointed	Elongate, narrow, with two apical setæ
Lichomolgus liber . .	7-jointed	(?) 5-jointed	One	Slender, with a terminal curved claw	(?) 1-jointed	A slender subulate joint, with stout basal seta.
Lichomolgus thorelli . .	7-jointed	4-jointed	(?) One	Broadly ovate, with curved terminal claw	1-jointed	Very small, bisetose
Lichomolgus furcilatus .	6-jointed	Doubtful	One	Doubtful	2-jointed	Elongate, narrow, with two apical setæ
Lichomolgus forficula .	6-jointed	3-jointed	One	Somewhat like *L. fucicolus*	2-jointed	Small, bisetose
Lichomolgus concinnus .	7-jointed	4-jointed	Doubtful	Doubtful	2-jointed	Somewhat like *L. fucicolus*
Lichomolgus arenicolus .	6-jointed	4-jointed	Two	Moderately broad, with strongly curved claw	3-jointed	Long, subclavate
Lichomolgus littoralis .	7-jointed	4-jointed	No stylets—mandible broad, with one stout conical tooth and two setæ	Broadly triangular, with long curved claw	3-jointed	Broadly foliaceous
Lichomolgus aberdonensis	7-jointed	4-jointed	No stylets—mandible broad, with two tooth-like processes and two setæ	Broad, with long sinuous claw	3-jointed	Broadly foliaceous
Lichomolgus sabellæ	7-jointed	4-jointed	(?)	Somewhat like *L. fucicolus*	3-jointed	Small, bisetose

Thysanoessa borealis (G. O. Sars).

1882. *Thysanoessa borealis*, "Oversigt over Norges Crustaceer," Bd. I. pp. 52, 53.

This Schizopod has been obtained in various parts of the Firth of Forth, but never in quantity—one, or at most only a few specimens being taken at a time. *Thysanoessa* has the first pair of legs long, but not so long or so slender as those of *Nematocelis*, which it somewhat resembles. It is further distinguished from *Nematocelis* by the penultimate joint of the first pair of legs being provided throughout its length with stout ciliated setæ, the last joint—which is very small—being also furnished with a number of hairs. On the other hand, the first pair of legs in *Nematocelis* have both the penultimate and antipenultimate joints (which are long and slender) naked, but there is a bunch of spiniform setæ at the apex of the legs. The first legs are very easily broken, so that in handling specimens, or in collecting them, great care is required to keep the legs intact. We are indebted to the Rev. A. M. Norman for the name of the *Thysanoessa* here recorded.

Among a few specimens of Forth Schizopoda forwarded to Dr. Norman for identification, and which included the *Thysanoessa* referred to above, he observed what he considers to be a specimen of *Nematocelis megalops* (G. O. Sars); but the specimen he examined, and one or two others that seem to belong to the same species, having lost their first legs, and thus wanting the character which chiefly distinguishes them, it is perhaps better for the present to leave the claim of *Nematocelis megalops* for a place in the Forth fauna in abeyance till more satisfactory specimens turn up. Dr. Norman informs us that *Nematocelis megalops* was sent to him from Banff by Thomas Edward twenty or thirty years ago; from Aberdeen by Mr. Sim in 1872; and that it has quite recently been obtained at Redcar.

The eyes of *Thysanoessa* and *Nematocelis* have a marked constriction near the middle, which divides the eye into what appears to be a lower and upper eye, and thus imparts to them a peculiar and rather striking appearance, and which

serves to distinguish them at a glance from either *Boreophausia* or *Nyctiphanes*.

Explanation of Plate VI.

Lichomolgus aberdonensis, n. sp.

Fig. 1. Adult female . . . . . × 40
„ 2. Anterior antenna . . . . . × 95
„ 3. Posterior antenna . . . . . × 125
„ 4. Mandible; *a*, maxilla . . . . × 125
„ 5. Anterior foot-jaw . . . . . × 190
„ 6. Posterior foot-jaw (female) . . . × 190
„ 7. Posterior foot-jaw (male) . . . × 190
„ 8. Foot of first pair . . . . . × 125
„ 9. Foot of fourth pair . . . . × 85
„ 10. Foot of fifth pair (female) . . . × 125
„ 11. Foot of fifth pair (male) . . . . × 125
„ 12. Abdomen of male . . . . . × 40

Explanation of Plate VII.

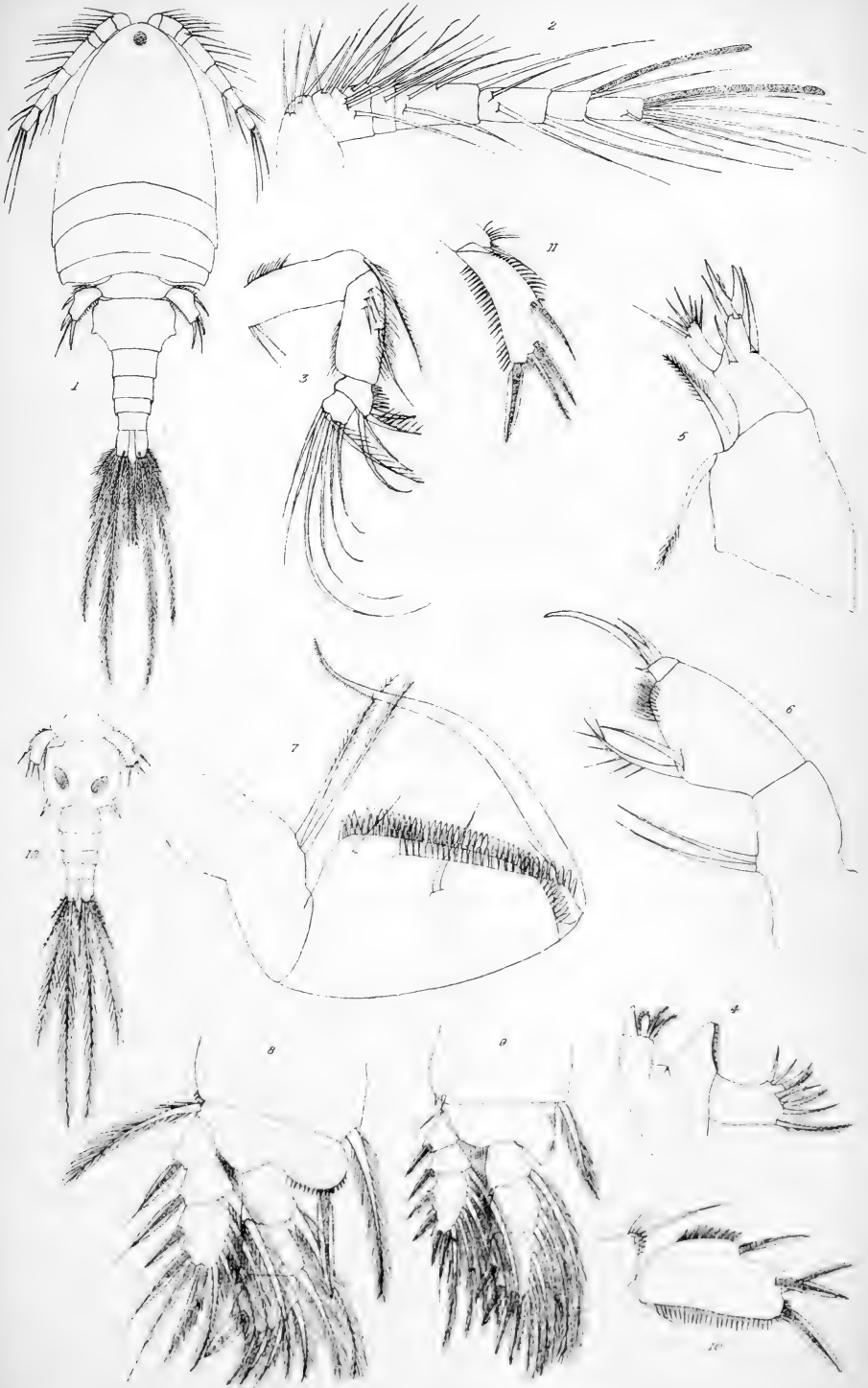
Lichomolgus arenicolus, Brady.

Fig. 1. Adult Female . . . . . × 40
„ 2. Anterior antenna . . . . . × 125
„ 3. Posterior antenna . . . . . × 190
„ 4. Mandible . . . . . × 250
„ 5. Maxilla . . . . . × 280
„ 6. Anterior foot-jaw . . . . . × 280
„ 7. Posterior foot-jaw . . . . . × 280
„ 8. Foot of first pair . . . . . × 125
„ 9. Foot of fourth pair . . . . × 85
„ 10. Foot of fifth pair . . . . . × 190

CONTRIBUTIONS TO THE VERTEBRATE FAUNA OF SUTHERLAND AND CAITHNESS.

By T. E. Buckley, B.A., F.Z.S., etc.

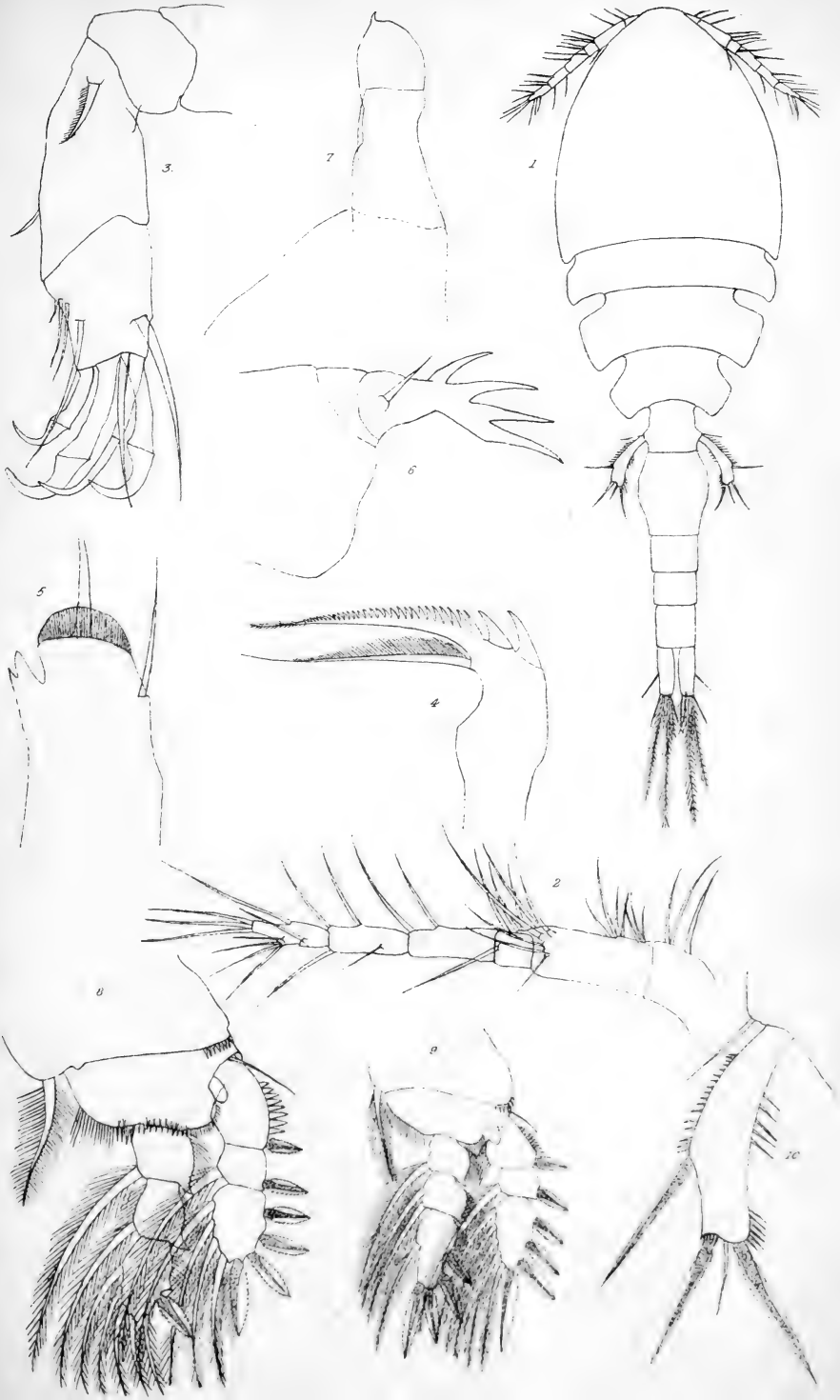
The object of the following notes is to enable us to bring the Fauna of Sutherland and Caithness up to date. One bird, the Ruff, is new to the Sutherland list, and we are able to show the spread of certain other species, such as the Stock Dove, Tree Pipit, etc.



Andrew Scott del. ad Nat.

LICHOMOLGUS ABERDONENSIS. N. Sp.

R. & R. Clark imp.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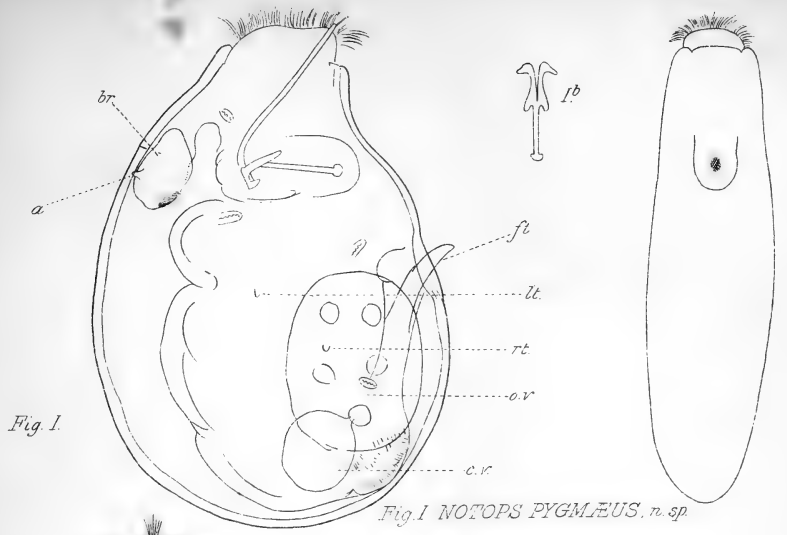

Fig. I.

Fig. I NOTOPS PYGMÆUS, n. sp.

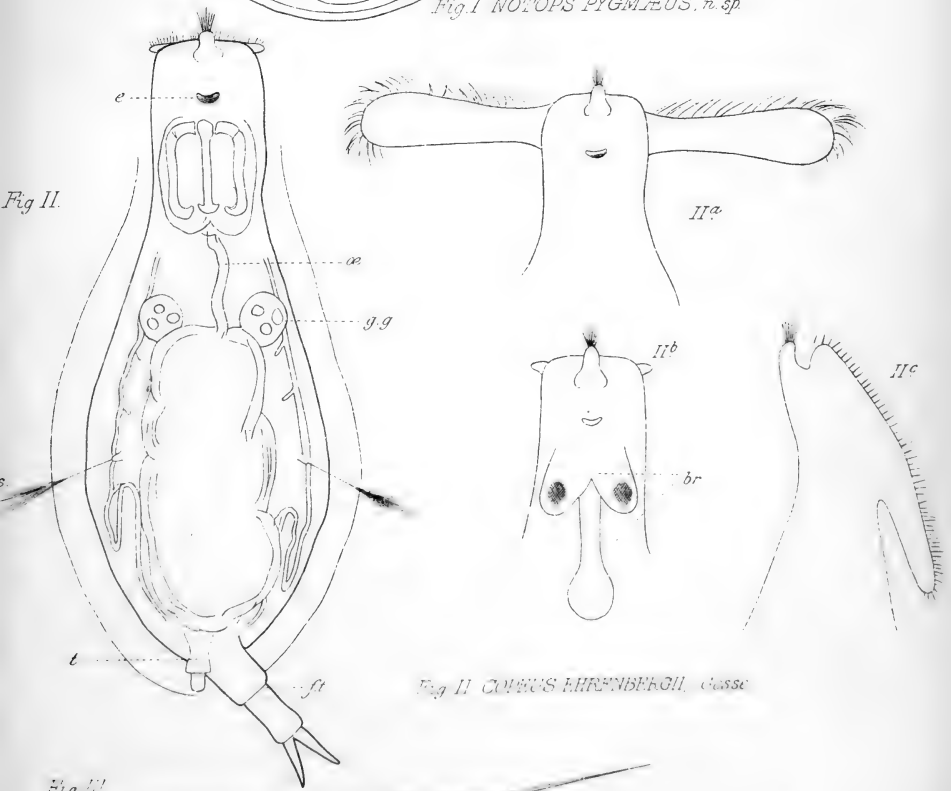

Fig II.

Fig II COPEUS MIRENBERGII Gosse

Fig III.

Fig III. TRIARTHRA TERMINALIS, Plate

Eagles still hold their ground fairly well, but other birds of prey show a decrease; this, however, might be expected, though it is sad to see how the Hen Harrier is rapidly approaching utter extermination.

Plantations are growing up and doing their silent work in increasing the numbers and breeding areas of certain species. When staying at Badenloch, we have been repeatedly struck, any autumn we have been there, with the attraction which a few (say three or four hundred) small firs, a garden, and an acre or two of cultivated ground, has on migrating birds. Constantly in the early October mornings we have seen flocks of small birds, such as Greenfinches, Chaffinches, etc., descend into these trees, rest for a short time, then with an unanimous twitter rise up and pursue their onward course. As a rule everything was quiet for the day by nine o'clock.

In the late W. Dunbar's possession at Brawl, was a large case, containing amongst other specimens, a Sutherland Osprey, shot in the breeding season, the two Red-necked Phalaropes mentioned in St. John's "Tour in Sutherland," and some other rarities. All in the case are supposed to be from Sutherland or Caithness, but as there seems to have been no record kept of date and locality, and seeing that one of the hawks (a species of Harrier) is undoubtedly foreign, their genuineness must be accepted with extreme caution.

In a paragraph taken from the "Scotsman" of 24th December 1887, the following is said: "Gordon of Straloch, on the authority of Mr. Timothy Pont, who was minister of Dunnet about the year 1614, and likely to be well informed, when writing of the district of Parf or Cape Wrath remarks, 'Verie great plentie of wolfes doo hant in thir desert places.'"

MAMMALIA.

Erinaceus europæus, *L.*—Hedgehog.—Mr. Houstoun brought four Hedgehogs, two of each sex, from Ross-shire in August 1888, and turned them into his garden at Kintradwell, from which they made their escape.

Crossopus fodiens, *Pall.*—Water Shrew.—Under date of 8th September 1888, Mr. G. R. Lawson of Golspie writes us: "I got a pretty specimen of the Water Shrew here yesterday, and have

sent it to Joass. It was 'trapped' in a cistern which I put in recently for irrigation purposes: the cistern has at present only about one inch of water in it, so the Shrew, having fallen in, could not get out. It was sitting upon the top of a stone busily engaged in devouring the remains of a companion in misfortune.

Felis catus, *L.*—WILD CAT.—A Wild Cat was caught in a rabbit-snare at Kirkton near Golspie by Mr. S. Sherlaw, in April 1888, and another was got at Berriedale in March 1890.

Mustela putorius, *L.*—POLECAT.—In January 1888, Mr. Hogg, Edinburgh, received a Polecat from Betty-hill. Three Polecats were trapped at Syre in Strathnaver by a rabbit-catcher, in October 1888, and sent to Mr. MacLeay in Inverness.

Martes abietum, *Fleming.*—MARTEN.—In January 1888, Mr. Hogg, Edinburgh, had a male Marten sent him from Loch Laoghal. In the "Inverness Courier" of 22nd November 1889, a fine specimen of the Marten is reported to have been sent in from Lairg, to be stuffed by Mr. Snowie.

Meles taxus, *Schreb.*—BADGER.—Two Badgers were killed on Ben Bhraggie in the winter of 1879, and brought to Mr. G. R. Lawson. We understand they are preserved as far as possible.

Delphinapterus leucas, *Pall.*—WHITE WHALE.—Mr. G. R. Lawson informs us that the skeleton of the White Whale, whose stuffed skin is now preserved in the Dunrobin Museum, and which was caught at the Little Ferry in 1879, was presented by the Duke of Sutherland to the Museum of the Royal College of Surgeons.

Cervus elaphus, *L.*—RED DEER.—Mr. W. Ross, forester to the Duke of Westminster, but now (1887) pensioned off, a man of nearly eighty, told us that Red Deer frequented the neighbourhood of Cape Wrath as late as about 1830, and that it was the building of houses in or near their favourite passes that first frightened them away. When a lad of about thirteen or fourteen he killed a stag of fifteen points during the year the Cape Wrath lighthouse was being built, and not far from where it now stands. A stag was seen in the suburbs of Wick, according to "Rod and Gun" of 14th November 1889, a very unlikely locality for such an animal.

Lepus variabilis, *Pall.*—MOUNTAIN HARE.—A cream-coloured variety of this species was shot by Mr. Donald Ross, the keeper at Torish on Ben Duan, in November 1890. Varieties of the White Hare are, in our opinion, very rare.

AVES.

Ruticilla phœnicurus, *L.*—REDSTART.—Rather irregular in its appearance; not one was seen about Brora in 1890. The species does not seem to increase as one would be led to expect; it appears to be most partial to old birch woods, where it can find convenient holes for nesting in.

Sylvia rufa, *Bodd.*—WHITETHROAT.—Like the Redstart, does not appear to increase much, but we had a nest sent us from Brora in 1890.

Sylvia atricapilla, *L.*—BLACKCAP.—A female was shot at Kintradwell on 21st November 1889 by Mr. Houstoun and sent us for preservation; it was feeding on the berries of a Cotoneaster, and was seen for several days in company with some Tits. The female seems to be much less often obtained up in the north than the male.

Phylloscopus sibilatrix, *Bechst.*—WOOD WREN.—Booth says that the Wood Warbler is not uncommon near Berriedale.

Acrocephalus schœnobænus, *L.*—SEDGE WARBLER.—Mr. L. Hinxman reports a nest and eggs of this species from Duartmore, Assynt, in 1887. Captain S. G. Reid also gives Loch Laoghal as a locality for this Warbler in 1886.

Acredula rosea, *Blyth.*—LONGTAILED TIT.—A correspondent sends us word that for some time back he has been unable to find their nests in a wood near Brora where once they were common. Long-tailed Tits were first seen at Badenloch in November 1890.

Parus ater, *L.*—COLE TIT.—First seen at Badenloch in November 1890.

Anthus trivialis, *L.*—TREE PIPIT.—Breeds not uncommonly about Brora, and we have had several eggs sent us from that locality. Like other summer migrants they are variable in putting in an appearance.

Muscicapa grisola, *L.*—SPOTTED FLYCATCHER.—Mr. L. Dunbar in a letter to Harvie-Brown, dated 21st August 1886, reports two Spotted Flycatchers at Thurso in June of that year.

Hirundo rustica, *L.*—SWALLOW.—No swallows appeared about Brora in the season of 1890. In any case these birds are not common anywhere in Sutherland, though a pair or two can be found in certain localities.

Chelidon urbica, *L.*—HOUSE MARTIN.—We have been informed by Mr. James Hill of Helmsdale, that numbers of House Martins build annually in a large cave which is underneath the "Green Table," half way between Navidale and the Ord. All

the nests are built on the roof of the cave, which is about fifty feet high.

Passer domesticus, *L.*—House Sparrow.—House Sparrows were seen at Glencassly in August 1891, though this does not by any means prove that they are permanent residents there.

Ligurinus chloris, *L.*—Greenfinch.—Common about Badenloch during the autumn migration.

Fringilla cœlebs, *L.*—Chaffinch.—The first Chaffinch seen at Badenloch was a female, on the 21st July 1889; since then they have been noticed frequently on the autumn migration.

Fringilla montifringilla, *L.*—Brambling.—Several Bramblings were seen at Badenloch on migration in October 1889.

Loxia curvirostra, *L.*—Crossbill.—Mr. L. Dunbar informs us that three Crossbills were killed near Thurso in July 1888, and sent to him for preservation. There seems to have been quite an irruption of these birds in the north about that time.

Sturnus vulgaris, *L.*—Starling.—Mr. G. R. Lawson informs us that a flock of about thirty Starlings perched on the chimney and roof of the house at Griam-a-corry, Badenloch, on the 18th October 1888. The forester had never seen such a thing before.

Pica rustica, *Scop.*—Magpie.—Very rare about the east coast of Sutherland. One pair seen about the Uppat Woods for some three years back (W. Baillie); more common about Dornoch.

Corvus monedula, *L.*—Jackdaw.—A Jackdaw was seen at Badenloch on 21st July 1889.

Corvus corax, *L.*—Raven.—Numbers of Ravens appear above a certain hill near Kinbrace station, in the month of May, and we have often seen eight or ten together there. Where do they come from? as the Raven is a rare bird during the breeding season anywhere near there, indeed at any time, except that particular month. In a letter to Harvie-Brown from Mr. Candler, dated 22nd July 1891, the latter says:—"There is one pair of Ravens still surviving at Scourie. For eleven years they have never reared a single young bird. This year they nested in the cliffs of the Duke's Mount. The nest could not by any means be reached, but the tenant of the shooting blew nest and young birds to pieces with rifle bullets."

Cypselus apus, *L.*—Swift.—Mr. James Hill of Helmsdale informs us that a good many Swifts build under the tiled roofs of the curing yards in that town. They are very scarce about Clyne and Brora (W. Baillie), but used to breed in the old prison at Dornoch.

Caprimulgus europæus, *L.*—Nightjar.—Very rare, if not altogether absent, about Brora, in 1890. (W. Baillie.)

Iynx torquilla, *L.*—Wryneck.—A Wryneck was killed at Berriedale on the 16th of October 1889, and the following extract from a letter from the Hon. G. Lascelles to Lord Lilford, and for which we are indebted to Prof. Newton, gives the curious way in which the bird was captured:—"It was a curious thing that one of the falcons at Langwell stooped from a high pitch and cut over stone dead a Wryneck out of the heather—the only specimen that any of the men about had ever seen in that county. What was he about out on the hill? and do you think they are really very rare in Caithness?" (*In lit.* 9th November 1889.)

Alcedo ispida, *L.*—Kingfisher.—A Kingfisher was seen on the Golspie Burn in October 1887, by Major Reid and Mr. Melville, gardener at Dunrobin. Another was seen on the Brora above the bridge, on 11th August 1890; a stiff breeze from the east had prevailed for the three previous days. (W. Baillie.)

Cuculus canorus, *L.*—Cuckoo.—We saw one at Lothbeg Burn when out rabbit shooting on the 28th October 1886.

Strix flammea, *L.*—Barn Owl.—Mr. G. R. Lawson has informed us of two other occurrences of this bird in Sutherland. Mr. Lawson himself shot one at Loch Tubernach, near Brora, in August 1880, and another was killed at Clynelish in the summer of 1887. The remains of another were picked up by Mr. John Ross, near Garnsary, not long dead, in April 1890.

Asio accipitrinus, *Pall.*—Short-Eared Owl.—A bird of this species was shot at Dornoch in August 1889. They are very rare birds in Sutherland in the summer season, and not common at any time.

Asio otus, *L.*—Long-Eared Owl.—A Long-Eared Owl was shot at Forss on the 14th February 1887. There is a good-sized plantation there, one of the largest in this part of Caithness, though mostly consisting of hard wood. Two Long-Eared Owls haunted the very small plantation at Badenloch for more than a year in 1889 and 1890, though they did not seem to have bred there. They were often seen hunting about the garden, and were never disturbed.

Syrnium aluco, *L.*—Tawny Owl.—In a letter to Harvie-Brown from Mr. C. J. Holdsworth, dated 11th August 1890, the latter gentleman states that during that season he came across three young and one old Tawny Owl in the neighbourhood of Scourie.

Circus cyaneus, *L.*—Hen Harrier.—The Hen Harrier appears to be extinct now as a breeding species in the Badenloch district, there seems to have been only one nest taken since 1886, and the bird itself is now rarely seen.

Archibuteo lagopus, *Gmel.*—Rough-Legged Buzzard.—In the "Inverness Courier" of 8th February 1889, it is mentioned that "Messrs. H. Snowie and Son received during last week several beautiful Buzzards shot in Sutherlandshire, one of them the Rough-Legged Buzzard now becoming so rare."

Buteo vulgaris, *Leach.*—Common Buzzard.—In 1887 a nest of the Common Buzzard containing young birds was reported to Harvie-Brown by Mr. L. Hinxman from Duartmore, Assynt. From the increasing scarcity of the birds, it is well, here, to place this instance of their breeding on record.

Aquila chrysaetus, *L.*—Golden Eagle.—In 1889 a Golden Eagle made its nest on a small rock in a burn in the centre of the county of Sutherland, so easily accessible that a child could have gone into it. The nest itself was very small in size, and made mostly of heather. Unfortunately, being on the march between two shootings, it was impossible to preserve it, and the eggs were taken by the neighbouring shepherd.

Pernis apivorus, *L.*—Honey Buzzard.—A most beautiful Honey Buzzard was shot at Balblair on the 14th October 1889. It was curiously marked and spotted on the back, the breast being nearly white.

Falco candicans, *Gmel.*—Greenland Falcon.—In "Rod and Gun" of 28th November 1889, it is mentioned that Mr. Ireland, head keeper of Skibo Castle, recently shot a falcon, which, with the exception of a few feathers, was pure white. Another specimen was shot by Mr. J. Macpherson, forester, Griam-a-corry, near Kinbrace, on the 27th March 1888. It was first seen eating a grouse, and the forester returned for his gun, and stalked and shot it. The bird had only one leg, the other apparently having been lost in a trap. The specimen is now in our possession.

Falco islandus, *Gmel.*—Iceland Falcon.—A young Iceland Falcon was shot at Glutt, by Mr. M'Nicol, on the 7th October 1887.

Pandion haliaetus, *L.*—Osprey.—Barely a year passes without an Osprey being seen in May on the Helmsdale river. We saw one at Badenloch on 17th May 1890.

Phalacrocorax carbo, *L.*—Cormorant.—Cormorants breed abundantly on the rocks between Port Skerra and Strathy Bay.

Anser cinereus, *Meyer*.—Grey-lag Goose.—The Grey-lag still keeps up its numbers about Badenloch, but does not seem to increase much, if at all. The birds have not been disturbed in any way, as far as the lessee of the place could preserve them, for more than twelve years. Foxes seem great destroyers of geese, catching the old bird in the nest, and several were in this way spoilt. So tame are the birds there, that we have walked within eighty and a hundred yards of them feeding in one of the grass parks near the house, and when they rose they only went a short distance. Let us hope the new lessee of the place will be as careful of them. The Grey-lag breeds on one of the Badcall islands, and the people there take their eggs and hatch them under hens. This year (1891) the Mathiesons (of Scourie) took eggs from one of the islands in Loch Laxford (Charles Candler *in lit.* to J. A. Harvie-Brown, 22nd July 1891). Grey-lags appear at Badenloch in February. Under date, 3rd June 1888, Mr. Wallis, Reading, writes Harvie-Brown that the geese have at last deserted Eillean Fiag in Loch Shin.

Tadorna cornuta, *Gmel.*—Sheldrake.—An adult female was shot at Wick, on the 3rd of April 1876 (R. W. Chase).

Dafila acuta, *L.*—Pintail.—A male Pintail was obtained in Durness, in April 1889, by Mr. A. Mackay.

Fuligula ferina, *L.*—Pochard.—Booth mentions that Pochards are excessively abundant in east Loch Shin in autumn. One, a male, was obtained at Balnakiell, in February 1890, by Mr. Scott. We saw this species, in June 1889, in one of the Caithness lochs, and from the appearance of the locality we have little doubt they were breeding there; our boat was, however, too bulky to take into the reeds.

Fuligula cristata, *Leach*.—Tufted Duck.—The Tufted Duck is one of those birds that has spread enormously in the last three or four years. So far we have, however, no record of its breeding in Sutherland, though in one loch in the east of the county these birds are to be seen all through the late summer and autumn in numbers, the loch being full of weeds. Its shores, however, are not adapted for breeding purposes. In Caithness, we found a great many pairs breeding in a loch amongst the reeds and grass at the sides; indeed, they were far the commonest species of duck on the loch. We found several nests, two containing respectively sixteen and seventeen eggs, at which rate it would not require many birds to stock every suitable place in the county.

Somateria mollissima, *L.*—Eider Duck.—Two Eiders were shot in Sutherland—but no exact locality is given—on 4th January 1877; one was an adult male, the other an immature male in

first plumage. Both are in the collection of Mr. R. W. Chase. Mr. J. T. Thomson writes Harvie-Brown that he found an Eider Duck's egg, in May 1888, on one of the Badcall Islands, "Not in a nest, but a little embedded in a small portion of grass among the rocks. I say an Eider because I know no other egg like it. It corresponds with eggs of that bird taken in Norway." Seeing that the Eider Duck is such an abundant species in other parts of the west, it does seem strange it should be so rare on the Sutherland coast. Perhaps this may be the first indication of its extension there.

Œdemia nigra, *L.*—Common Scoter.—The Scoter is increasing its range in Sutherland, and getting more numerous yearly. As we were anxious to get a nest for our Sutherland collection we wrote to a person on whose ground they bred, and he kindly sent us a nest and six eggs. In his letter, dated 4th June 1890, he remarked that there were plenty of them about, but the nest was not always easy to find, he had often seen them with eight eggs, and adds they are late in nesting. In another letter, dated 16th June 1890, the same person says, "The Scoter's nest was not by a loch side, but in a place where there is a great number of water-holes; but any of them that I have seen before were always by a loch side. There were a great many little gulls (? Black-headed Gulls) nesting where this duck had her nest. I saw two pairs of the duck on the 6th and on the 13th of May, but no nest: and when I looked again on the 21st I got her nest with one egg. On the 30th she had six eggs, but was not sitting; and on the 4th of June she had still the six eggs and was sitting on them, so I took them. The other pair left that place, but there was a pair at some more water-holes about a mile over from this one, only there were a great many little islands that I could not get into where one duck was sitting (a common Wild Duck), and I think the Scoter had her nest there. They are getting more numerous here every year and spreading more to the westward."

Columba palumbus, *L.*—Ring-Dove.—Wood-pigeons bred for the first time at Erribol in either 1889 or 1890.

Columba œnas, *L.*—Stock-Dove.—The eggs of this bird were taken by us on the east coast of Sutherland, for the first time on 19th May 1889, and since then they have bred regularly. Dr. Penrose informs us that when on a visit to Glencassley in August 1891, he put three or four Stock-Doves out of a rocky burn, about two miles farther up the Cassley Strath.

Turtur communis, *Selby.*—Turtle Dove.—A Turtle Dove was shot at Forss on the 27th of September 1887, by Mr. Peter Calder, the keeper, and preserved by Mr. L. Dunbar.

Syrrhaptes paradoxus, *Pall.*—PALLAS SAND-GROUSE.—Sand-grouse do not seem to have visited Sutherland in the same abundance as many other parts of the country. Mr. G. R. Lawson writes us under date 12th July 1888:—"The only lot of Sand-grouse I have heard of in this county was between the Muckle Ferry and Dornoch. The Chief Constable told me on 4th inst. that they were still there. I first heard of them about a month ago." A pair of Sand-grouse was seen by John Bannerman on the Golspie Links on 14th July 1888. Other records of this species in the two counties have already been noted by Rev. H. A. Macpherson.

Caccabis rufa, *L.*—RED-LEGGED PARTRIDGE.—From a sale Catalogue of the effects of the late W. Dunbar of Brawl Castle is the following item:—"Case French or Red-legged Partridge, which the late Mr. Dunbar tried to introduce into Caithness. Some were afterwards killed on Brawl Farm." 2nd July 1888.

Perdix cinerea, *Lath.*—PARTRIDGE.—In the old Statistical Account for Scotland published in 1797, vol 19, p. 21, it is stated that "It is only of late years that this bird (the Partridge) has been seen at Halkirk, Caithness." In 1890, a covey of partridge appeared close to the foot of the Big Ben Griam, and one was shot; this is a long way from any cultivated ground. A pair of old birds was shot at Badenloch on 15th October of that year, and a few days after a single young bird. Partridge had only been seen there about twice in the previous twelve years.

Coturnix communis, *Bonnat.*—QUAIL.—A Quail was shot at Achavarasdal, Caithness, by the keeper on 16th October 1887, and was preserved by Mr. L. Dunbar.

Lagopus mutus, *Leach.*—PTARMIGAN.—A covey of Ptarmigan, two old and three young birds, were seen on Big Ben Griam in August 1888 by John Macpherson, forester. These birds are only very occasional visitors there. They are also seen occasionally on Ben Uarie, but do not breed there as far as is known: they breed, however, sparingly on Morven in Caithness.

Lagopus scoticus, (*Lath.*)—RED GROUSE.—In the spring of 1889, two grouse were seen by Mr. G. R. Lawson to fly across the Helmsdale river at Torish, and settle on a low tree. Two hens shot on 10th November 1890 only weighed 1 lb. and 1 lb. 4 oz. respectively; a young cock shot on 1st November weighed 1 lb. 9 oz., an older bird 1 lb. 13 oz., this latter weight is a good average.

Fulica atra, *L.*—COOT.—Coots were seen and shot at Badenloch for the first time in August 1889, by Mr. C. H. Akroyd.

Scolopax rusticola, *L.*—Woodcock.—Immense numbers of Woodcocks came to Sutherland in the season of 1890-1.—Badenloch shooting produced twenty-seven, whereas the twelve previous years would scarcely have given seven all put together. Another small shooting gave 125: and two days' shooting by two guns and the keeper gave forty. Snipe were by no means so numerous in proportion, indeed they never are very abundant on the east coast of Sutherland.

Machetes pugnax, *L.*—Ruff.—From Glencassly, Mr. Flower, the proprietor, writes us under date 15th September 1890:—"On the little marshy loch between Lochs Rossal and Skerrach, my nephew A. D. Flower shot a Ruff, one of a pair which he took for plovers. I have sent it to Quartermain to preserve, and he says it is a fine specimen, though of course without the distinctive plumage. I thought you would like to know, as you do not record one in the Fauna." We have also received a notice that one was shot on the Sutherland side of the Dornoch Firth by a son of Sheriff Mackenzie, though, unfortunately, no date is given.

This is a new bird to the Sutherland Fauna, though not to Caithness, from which county we have to record another specimen shot at Achavarasdal by the keeper on 20th September 1887.

Sterna minuta, *L.*—Little Tern.—A Little Tern was shot at the mouth of the river Brora, in October 1890, by Mr. G. Sutherland, innkeeper, and sent to his brother-in-law Mr. W. Gordon, Embo. It was apparently feeding on flies and moths. (W. Baillie *ex ore*).

Sterna cantiaca, *Gmel.*—Sandwich Tern.—A nest of the Sandwich Tern containing one egg was found by Mr. Swailes of Beverley, Yorkshire, at the Little Ferry, near Golspie, on 3rd June 1878. There was only one pair of birds, and the nest contained only the one egg. It was placed on a point to which he had to wade, and on which was some seaweed, etc. This point has since been washed away, the strong tides there often making changes at the mouth of the Little Ferry estuary, and the birds have not been noticed there since.

Larus fuscus, *L.*—Lesser Black-backed Gull.—A male of this species was shot at Thurso by Mr. Schofield on 4th November 1885. We notice this as the late date is unusual.

Larus marinus, *L.*—Great Black-backed Gull.—The Handa colony of this species has been exterminated, or rather perhaps driven out, since the raid made by the Stornoway smacksmen. (See under Guillemot.)

Larus glaucus, *Fabr.*—Glaucous Gull.—An immature specimen of this bird was killed at Wick on 2nd December 1872, and

sent in the flesh to Mr. P. Henderson, Dundee. This was the season these and the Iceland Gulls were so abundant in the Firth of Forth.

Stercorarius crepidatus, *Banks.*—RICHARDSON'S SKUA.—Still only one pair of these birds breeds in a locality in the east of Sutherland. Their eggs have been taken on two occasions, and one pair is in our possession.

Procellaria pelagica, *L.*—STORM PETREL.—"On the 20th June we went to the . . . Islands. Upon the ridge of rocks on the west side of Eilean . . . (separated by a great chasm from the island) . . . my brother put his arm down a hole . . . and drew out two Stormy Petrels; there were no eggs. He showed the birds to . . . who were delighted with them and had not seen them before. Then we let the birds fly. I expect several pairs breed upon this place." (C. Candler in letter to J. A. Harvie-Brown, 22nd July 1891.)

Puffinus anglorum, *Temm.*—MANX SHEARWATER.—In the old Statistical Account for Caithness published in 1794, Vol. 2, p. 249, it is remarked that:—"Shearwaters are reported to be found at Dunnet Head." It has not yet been ascertained whether they breed there or not, but we have seen numbers flying about in the evening when coming in to Scrabster from Orkney, and passing Dunnet Head.

Alca torda, *L.*—RAZORBILL.—**Lomvia troile,** *L.*—GUILLEMOT.—Under date of 22nd July 1891, Mr. Candler writes as follows:—"Some few years ago a smack came from Stornoway and landed a party upon Handa. They brought with them an immense length of rope. They secured this rope on the headland on one side of the Stack, walked along the brow of the cliff paying out the rope as they went, until they reached the projecting headland on the other side of the stack. Then they hauled the rope taut, and so brought it across the summit of the stack. They took from this rock every egg they could reach, and by means of nooses on the ends of poles they snared and killed 1500 Guillemots and Razorbills. Since this date the Great Black-backed Gulls have entirely forsaken the Stack and indeed the whole island."

Uria grylle, *L.*—BLACK GUILLEMOT.—Mr. Candler in the letter just quoted remarks that the Black Guillemot has entirely disappeared from Handa. In another locality, on one of the Badcall Islands, he found about forty pairs.

Colymbus septentrionalis, *L.*—RED-THROATED DIVER.—Mr. Candler informs us that a pair of these birds bred this year, 1891, in Handa.

ON THE FORMER ABUNDANCE OF THE QUAIL (*COTURNIX COMMUNIS*, BONNATERRE) IN WIGTOWNSHIRE.

By PETER ADAIR.

IT may be stated, without fear of contradiction, that this fine little game-bird, which in the early experience of many sportsmen and ornithologists was fairly common in certain localities in Scotland, has now almost disappeared. In fact, in many of its former haunts it has been a stranger for years.

In view of this, it has occurred to me that the result of observations made, and of information obtained, in a district which was once a favourite haunt of the bird might be of interest. I refer to the Upper or Rhins district of Wigtownshire, being that part of the county to the south and west of the Water of Luce, and in particular to the parishes of Inch, Stoneykirk, Kirkmaiden, Leswalt, and Kirkcolm. These parishes form almost a peninsula, watered on the east by the Bay of Luce, on the south and west by the Irish Channel, and on the north partly by Lochryan. The soil varies, but it is chiefly sandy or gravelly. Situated as the district is, the climate is mild, and snow seldom lies, except in severe and protracted storms. The principal crops are oats and turnips. Game of all kinds is abundant.

It may not be out of place to make a few remarks on the haunts and habits of the bird in the district when it was common. It was not diffused generally; but confined to certain farms, and even to favourite fields on these farms, choosing dry, well-cultivated, sandy, or sharp gravelly soil. In spring the call-note sounded from the fields of rye-grass or of oats. In early autumn the birds frequented stubble, often close to some sheltering fence. In late autumn and winter they were found principally among the turnips, particularly in those parts of the fields interspersed with patches of chickweed. At all seasons they lay close—so close indeed that in autumn I have more than once seen birds caught by dogs. When a bevy of young birds was

flushed in autumn, they generally flew away singly or in pairs. In the winter months the birds were, as a rule, dispersed singly.

I have seen the nest twice in different years, on each occasion during harvest (early September), on the same farm, Springbank, in the parish of Leswalt. On each occasion the nest was in a field of oats. These nests were very late; as I once flushed a brood of seven very small young, strong on the wing, in an oat-field on the same farm in August of 1860 or 1861.

Though the bird was undoubtedly a summer visitor, during the years of its abundance in the district numbers remained all the year, except perhaps during severe winters. In the winter months they were often shot by sportsmen, and by gamekeepers when after Partridges. I have seen a bird in the end of December, and another (flushed near Stranraer) well on in January.

That the bird was common in the district in old times is beyond dispute; but it is most difficult to get information as to its numbers. I shall accordingly content myself by stating the result of information which I have obtained from living witnesses. Old men who have resided in the district all their lives concur in stating that the bird was quite common and familiar from the earliest date to which their recollections extend, down to the time of its disappearance. But I have not been able to get particulars of the actual numbers which were killed in suitable localities during a day's sport, till about the year 1858. Mr. Skinner, who has long been gamekeeper on the estate of Balgreggan, Stoneykirk, tells me that about that year it was possible to have shot eight or ten brace in a day in certain suitable localities on that estate; that he had killed three or four brace in a day when after Partridges, and refrained from shooting more, as they were not then much valued; and that the farms most frequented were the Galdenocks, Freughs, and Mye. These farms are contiguous, and lie at a low elevation, within two or three miles of Luce Bay. Their soil is naturally dry and sandy. Mr. John Martin, who was gamekeeper at Lochnaw in the parish of Leswalt during the years of the quail's abundance, states that the bird was regularly killed in

suitable localities on that estate during the shooting season down to about the year 1873; that two or three brace were sometimes killed in a day; that the greatest numbers he had seen killed in a day were four brace; and that the farms on which the bird was most plentiful were the Dindinnies, which are situated about midway between Lochryan and the Irish Channel, and Kirronrae and Salchrie which adjoin Lochryan. The soil on these farms is principally of a gravelly or sandy character. Mr. Samuel Wither, farmer, Craigochpark, Portpatrick, informs me that when his father was tenant at Duchra the bird was common on the farm, and that numbers were shot every winter during the years of the bird's plenty. And Mr. Halliday, gamekeeper, Corsewall, Kirkcolm, says that, from information obtained by him, the bird was common in that parish thirty-five or forty years ago, and that two or three brace had then been killed in a day by a shooting party. Another haunt was the sharp gravelly ground to the south and west of Stranraer, within a radius of a mile and a half of the town.

In the last twenty to twenty-five years, however, the bird has been almost unknown in the district. I have not been able to fix the exact years in which the diminution began, but it was somewhat sudden, and the disappearance has been so complete that I have only been able to get a few records of the bird since the time when it practically ceased to inhabit the district. Mr. Weir, gamekeeper, Lochnaw (who succeeded Mr. Martin), has seen two during the last ten years, both on the farm of High Mark, Leswalt. The Logan gamekeeper informed me that the last Quail killed there was about thirteen years ago. The last bird seen by Mr. Skinner was on the farm of Culmore, Stoneykirk, in the year 1889. Mr. Martin heard and saw some in 1887, on the farms of Blair and Kilhilt in Stoneykirk. Mr. Marchbank, gamekeeper on the extensive Estate of Lochinch, informs me that a young bird was killed on the farm of Clenry in the parish of Inch in October 1890, and that this was the only one seen by him during the ten years of his residence at Lochinch. And in November of last year a bird was flushed out of a turnip-field on the farm of Kirklauchlan, Stoneykirk, which adjoins the Irish Channel. One of the strongest pieces of evidence,

to my mind, of the disappearance of the bird, is that its call is quite unfamiliar to the youth who reside in the neighbourhood of its old haunts.

I never heard a theory of the cause of the birds disappearance in the district supported by reasonable evidence. There has been no change in the climate, or in the methods of farming; and there is no reason to think that the young broods were insufficient to meet the losses sustained from sportsmen, vermin, poachers, and accident. It is to be hoped that observers, familiar with other districts at one time frequented by the bird will communicate particulars. When the facts are collected light may be thrown on the mystery.

ON THE SUPPOSED BREEDING OF THE SCLAVONIAN GREBE (*PODICIPES AURITUS*, L.) IN ROSS-SHIRE.

By A. H. Evans, M.A., F.Z.S., etc.

Between the years 1881 and 1887 Mr. E. T. Booth in his 'Rough Notes' stated under the head of "Sclavonian Grebe" that he had seen on a certain Highland loch, where "blinding squalls, with drifting sleet and rain, prevented satisfactory identification," a bird which, if it was a Grebe at all, and not a Diving Duck, was a Sclavonian, to judge from the keeper's report.

The details are more fully given by Mr. J. H. Dixon in the carefully compiled list of birds annexed to "Gairloch and Guide to Loch Maree" published in 1886, and are as follows: "A pair of Grebes has for many years nested annually on a fresh-water loch in Gairloch parish: in some years there have been two pairs on the same loch; and sometimes another pair has nested on a loch about two miles away. Mr. E. T. Booth saw the Grebe on the former loch in 1868; he was unable to decide the species at the time, but in a letter he wrote to me on 2nd March 1885, he said that from the last description of the bird that he received he came to the conclusion that it was a Sclavonian. Mr. H. E. Dresser

saw one old and one young Grebe on the same loch on 30th June 1886. He could not get a distinct view of the bird, but he was satisfied it was either the Sclavonian or the Eared Grebe. Mr. John Munro, who has annually seen and scrutinised the birds during the past twenty-one years, and has compared his impressions of them with the pictures of the several species of Grebe from Mr. Dresser's 'Birds of Europe' and other works, believes that these birds nesting in Gairloch are Sclavonian Grebes."

Since this was written, however, Mr. Dixon and I have been able to examine the birds at close quarters under exceptional circumstances of calm water and bright light, and have conclusively ascertained that, although they have an appearance of considerable size,—possibly from an ocular deception due to the dearth of herbage and absence of other waterfowl for comparison,—they are undoubtedly Little Grebes. We have now visited the loch at intervals during the breeding season for three years in succession, and have constantly seen both male and female, with and without field-glasses: on two occasions I have been within twenty yards of one of the pair as it rose to the surface, while Mr. Dixon has also more than once had a clear view.

Finally, we have procured eggs from the nest, placed exactly where Mr. Booth originally saw it, in one of the two solitary patches of sedge (*Carex ampullacea*) on the loch; they are indisputably those of the Little Grebe (*P. fluviatilis*).

LOCHINVER AS A LOCALITY FOR LEPIDOPTERA.

By Wilfrid W. O. Beveridge, M.B. (Edinburgh),
Surgeon-Captain, Medical Staff.

There are now few localities in our Islands, however inaccessible, which at one period or another have not been visited by those in search of lepidoptera. The far-reaching strides of civilisation, necessitating the formation of towns, the need of drainage, and the removal of forests and under-

wood, have driven the naturalist farther afield in order to pursue his quest; and it is with delight that we hail those few surviving localities which have remained in the same undisturbed state for generations.

Here and there such districts may yet be found; and although they may be familiar to the sportsman or botanist, they will yet prove a wide field of research to the entomologist. Many such localities exist in the northern parts of Scotland; and by careful and diligent search it is wonderful how many insects which hitherto have enjoyed the reputation of being only of southern origin have shown themselves as also occupying a more northern situation. Take for example the *Argynnis Paphia*, concerning which Mr. Newman remarks,[1] "As it occurs not uncommonly in our northern English counties, Northumberland, Cumberland, and Durham, it may be inferred that its rarity in Scotland is rather apparent than real." This butterfly I found in considerable numbers at Lochinver, which lies almost at the extreme north-west of Scotland. *Vanessa Polychloros* might also be instanced, the appearance of which in Scotland I have noted elsewhere. The *Rhopalocera*, owing to the need of a more genial climate, are not of such frequent occurrence or so numerous as in England; but Scotland lays claim to many species, such as *Erebia Epiphron*, *Erebia Æthiops*, *Satyrus Semele*, *Lycæna Astrarche* var. *Artaxerxes*, *Cœnonympha Typhon*, *Lycæna minima*, whose particular haunts still afford much scope for investigation. In the north also many varieties of different species are found, nowhere better exemplified than among the *Noctuæ*. The dark varieties of many kinds are well known: and how many more have yet to be brought to light?

Such localities as Rannoch, the Orkney and Shetland Islands, Deeside and Forth districts, have long been known as almost veritable mines of entomological wealth, and by our southern brethren have from time to time been the site of valuable additions to their collections and knowledge. That such places are apt to become deteriorated by becoming too well known is only too evident, especially when they become the prey of an evil which at all times

[1] "British Butterflies and Moths," Newman, 1st Ed., p. 25.

must strike deeply at the root of all searching and thorough scientific investigation. The evil we allude to is the *collector*, a so-called naturalist! whose only aim seems to be the rapid extermination of any rare species by taking as many as possible of *a good thing*, be it in the shape of ovum, larva, or imago, utterly oblivious to those who may come after him, and, of even greater importance, entirely careless as to the habits, the manner of life, and relation to their surroundings of the insects he so ruthlessly removes. To the advancement of science he contributes nothing, and concerning its study he cares still less.

That the study of entomology can be levelled to that of a trade is much to be regretted, and indeed one is almost tempted, not from selfish motives, to keep any desirable and little known localities to oneself and our particular friends, in order that we may at least aid in the preservation and protection of the insects contained therein.

We all know that collecting is to a great extent a necessity, and when kept within decent bounds becomes a delightful and instructive pastime; but he that would derive all the enjoyment from one of the most enthralling of pursuits, must combine with it the careful investigation and minute study of all, from ova to the perfect insects. I cannot do better than quote the words of the late Rev. J. G. Wood where he says, "The habits of insects are very mines of interesting knowledge, and it is impossible carefully to watch the proceedings of any insect, however insignificant, without feeling that no writer of fiction ever invented a drama of such absorbing interest as is acted daily before our eyes, though to indifferent spectators. Thus even in the mere structure of insects there is more than enough material for the study of a lifetime."

It is to the scientific and thorough entomologist, then, that these few notes of the neighbourhood of Lochinver, such as they be, are written, with a view that he may at some future season spend as pleasant and profitable a time there as did the writer.

The village of Lochinver, in the parish of Assynt, lies on the sea, about forty-nine miles by road from Lairg.

The geological formation is of a type usually found in

such mountainous districts, being of gneiss, limestone, marble, and basaltic rock. The vegetation is also of a like type. The woods, generally extending along the banks of a loch or situated upon a hillside, are composed chiefly of birch, oak, hazel, and alder. Fir and larch are to be found in many plantations. Heather, the cross-leaved heath, crow and blaeberry, are to be found everywhere, and the royal fern flourishes on the borders of the lochs, of which there are over two hundred in the parish, and upon the numerous islets which are dotted among their waters. Sugaring is with difficulty carried on amongst the trees, partly from the closeness of trees in the woods, and also from the smoothness of their bark; but if the solution be applied to the flowers of the ragwort, which this season at any rate has bloomed in vast profusion, much success may result. Among the Agrotis group, which come plentifully to this flower, were observed *Agrotis tritici* and *Agrotis nigricans* as being abundant. *Agrotis obelisca*, a few specimens near the sea shore. Amongst others visiting the ragwort we noticed *Hydræcia micacea*, *Xylophasia monoglypha*, *Xylophasia hepatica*, *Xylophasia lithoxylea*, *Leucania conigera*, *Polia chi*, this last being also very plentiful resting by day on the stone walls, the colouring of which it so closely resembles. There appears to be great diversity in the depth of colouring in this insect. Specimens I have from farther south seem much lighter, and by comparison of a larger size. The Lochinver specimens are darker, smaller, and the markings more pronounced. [Var. *olivacea*? (Eds.)] *Aporophyla nigra* is to be taken either at sugar or resting upon the heather by day. *Anchocelis pistacina* was of frequent occurrence. Among the butterflies were found *Argynnis Paphia* before alluded to. *Satyrus Semele*, which was generally to be found resting on the stony places on the hillsides, *Erebia Æthiops*, *Cœnonympha Pamphilus*, *Vanessa urticæ*, *Pieris napi*, *Pieris rapæ*, *Pieris brassicæ*, *Lycæna Icarus*, only need mentioning. Specimens of *C. Pamphilus* were large, and as a rule of a dark hue.

Among the Geometræ, and this district would seem especially rich in these, we may note the occurrence of *Oporabia dilutata*, *Larentia didymata*, *Larentia cæsiata*, *Thera simulata*, *Thera variata* var. *obeliscata*, the larva of the latter

being dislodged from the firs by sharply tapping the branches, *Hypsipetes sordidata*, *Cidaria miata*, *Cidaria truncata*, and *Cidaria populata*. Larvæ are very numerous, and any one who makes this a special study would find his time and labour well spent in this district. Among the heather *Saturnia pavonia*, as would be expected, was very common, as also the handsome larva of *Bombyx rubi*, and, in enormous profusion in September and October, the larvæ of *Spilosoma menthastri*, which appeared on every plant, showing great diversity in their colouring, from pure black to light brown. On the broom (*Spartium scoparium*) larvæ of *Chesias spartiata* and *Bombyx quercus* were found; the latter, which I have since fed on bramble, have now hibernated, constituting the variety *callunæ*, Palmer. On the brambles near the the roadsides the beautiful larvæ of *Thyatira batis* were to be met with, and in several instances were also found feeding on the common stinging nettle. They passed into the pupa stage towards the end of September.

Larvæ of *Hadena pisi* were plentiful on the bracken. On the birch, the larvæ of *Lophopteryx camelina* were in great abundance; nearly every tree on the banks of Loch Assynt had an enormous population feeding in company with *Notodonta ziczac*, which was almost as plentiful.

A few larvæ of *Acronycta psi* were also noted.

Many other larvæ too numerous to note in the time at our disposal were observed.

The micro-lepidoptera were plentiful, and included many rare and interesting species.

These few notes will, I hope, be sufficient on which to base a claim for Lochinver as a lepidopterous district of some importance.

The nomenclature adopted is that of Richard South's Synonymic List.

[Lochinver lies in the district of "West Ross," so named and defined in Insecta Scotica ("Scottish Naturalist," vol. i. p. 162). Of the entomology of West Ross a great deal has yet to be learned; and that it ought to be well worth exploring, Dr. Beveridge's observations distinctly show. For

though amongst his captives there seems to be no species of very great rarity so far as Britain is concerned, yet there are some which are not of universal distribution in Scotland, and others which were supposed not to range so far north. The late Mr. Newman's conjecture that the rarity in Scotland of *Argynnis Paphia* "is rather apparent than real" has not I think proved to be the case. It is possible that *A. Paphia*, a butterfly which cannot be mistaken for any other British one, may at one time have been more abundant in Scotland than it is now, since we know that this is the case with some other Rhopalocera such as *Pararge Megæra*, *Euchlöe cardamines*, etc. When I compiled the Lepidoptera of Scotland in "Insecta Scotica" I got records of the occurrence of *A. Paphia* in two districts only, viz. Tay (an old record) and Clyde. I note that Dr. Beveridge does not record *Argynnis Aglaia*, a widely distributed Highland species, but which is not recorded for West Ross in "Insecta Scotica." At the same time it can hardly be absent from that district. Another interesting capture is *Xylophasia hepatica*, which has not, I think, been recorded from any Scottish locality north of Rannoch—a place where, amongst many northern species, some southern ones (whose occurrence would scarcely be suspected) are found. Forms of *X. rurea* (a species not mentioned in the Lochinver list) are sometimes mistaken for *X. hepatica*. Neither *X. rurea* nor *X. lithoxylea* are down for West Ross in "Insecta Scotica," though the former must surely occur. The observation that the larvæ of *Thyatira batis* were sometimes found on nettles is I think a novel one, and is curious because there is no affinity between the genera *Urtica* and *Rubus*. *Notodonta ziczac* more usually feeds on willows, poplars, and alders, than on birch. From his concluding remarks, Dr. Beveridge seems to have met with a number of other species of Lepidoptera in Assynt. It would be a valuable contribution to the entomology of Scotland if he would kindly publish a complete list in the "Annals."—F. BUCHANAN WHITE.]

PLANTS OF GLEN SPEAN, WESTERNESS.

By G. Claridge Druce, M.A., F.L.S.

(*Continued from page* 131.)

Cornus suecica, *L.*—Common on the lower slopes of Aonach Mòr, Beinn Chaoruinn, etc.

† **Sambucus nigra**, *L.*—Had no appearance of being a native plant in Spean.

Galium boreale, *L.*—Also as a small rigid form on Creag Meaghaidh. **G. hercynicum**, *Weigel* (= *G. saxatile*, L. "Sp. Pl." Ed. ii., *non* Ed. i.)

* **G. palustre**, *L.*—As *G. Witheringii*, Sm., Roy, Spean.

Asperula odorata, *L.*—Woods by the Spean near Highbridge.

Sherardia arvensis, *L.*—A lax form by the Spean near Inveroy.

Solidago Virgaurea, *L.*, var. **S. cambrica**, *Huds.*—Aonach Mòr, etc.

Gnaphalium uliginosum, *L.*—The type with glabrous achenes, Roy, Moy, etc.

Chrysanthemum segetum, *L.*—Moy, Roy, etc. **C. Leucanthemum**, *L.*; Roy, Inveroy.

Matricaria inodora, *L.*—Rare. In a cornfield near Loch Laggan.

Senecio sylvaticus, *L.*—Local, on cottage roofs.

Saussurea alpina, *DC.* — Cliffs of Aonach Mòr and Beinn Chaoruinn.

* **Centaurea Cyanus**, *L.*—Rare; Spean.

Leontodon autumnalis, *L.*, and var. **pratensis** (*Koch*).

Taraxacum officinale, *Web.*; var. **palustre** (*DC.*)

Sonchus asper, *All.*—Spean. * **S. arvensis**, *L.*; rare, Roy.

* **Hieracium alpinum**, *L.*—Rare, a few plants on Aonach Mòr, by a huge rock which had been separated from a cliff in the Allt Coille an Rois at above 2000 feet. * **H. holosericeum**, *Backh.*; on a rock which is situated between a series of waterfalls at the entrance to the upper corrie of Stob Coire an Easain. **H. calenduliflorum**, *Backh.*; two or three specimens growing with the above. **H. lingulatum**, *Backh.*; with the two last species. Also on Aonach Mòr, on Beinn Chaoruinn and Creag Meaghaidh. * **H. senescens**, *Backh.*; rare; Stob Coire an Easain.

? **H. Backhousei**, *Hanb.*—A solitary specimen, in bad condition, from the rocks at about 3800 ft. on Aonach Mòr, Mr. Hanbury says is very like this species; but one specimen is not sufficient to decide by. **H. chrysanthemum**, *Backh.*; not unfrequent. Very fine specimens on Aonach Mòr, Ben Chaoruinn, and Creag Meaghaidh. * **H. anglicum**, *Fries.*; a few specimens on rocks by the Spean near Inveroy; splendid specimens in the Allt Coille an Rois. **H. vulgatum**, *Fries.*; frequent by the Spean. Near Inveroy occurred a handsome form with deeply incised leaves. **H. corymbosum**, *Fries.* (*H. Eupatorium*, Griseb.); a characteristic Hawkweed of the Spean side from near Inverlair, by the Roman Church, Roy, Inveroy, to Spean bridge. Especially abundant between Roy and Inveroy. **H. auratum**, *Fries.*; with, and almost as plentiful as, the foregoing species. * **H. boreale**, *Fries.*; near the Roman Church and near Roy.

Vaccinium uliginosum, *L.*—In the upper corries and on the rock in the waterfalls of Stob Coire.

Azalea procumbens, *L.*—On the rock in the waterfalls of Stob Coire.

Armeria maritima, *Willd.*—Aonach Mòr; not common.

† **Ligustrum vulgare**, *L.*—In several localities, but always having the appearance of a planted shrub.

Menyanthes trifoliata, *L.*—Laggan, Moy, etc.

Myosotis maritima, *Fries.* (*M. cæspitosa*, Schultz).—Spean, Gairlochy.

* **Calystegia sepium**, *Br.*—Glen Roy, perhaps a garden escape.

Scrophularia nodosa, *L.*—Inveroy.

Veronica humifusa, *Dickson.*—Aonach Mòr, Stob Coire, etc. **V. alpina**, *L.*; Aonach Mòr. **V. scutellata**, *L.*; always as the glabrous form. Near Roy Bridge occurred a very broad-leaved form which at first sight looked like *V. Anagallis*.

Bartsia Odontites, *Huds.*; var. **O. verna**, *Reichb.*—Gairlochy, rare.

Pedicularis sylvatica, *L.*, also var. **alba**.—On the moorland above Lianachan.

Rhinanthus Crista-galli, *L.*; and the * var. **angustifolia**, *Gr. & Godr.*—Near Inverlair and Moy.

Mentha hirsuta, *Huds.*—Roy. * **M. arvensis**, *L.*; Roy, etc.

* **Thymus Serpyllum**, *L.*

Galeopsis Tetrahit, *L.*—Common, especially as the var. **bifida** (*Boenn*). **G. speciosa**, *Mill.*; rare, Spean.

Lamium purpureum, *L.*—Rare, Spean.

Littorella juncea, *Bergh.*—Gairloch.

Scleranthus annuus, *L.*—Roy.

Atriplex patula, *Sm.*—Roy, rare. **A. angustifolia**, *Sm.*

* **Polygonum lapathifolium**, *L.*

Oxyria digyna, *Hill.*—On the rock of Aonach Mòr, etc.; also on the shingle at the mouth of the Spean, near Gairlochy.

* **Rumex conglomeratus**, *Murr.* * **R. acutus**, *L.*; not unfrequent above Roy. * **R. domesticus**, *Hartm.*; rather frequent. *R. **conspersus**, *Hartm.*; Inveroy, Roy, etc. When at Roy I made out a Dock to be **R. propinquus**, *Aresch.*; but I cannot identify it among my dried specimens. An *obtusifolius* specimen appeared to have also an *acutus* parentage.

Mercurialis perennis, *L.*—Highbridge.

* **Ulmus campestris**, *L.*—(*U. montana*, Sm.)

† * **Humulus Lupulus**, *L.*—Near Roy Bridge.

Betula alba, *L.* * **B. carpatica**, *Wald. et Kit.*; var. **odorata**, *Bechst.*—The Birches were usually barren.

* **Quercus Robur**, *L.*—(**Q. sessiliflora**, *Salisb.*; **Q. fœmina**, *Mill.*, 1762).

† **Fagus sylvatica**, *L.*—As a planted tree.

† * **Salix alba**, *L.* † * **S. purpurea**, *L.* **S. lapponum**, *L.*—Corrie of Stob Coire an Easain. **S. lapponum** × **aurita**; with above.

† * **Populus alba**, *L.*—Planted. † * **P. canescens**, *Sm.*

Listera cordata, *Br.*—On a rock in waterfall from Stob Coire.

* **Orchis incarnata**, *L.* **O. latifolia**, *L.*—Inveroy.

Habenaria albida, *Br.*; Roy. **H. viridis**, *Br.*; Aonach Mòr. **H. bifolia**, *Br.*—Inveroy.

Iris Pseudacorus, *L.*—Lianachan.

Juncus bufonius, *L.*; var. **fasciculatus**, *Koch.* **J. trifidus**, *L.*—Common on the higher hills.

J. lamprocarpus, *Ehrh.*; and * var. **nigritellus**, (*Don*). **J. sylvaticus**, *Reich.*; and * var. **multiflorus**, *Wahl.*

J. triglumis, *L.*—Rather rare on Aonach Mòr and Stob Coire.

Luzula spicata, *DC.*—A curious form with lax spikelets, the terminal one consisting of barren flowers, so that the plant assumes the aspect of *Carex ustulata*, as one saw it on the rocks above through the driving mist, occurred on Stob Coire an Easain. **L. erecta**, *Desf.*; * var. **congesta**, *Sej.*; * var. **pallescens**, *Hoppe.*

Sparganium minimum, *Fries.*—(*S. natans*, L., herb. et auct. plur.) Gairlochy.

Scirpus pauciflorus, *Lightf.*—Near Inveroy. **S. cæspitosus,** *L.*; as type, and viviparous on moorland above Lianachan. **S. setaceus,** *L.*; by the Spean near Inveroy.

Eriophorum polystachyon, *L.*; and var. **minus,** *Koch.*—Beinn Chaoruinn.

Rhynchospora alba, *Wahl.*—Coneachan, etc., locally common.

Carex dioica, *L.*—Apparently rare, but perhaps gone over. **C. pauciflora,** *Lightf.*; rather frequent on one moorland above Lianachan. **C. canescens,** *L.* (= **C. curta,** *Good.*); near Roy: also * **C. alpicola,** *Wahl.*; Roy; the former on south side of Spean nearly opposite Roy. **C. rigida,** *Good.*; which I should certainly keep separate from the next species, **C. Goodenovii,** *Gay*, which occurs in several forms. **C. flacca,** *Schreb.*; "Fl. Lips." (1771); common and very variable. (In Richter's "Plantæ Europeæ," p. 160, the author writes *C. glauca*, Murr. "Prod. Fl. Goett." p. 76 (1770). If this were a correct citation the name *C. glauca* would take precedence, but it is not so; on the page cited, Murray quotes Haller's description but gives no name to the variety. It is given by Scopoli as *C. glauca* in ed. ii. of Fl. Carn. 223). **C. pilulifera,** *L.*; typical, also in a bracteate form on Creag Meaghaidh.

C. pallescens, *L.*—The usual British form (*C. undulata*, Kunze) according to my observation is that in which the lowest bract is transversely crimped at the base. In several specimens met with in the Spean valley, as at the bridge near the Roman Church, the bracts were free from this wrinkling. **C. vaginata,** *Tausch.*, very rare; Stob Coire.

C. Hornschuchiana, *Hoppe.*—Common.* **C. xanthocarpa,** *Degl.*; near Inveroy. Corrie of Stob Coire. **C. flava,** *L.*; type on Stob Coire and Aonach Mòr, etc.; * var. **Œderi,** *Lilj.*; Roy, Moy, etc.

C. rostrata, *Stokes.*—Near Roy and by Loch Laggan, etc. **C. saxatilis,** *L.*—On the moist grassy slopes of the Corries of Aonach Mòr, Stob Coire, Beinn Chaoruinn, and Creag Meaghaidh.

* **Phleum pratense,** *L.*—Roy; also var. **nodosum,** *L.*—Inveroy. * **P. alpinum,** *L.*; rare, Stob Coire an Easain.

Agrostis vulgaris, *With.*; var. * **A. nigra,** *With.*—Roy. **A. canina,** *L.*; rare; Aonach Mòr.

Deschampsia cæspitosa, *Beauv.*; var. **alpina,** *Gaud.*—Aonach Mòr, etc.

D. flexuosa, *Trin.*; var. **A. montana**, *Huds.*—Stob Coire.

* **Avena pubescens**, *Huds.*—On shingly bank of river at Gairlochy.

Arrhenatherum bulbosum, *Presl.*—This was the prevailing form above Roy and Spean. My experience leads me to believe that this is distinct from *A. avenaceum*, Beauv. It keeps true in cultivation.

Poa alpina, *L.*—Aonach Mòr, but not seen on Beinn Chaoruinn or Stob Coire. This Westerness *Poa* differed from the plants of the Cairngorms in being more tufted and in its smaller size. The culms too were more drooping. I have had a similar form sent me from Canlochan as *P. laxa*. Prof. Hackel confirms the name.

* **Bromus racemosus**, *L.*—Roy.

Brachypodium gracile, *Beauv.*—Spean.

* **Agropyrum repens**, *Beauv.*—Roy, rare and as var. **barbatum**, *Duval Jouve*.

CRYPTOGAMS.

Hymenophyllum unilaterale, *Bory.*—Side of Spean near Highbridge.

Cryptogramme crispa, *Br.*—Aonach Mòr, etc.

Asplenium Trichomanes, *L.*—Spean bridge, with **A. Ruta-muraria**.

Athyrium alpestre, *Milde.*—Aonach Mòr, Stob Coire, etc.; **A. flexile**, *Syme.*—Aonach Mòr.

Cystopteris fragilis, *Bernh.*—Roy bridge.

Polystichum Lonchitis, *Roth.*—Aonach Mòr.

Lastrea Oreopteris, *Presl.*; **L. Filix-mas**, *Presl.*; **L. spinulosa**, *Presl.* **L. dilatata**, *Presl.*; **L. æmula**, *Brack.*—Near Roy.

Phegopteris Dryopteris, *Fée.*; **P. polypodiodes**, *Fée.*

Botrychium Lunaria, *L.*—Stob Coire (E. R.), near Inveroy.

Equisetum arvense, *L.*; **E. silvaticum**, *L.*; **E. palustre**, *L.*; **E. limosum**, *L.*—Lianachan; var. **E. fluviatile**, *L.*—Gairlochy; * var. **polystachyum**, *A. F. Brückner* in "Fl. Nesl. Bod." (1803), p. 63.—Gairlochy.

Selaginella selaginoides, *Gray.*—Spean side, etc.

Lycopodium Selago, *L.*; **L. annotinum**, *L.*—Stob Coire, Aonach Mòr, etc.; **L. alpinum**, *L.*—Common; * var. **decipiens**, *Syme.*—Stob Coire. It may be well to add a little explanation to the note on *L. complanatum*, which appeared in the "Journal of Botany" (1891), pp. 178-179, by Messrs. Groves, so that its Scottish name may be now corrected.

The name *L. complanatum*, which I adopted for the Gloster plant, was only chosen after consultation with some of our leading botanists. Mr. Carruthers kindly drew up the description which was published in the November number of the "Journal of Botany" for 1882. On page 381 in the same year, and in the "Proceedings of Linn. Soc." 1883, p. 2, Mr. J. G. Baker is stated to have exhibited a specimen collected by Professor Lawson in Skye, as true *complanatum*, to a meeting of the Linnæan Society. An editorial note in the "Journal of Botany," 1882, p. 381, states that a Forfar specimen was also found to be *complanatum*. In the supplement to his "Manual" Professor Babington quotes Hants, Gloster, Worcester, Ross, and Skye, for *complanatum*; while in the third edition of the "Students' Flora," 1884, Sir J. D. Hooker treats the Linnæan *complanatum* as an aggregate species, with two sub-species: viz. (1) *L. complanatum* proper "from Gloster and Worcester . . . leafy branches, longer, less crowded; leaves dimorphic, central ones on the flattened stem more erect and narrower than the lateral; spikes usually several, peduncled." (2) *L. alpinum*, L.—"Leafy branches, shorter, more crowded, not flattened; leaves uniform; spikes solitary, sessile." This latter description of the leaves, branches, and spike, would exclude the Gloster plant, since the leafy branches are long and lax, and conspicuously flattened, the leaves are dimorphic, and in my specimen the three fruiting peduncles bear respectively two, three, and four sessile spikes. The wording of the description of *complanatum*, *i.e.* "spikes usually several, peduncled," is not free from ambiguity. It may be read "spikes pedunculate, usually several," but this does not suit the British specimens, since these have sessile spikes. It probably intends "spikes usually several, usually peduncled." This would admit the Gloster plant, but as certainly alters the specific character given by Linnæus. It was this presumed alteration of the description given in the "Species Plantarum," and the doubt which existed in my own mind of our having the true *complanatum* in Britain, which led me to write *L. complanatum*, L. 'Hook. fil.,' when recording the occurrence of the flattened form of *L. alpinum* from the Cairngorms, etc., in the "Journal of Botany," 1888, p. 26, and still more recently as *L. alpinum*, L.; var. *decipiens*. Dr. Boswell wished me to let him have the Gloster specimen to figure in "English Botany"; and in December 1882 he wrote me thus: "I do not think the plate in last number of Journ. Bot. represents the *complanatum*; but I am in correspondence with Messrs. Newbould and Baker about it. But for Mr. Baker's decided opinion upon the Gloster and Skye plants I would have no doubt about supposed *complanatum* being really *alpinum*." Professor Babington, in February 1883, on receipt of a specimen from Ross-shire wrote: "I see the name is confirmed by Mr. Baker. I also have a bit of Professor Lawson's Skye species named by him. It seems

somewhat different, having a very much broader and flatter appearance; more so than any of my Continental examples. But that is apparently only an apparent difference, and may result from the way in which it was preserved." On the 3rd June 1883 Dr. Boswell wrote that he did "not believe the Gloster plant had anything to do with *L. complanatum*. I have named it in "E. Bot.," plate iii., *L. alpinum*, var. *decipiens*. The New Forest plant is more likely to be *complanatum* var. *Chamæcyparissus*; the Skye plant may be *complanatum*, *L. genuinum*, but I must wait further evidence before I admit *complanatum* as British." In the twelfth volume of "E. Bot.," the plate 1834*, drawn from my Gloster specimen, is labelled *L. alpinum*, L., var. *decipiens*, but it is a *nomen solum*, no reference to description of it being given in the text; but the plate is not so characteristic of the plant as is the one which appears in the "Journal of Botany," since the flattened character of the branches is not well shown, nor are the parent bracts on the spikes properly expressed. On the same "E. Bot." plate is a drawing of a barren fragment labelled *L. complanatum* var. *anceps*, which appears identical with Professor Lawson's Skye plant; but I have failed to obtain any account of its history. Messrs. Grove consider the Skye plant only larger *alpinum*. It has the branches much broader than any specimen of pedunculate *complanatum* that I have seen, but in the leaf-character it is more like that species than is even my barren Gloster plant; this itself having teeth much less saw-like than have the creeping, flattened specimens of *L. alpinum* from Scotland and the Lake district; indeed leaf specimens alone would be very difficult to distinguish from those of a specimen of pedunculate *complanatum* from North America, which led me to think the two were not dissimilar. Probably Sir Joseph Hooker is right in placing *L. alpinum* as a subspecies of *L. complanatum*, that is, in a Benthamian sense; this was the view taken by such a high authority as Milde. Personally I think they should be kept distinct, as under:—

† Cones usually several, peduncled—

L. complanatum, *L.*—"Sp. Pl." Ed. 1104, et Herb.! "Flora Danica" 2671; branches prostrate, flabellate. Var. **L. Chamæcyparissus**, *A. Braun.*—In Döll. "Rhein. Fl.," p. 36; "Fl. Danica," pl. 2672; branches erect, fastigiate.

†† Cones usually solitary, sessile—

L. alpinum, *L.*—"Sp. Pl." 1104. Leaves nearly uniform, branches not flattened. Scottish Lakes, Wales, Lincoln. Var. **decipiens**.—"E. Bot.," pl. 1834* (*sine descriptione*). Distinguished from *alpinum* by its larger size, by its flattened spreading branches, with the central leaves on the flattened stem more erect than the lateral. Scotland, Westmoreland, Cumberland, Gloster, Worcester.

With Messrs. Groves, I consider that restricted *complanatum* has not yet been found in Britain.

A note on specimens of *Ranunculus acris*, L., may be added. I sent several forms collected on the Glen Spean Hills, and also from the Cairngorms, to Dr. Wettstein, who kindly went over them with Professor A. von Kerner. They were then sent to Herr Freyn. They agree in naming them *R. vulgatus*, Jord.; which is placed under *R. Steveni*, Andr., in the "Schedæ ad Floram Exsiccatam Austro-Hungaricam," 1888. Herr Freyn says that the three montane forms "have very slight covering of hairs, and such forms have not been noticed before. In habit they remind us of the northern forms of *R. acris*. The rhizome is also very weak as compared with that of typical *vulgatus*, no doubt in consequence of the rude, damp climate."

ON SOME SCOTTISH PLANTS OBSERVED JULY 1891.

By Rev. E. S. Marshall, M.A., F.L.S.

The following notes give some results of a week passed in East Ross, Tain being my headquarters, and of nearly a week's botanising in the Tyndrum neighbourhood. Another week was spent at Killin; but about this I shall say little, as Messrs. E. F. and W. R. Linton, with whom all my expeditions there were made, are publishing a short account of the few novelties met with.

Ben Chaisteil, near Tyndrum, has a bad botanical reputation, fully deserved, I should say, as far as Perthshire is concerned; the Argyle cliffs are, however, decidedly rich. A furious thunderstorm, and my own indifferent climbing powers, prevented my working them thoroughly; but the number of interesting plants seen there induces me to recommend it strongly to the attention of future visitors. Probably not more than a third of the likely ground was searched by me.

Plants marked with an asterisk are, to the best of my belief, new records for the various Watsonian vice-counties—87, West Perth; 88, Mid-Perth; 98, Argyle; 106, East Ross.

I am greatly indebted for his generous assistance to Mr.

Arthur Bennett. Messrs. Beeby, Druce, Fryer, Groves, Hanbury, Linton, Moyle Rogers, Dr. Focke, and Dr. Buchanan White, have also helped me.

Thalictrum minus, *L.* (aggregate).—A curious plant, for which as yet I have no name, occurs in good quantity on some of the Ben Chaisteil rocks (98). *T. **majus**, *Crantz.*—With the other, but very scarce; I secured only one specimen, but saw several well out of reach. A strongly marked and handsome form, upon which Mr. Bennett writes: "Your specimen exactly agrees with some thus named by Mr. N. E. Brown, and agrees well with Jacquin's plate 'Fl. Austr.,' vol. v. t. 420, in herb. Kew!"

Ranunculus trichophyllus, *Chaix.*—Ditches near Tain, and in Loch Eye (106). Smaller and more slender than the usual English form. *R. **Lingua**, *L.*—Abundant in a mill-pond between Fearn and Balintore (106); also in a ditch about half a mile beyond, towards the latter place. Not recorded north of Elgin in "Topographical Botany," Ed. 2. *R. **Steveni**, *Andrz.*—About Tain (106); apparently not uncommon.

Nasturtium officinale, *R. Br.*; var. **siifolium**, *Reichb.*—Well marked; in ditches near Tain.

Cardamine hirsuta, *L.*—Cliffs south of Balintore. This is, I think, rarer in the north than *C. flexuosa*, With.

Draba incana, *L.*—Very fine, upon the lower cliffs of Ben Chaisteil, rocks of Stob Garbh, at the head of Inverlochlarig glen, and facing Am Binnein (87).

Cochlearia officinalis, *L.*—Salt-marsh, Tain; typical. *C. **danica**, *L.*—Plants growing in wet ground, near the top of Corrie Dubh Ghalair, alt. 2700 feet, and on Meall Ghaordic, alt. 3000 feet (88), are so named by Dr. Lange. They are, if rightly determined, off type in having the rosette-leaves entire, in this respect recalling the figure of *β integrifolia*, Drejer, in "Fl. Danica." They also differ somewhat in habit from the normal coast plant, and have larger flowers.

C. **alpina**, *Watson.*—Very luxuriant upon the shingles of the Fillan, about two miles above Crianlarich. I incline to consider this specifically distinct from *C. officinalis*, and am growing them for purposes of comparison. The alpine forms of scurvy-grass occurring in North Britain need to be thoroughly studied afresh, especially under cultivation; but the task will require much time and patience. I believe that we have at least one plant which fits neither *officinalis*, *danica*, nor *alpina*, as commonly understood. I formerly supposed this to be the

true *C. grœnlandica*, from which, however, it greatly differs. Brought from Ben Lawers in 1887, it has grown in my garden ever since; doubtless it occurs also on other high mountains. It does not agree at all well with the specimens of *C. arctica*, Schlecht., which I have seen, nor with Fries's description of that plant. The very numerous and crowded leaves which are produced in early spring under cultivation suggest *C. conferta* as an appropriate name, should it eventually prove to be an undescribed species.

***C. grœnlandica**, *L.*—Sandy ground, west shore of Inver Bay, near Tain (106); locally abundant. A small and characteristic form; confirmed by Dr. Lange. I hope to treat this more fully elsewhere. It was found by Mr. Hanbury and myself, in July 1890, at Lochinver, West Sutherland (*108), and recorded as *C. danica*. New to the mainland of Britain, but found by Mr. Beeby in Shetland in 1886.

Sisymbrium Sophia, *L.*—Coast, Balintore; looking like a native.

***Senebiera didyma**, *Pers.*—Damp ground, Balintore; only a few plants. Doubtless introduced.

***Lepidium Smithii**, *Hook.*—Bank near the station, Kildary (106). Like the following, it is recorded from East Inverness.

***Teesdalia nudicaulis**, *R. Br.*—Near Tain (106); apparently very scarce, but it may have been mostly withered up.

***Viola canina**, *L.* (*pro parte*).—With the last.

***Polygala vulgaris**, *L.*—By the Carron river, near Bonar Bridge (106). Banks of the Fillan, above Crianlarich. **P. serpyllacea**, *Weihe.*—Rather common on the heaths about Tain and Nigg.

***Cerastium semidecandrum**, *L.*—Sandhills east of Tain; much scarcer than *C. tetrandrum*.

Arenaria serpyllifolia, *L.*, var. **leptoclados**, *Guss.*—Plentiful and characteristic on the railway-bank at Kildary.

A. sedoides, *Schultz.*—Associated with *Cochlearia alpina* on the shingles of the Fillan, below 600 feet; several vigorous plants in flower. Seed evidently washed down from Ben Laoigh in both cases.

Lepigonum rubrum, *Fr.*—On the railway at Kildary. Very rare, I believe, so far north.

Hypericum quadratum, *Stokes.*—Lane at Kildary; only a few plants.

***Geranium pratense**, *L.*—Between Fearn and Balintore, sparingly, but probably wild; not previously recorded north of Banffshire.

Trifolium hybridum, *L.*—Well established by roadsides, etc., about Tain and Nigg. **T. agrarium** (*106) also occurs at both places in clover fields—introduced with the crop.

Oxytropis uralensis, *DC.*—Reported as extinct in East Ross in "Journal of Botany" for 1889, p. 361. I found it in fair quantity at one spot near Balintore, but withhold precise details for obvious reasons.

***Rubus fissus**, *Lindley.*—Near Bonar Bridge and Tain (106). **R. plicatus**, *Wh. and N.*—Bonar Bridge, Tain, Nigg, Kildary. In the first-named locality, besides the type, occurs a variation which Dr. Focke calls "forma *cordifolia*." **R. villicaulis**, *Koehl.*—The most abundant bramble of East Ross; very unlike the southern plant so named. **R. mucronatus**, *Blox.*—Common in East Ross in a small and neat form. Typical, but rare, near Killin (*88); also seen, but not collected, at Callander Station, which I suppose to be in v.c. 86, Stirling. ***R. radula**, *Weihe.*—Kildary (106). Two other brambles noticed here merit attention, but were too young at the time of my visit for safe determination. ***R. corylifolius**, *Sm.*—Kildary; between Balintore and Nigg; between Loch Eye and Tain (106). Typical, or nearly so.

***Geum rivale** × **urbanum** (*G. intermedium*, Ehrh.)—By the stream at Kildary, very scarce; associated with *urbanum*.

Rosa involuta, *Sm.*—Kildary (?); a form with remarkably pinnate sepals, which the Rev. W. Moyle Rogers agrees with me in placing here; other friends have referred it to *mollis*, *tomentosa*, and *involuta* × *mollis*. Balintore; another puzzling plant, strongly sweetbriar-scented, and very tall and straggling for this species, but confidently named as above by Mr. Rogers. Var. **Sabini**, (*Woods*).—Near Tain; a marked and handsome form, several bushes growing together. **R. rubiginosa** *L.*—It is difficult to see why H. C. Watson so decidedly rejected this as a native of Scotland, since it is considered to be wild in southern Scandinavia. I cannot doubt its being indigenous in East Ross, having met with it not only at Kildary, near houses, but also between Fearn and Balintore, at least half a mile from human habitations. Mr. C. Bailey has also recorded it, under more suspicious circumstances, from Strathpeffer ("Bot. Exch. Club. Report" for 1890). Tain was the only place where I observed it in a garden. **R. canina**, *L.*, var. **andegavensis**, *Bast.*—Cliffs near Balintore; also by the Fillan, between Crianlarich and Tyndrum (a glaucous form); var. **verticillacantha**, *Mérat*, Strathcarron, near Bonar Bridge; var. **celerata**, *Baker*, Tain; var. **Borreri**, *Woods*,—apparently common in East Ross; not always easy to separate from some forms of *tomentosa* when dried.

Saxifraga nivalis, *L.*—Cliffs of Stob Garbh (87); scarce.

Epilobium obscurum, *Schreb.*—Near Bonar Bridge.

Apium inundatum, *Reichb.*—Abundant at the west end of Loch Eye; it also occurs in ditches near Tain.

Ægopodium Podagraria, *L.*—Beside a brook by the road, about three-quarters of a mile east of Nigg Station; looking more like a native than I remember to have seen it previously.

Myrrhis Odorata, *Scop.*—Plentiful by the river at Kildary, and long established there, if not truly wild. Evidently only an escape at Tain and Bonar Bridge.

Anthriscus vulgaris, *Pers.*—Coast at Balintore, apparently native.

Galium erectum, *Huds.*—Grassy roadside bank between Balintore and Nigg Station. Mr. Bennett, who named it, tells me that it was reported long since from near Bonar Bridge, but was rejected by Watson as "insufficiently vouched." It looked as much at home as *G. Mollugo* does by the highways in Surrey.

Eupatorium cannabinum, *L.*—Very sparingly, below the cliffs south of Balintore.

Anthemis arvensis, *L.*—Near Tain; perhaps only a colonist.

***Hieracium pratense**, *Tausch.*—I noticed this species flowering on the railway embankment at Dunphail (v.c. 95, Elgin), but not in time to secure a specimen. As it is a native of Norway, I do not understand upon what grounds Watson assumed it to be an introduction in Scotland generally; with regard to this particular station I can, of course, come to no conclusion at present. ***H. holosericeum**, *Backh.*—A few specimens were gathered on Stob Garbh (87). **H. lingulatum**, *Backh.*—Ben Chaisteil; Stob Garbh. **H. iricum**, *Fr.*—Ben Chaisteil. ***H. strictum**, *Fr.*—Carron river, near Bonar Bridge (106). ***H. commutatum**, *Becker* (*H. boreale*, Fr., *pro parte*).—Railway between Loch Eye and Tain (106). I had not found it before in Scotland, but have a specimen of Mr. Beeby's collecting from near Aberdeen.

***H. Langwellense**, *F. J. Hanbury.*—Carron river, scarce; gathered for *H. anglicum* (106). Mr. Bennett's record of that species (p. 125) must be expunged. **H. cæsio-murorum**, *Lindeberg.*—By the Fillan, above Crianlarich (88); certainly not a hybrid, I should say. **H. Sommerfeltii**, *Lindeberg.*—Meall Ghaordie (*88), in fair quantity; abundant on Ben Chaisteil (*98), and over one range of rocks on Stob Garbh (*87). This Breadalbane form, which is exactly alike in all three stations, differs from the type in having pure yellow (not fuliginous) styles; a similar variation is found in the case of *H. corymbosum*. ***H. onosmoides**, *Fr.* (*teste* Hanbury).—Plenti-

ful among sandhills, south of Balintore (106). *H. **auratum**, *Fr.*—Carron river (106).

Trientalis europæa, *L.*—Strathcarron. No personal authority given in "Top. Bot." for v.c. 106.

***Anagallis tenella**, *L.*—Plentiful at one spot, near the north-west end of Loch Eye.

***Erythræa littoralis**, *Fr.*—On the west side of Inver Bay (106), in profusion; a small form—one to three inches high—agreeing well with the description of var. *minor*, Hartman, in Lange's "Haandbog i den danske Flora." No *E. Centaurium* was observed.

***Myosotis palustris**, *With.*, var. **strigulosa**, *Reichb.*—Plentiful at Kildary (106).

Scrophularia nodosa, *L.*—By the river at Kildary there grows a curious form, unusually tall and branching, and with the staminodes entire, not notched or emarginate, as Hooker, Babington, and Lange concur in describing them. Mr. Beeby has found the same peculiarity in a Scandinavian specimen; and it seems to differ from the assumed type much as *S. cinerea*, Dumort, does from the assumed type of *S. aquatica*. Which is Linné's type cannot well be ascertained, the specimen in his herbarium being in fruit only.

Bartsia alpina, *L.*—Rather frequent on Ben Chaisteil, where I understand that Professor Balfour found it many years ago.

Melampyrum pratense, *L.*, var. **hians**, *Druce.*—In shade, near Bonar Bridge.

Rhinanthus minor, *Ehrh.*—The remarkable plant with narrow leaves, and frequently with numerous long patent or ascending branches, which Mr. Hanbury and myself reported last year in "Journal of Botany," and which grows abundantly on heaths near Tain, has been named var. **angustifolia**, *Koch*, by Dr. Lange.

***Utricularia neglecta**, *Lehm.* (?)—Very sparingly, in a small pool at the west end of Loch Eye (106). A slender plant, with rather large bladders, which is certainly neither *minor* nor *vulgaris*, and must, I believe, be referred to this species, though the leaves are shorter and less finely capillary than usual. It was not in flower. I have seen what appears to be typical *neglecta*, collected near Melrose by Mr. W. B. Boyd.

Pinguicula vulgaris, *L.*; var. **bicolor**, *Nordstedt.*—Perthshire, cliffs of Ben Laoigh; exactly like the Ben Nevis plant which I published under this name in 1889. It has the corolla much flattened, with very pale lilac or white lips, and appears to shade off gradually into the type.

Lycopus europæus, *L.*—Mill-pond between Fearn and Balintore.

Stachys palustris × **sylvatica** (*S. ambigua*, Sm.)—Shingles of the Fillan river, growing close to *S. palustris*; fairly intermediate.

Plantago maritima, *L.*—A plant which occurs in wet ground on Ben Laoigh, and which I suspected to be *P. serpentina*, Vill., was again examined *in situ* by Mr. Cosmo Melville and myself, and we came to the conclusion that it was only one of the alpine states of the common species.

Chenopodium album, *L.*, var. **paganum**, *Reichb.*—Balintore.

***Salsola Kali**, *L.*—Coast near Tain, Balintore, and Kildary (106).

Polygonum aviculare, *L.*, var. **littorale**, *Link.*—On shingle near Balintore. I notice that Lange retains this as a distinct species.

***Salix phylicifolia**, *L.*—Banks of the Carron (106). **S. Arbuscula** × **herbacea** (*S. simulatrix*, B. White).—Ben Laoigh; a form approaching *herbacea*. Ben Chaisteil (*98); very near *Arbuscula* indeed. **S. cinerea** × **phylicifolia** (*S. Wardiana*, Leefe).—By the Benmore burn, just below the railway-bridge, two miles east of Crianlarich.

Orchis incarnata, *L.*—A few plants were noticed on a heath near Nigg.

Habenaria albida, *R. Br.*—Ascends to 1800 feet on Ben Chaisteil. ***H. chloroleuca**, *Ridley.*—Strathcarron (106).

***Typha angustifolia**, *L.*—Very abundant beside a loch, close to the railway, about two miles south of Bonar Bridge Station (106). I have noticed it there for two years in succession, and feel quite sure about the species, though I have not gathered it. Evidently wild.

Sparganium ramosum, *Curtis.*—Mill-pond between Fearn and Balintore. A sterile state found near Crianlarich much resembles *S. neglectum* in *facies* when growing; it seems to be the var. **microcarpum**. **S. minimum**, *Fr.*—In the Fillan, between Crianlarich and Tyndrum.

Alisma Plantago, *L.*—Mill-pond between Fearn and Balintore.

***Potamogeton prælongus**, *Wulf.*—Loch Eye (106). **P. pectinatus**, *L.*—With the last; queried in "Top. Bot."

***Ruppia rostellata**, *Koch.*—Tain (106); infested with a globular growth, probably the fungus lately mentioned by Mr. Beeby as found by him in Shetland on **R. spiralis**.

Carex remota, *L.*—Strathcarron and Kildary. I believe that this

is uncommon in the Northern Highlands. *C. **pilulifera**, *L.*—Heaths about Tain (106). *C. **distans**, *L.*—Base of the cliffs south of Balintore (106); typical and fine. A very reduced state, from one to four inches high, which I had not previously met with, was found in a salt-marsh near Inver Bay. *C. **extensa**, *Good.*, var. **pumila**, *Anderss.*—On the west side of Inver Bay, abundant and very marked; prostrate, with stems only from one to three inches long. I could not find the type. C. **rostrata**, *Stokes.*—An alpine state, plentiful in bogs on Meall Ghaordie, above 2800 feet, is named by Mr. Bennett var. **brunnescens**, *Anderss.*

Phalaris arundinacea, *L.*, var. **picta**, *L.*—Mill-pond between Fearn and Balintore; native. I have seen it wild also in Caithness and at Braemar.

*Milium **effusum**, *L.*—Very scarce indeed, on the wooded banks of the Carron river; an unexpected find (106).

Deschampsia flexuosa, *Trin.*, var. **montana**, *Huds.*—Ben Chaisteil; Stob Garbh. A marked form of this species, which I gathered on Meall Garbh, Ben Lawers, in 1887, seems to me exactly like authentic specimens of var. **Voirlichensis**, *Melvill.* It was sent to Professor Hackel, who did not, however, separate it from the type.

*Trisetum **flavescens**, *Beauv.*—Tain (106).

Avena pratensis, *L.*, var. **longifolia**, *Parn.*—Frequent on the cliffs of Ben Chaisteil.

*Catabrosa **aquatica**, *Beauv.*—Tain (106).

Poa glauca, *Sm.*—Stob Garbh (87). *P. **nemoralis**, *L.*—Ben Chaisteil (98); a glaucous alpine form, which may be var. **glaucantha**, *Reichb.*

Glyceria maritima, *Wahl.*, var. **hispida**, *Parn.*—Muddy ground, Tain, with the type.

*Bromus **sterilis**, *L.*—Tain (106). B. **commutatus**, *Schrad.*—Tain, Nigg, and near Bonar Bridge. Mixed with the type, near Tain, grows a form with hairy flowers, which may be var. *pubescens* of the "London Catalogue."

Hymenophyllum unilaterale, *Bory.*—On the cliffs of Stob Garbh (87), in small quantity.

*Asplenium **Adiantum-nigrum**, *L.*—Cliffs south of Balintore (106).

*Athyrium **Filix-fœmina**, *Roth.*—Strathcarron (106). A. **alpestre**, *Milde.*—Stob Garbh (87).

Equisetum arvense. *L.*: var. **alpestre**, *Wahl.*—Ben Laoigh, and near the top of Corrie Dubh Ghalair, Glen Lochay.

Lycopodium alpinum, *L.*; var. **decipiens**, *Syme* (*L. complanatum*, auct. angl., non L.)—At the very low elevation of about 200 feet, fruiting freely, on a heathery bank above the Carron river (106).

THE DESMIDIEÆ OF EAST FIFE.

By John Roy, LL.D.

The following short list has been made from material gathered by Mrs. Farquharson, F.R.M.S., towards the close of last year.

The district is evidently not rich in Desmids, for though my valued friend collected indefatigably all about St. Andrews, from Blackhills to Newport, and inland as far as Cupar (Tent's Moor proving by far the most productive), yet the number seen is comparatively small. There are no new species to record, but some of those noted are scarce elsewhere. *Cosmarium microsphinctum*, Nord., forma *parvula*, Wille, is believed to be new to Britain, and the following are very rare: *Cosmarium præmorsum*, Breb.; *Cosmocladium constrictum*, Archer; *Xanthidium Brebissonii*, Ralfs., *β basidentatum*, Börg.; and *Docidium Farquharsonii*, Roy. The interest of the list lies in the fact that it relates to a district of which, from a Desmidian point of view, nothing was previously known.

DESMIDIEÆ, *Kütz.*

Hyalotheca, *Kütz.*

Hyalotheca dissiliens, Sm. Tent's Moor.
" " *β bidentula*, Nordst. Tent's Moor.
" " *γ tridentula*, Nordst. Peat End.

Desmidium, *Ag.*

Desmidium Aptogonum, Breb. Tent's Moor.

Sphærozosma, *Corda.*

Sphærozosma excavatum, Ralfs. Tent's Moor.

Micrasterias, *Ag.*

Micrasterias denticulata, Breb. Tent's Moor.
,, *rotata*, Grev. Tent's Moor.
,, *papillifera*, Breb. Tent's Moor.
,, *truncata*, Corda. Tent's Moor.
,, *crenata*, Ralfs. Tent's Moor.

Euastrum, *Ehr.*

Euastrum verrucosum, Ehr. Tent's Moor.
,, *oblongum*, Grev. Tent's Moor.
,, *ampullaceum*, Ralfs. Tent's Moor.
,, *ansatum*, Ralfs. Tent's Moor.
,, *pectinatum*, Breb. Tent's Moor.
,, *rostratum*, Ralfs. Tent's Moor.
,, *elegans*, Breb. Tent's Moor.
,, *bidentatum*, Näg. Tent's Moor.
,, *declive*, Reinsch. Tent's Moor.
,, *denticulatum*, Kirch. Tent's Moor.
,, *binale*, Turp.
(*a*) Forma *minuta*, Lund (Ralfs, "Br. Des.," t. xiv 8*a* Tent's Moor.
(*b*) Forma (Ralfs, *l.c.*, 8*b*). Peat End.
(*c*) Forma (Ralfs, *l.c.*, 8*c*, *d*). Tent's Moor.
(*d*) Forma (Ralfs, *l.c.*, 8*e*). Tent's Moor.

Cosmarium, *Corda.*

Cosmarium margaritiferum, Turp. Tent's Moor; Scotscraig.
,, *reniforme*, Archer. Tent's Moor.
,, *Turneri*, Roy. Tent's Moor.
,, *præmorsum*, Breb. Tent's Moor.
,, *ochthodes*, Nordst. Tent's Moor.
,, *tetraophthalmum*, Kütz. Tent's Moor.
,, *Botrytis*, Bory. Tent's Moor.
,, *Brebissonii*, Menegh. Tent's Moor.
,, *gemmiferum*, Breb. Kemback; Mount Melville.
,, *gradatum*, Roy. Mount Melville.
,, *punctulatum*, Breb. Peat End.
,, *subpunctulatum*, Nordst. Tent's Moor; Kemback Peat End; Scotscraig.
,, *Blyttii*, Wille. Peat End.
,, *Slewdrumense*, Roy. Tent's Moor; Mount Melville.
,, *striatum*, Boldt. Tent's Moor.
,, *substriatum*, Nordst. Tent's Moor.

Cosmarium microsphinctum, Nordst.
Forma *parvula*, Wille. Kemback.
„ *crenatum*, Ralfs. Peat End; Mount Melville.
„ *Phaseolus*, Breb. Tent's Moor.
„ *pygmæum*, Archer. Tent's Moor; Peat End.
„ *Meneghinii*, Breb.
(*a*) Forma (Ralfs, "Br. Des.," t. xv. 6). Tent's Moor.
(*b*) Forma (De Bary, "Conjug.," t. vi. 33-34). Kemback.
„ *granatum*, Breb. Tent's Moor; Scotscraig.
β *alatum*, Jacobs. Tent's Moor.
„ *polygonum*, Näg. Tent's Moor; Kemback.
„ *quadratum*, Ralfs. Tent's Moor.
„ *cucurbita*, Breb. Tent's Moor; Peat End.
„ *parvulum*, Breb. Peat End.
„ (*Cosmocladium*, Breb.), *constrictum*, Archer. Tent's Moor.

Arthrodesmus, *Ehr.*

Arthrodesmus convergens, Ehr. Tent's Moor.
„ *Incus*, Breb.
β *convergens*, Archer. Tent's Moor, with zygospores.

Xanthidium, *Ehr.*

Xanthidium Brebissonii, Ralfs. Tent's Moor.
β *basidentatum*, Börg. Tent's Moor.
„ *antilopæum*, Breb. Tent's Moor.
„ *fasciculatum*, Ehr. Tent's Moor.

Staurastrum, *Meyen.*

Staurastrum orbiculare, Ehr.
β *depressum*, Roy and Bisset. Tent's Moor.
„ *dejectum*, Breb. Tent's Moor.
„ *apiculatum*, Breb. Tent's Moor.
„ *mucronatum*, Ralfs. Tent's Moor.
„ *Dickiei*, Ralfs. Tent's Moor.
„ *hexacerum*, Ehr.
β Ralfs. Tent's Moor.
„ *alternans*, Breb. Tent's Moor.
„ *Kjellmani*, Wille. Tent's Moor.
„ *punctulatum*, Breb. Kemback; Mount Melville.
„ *asperum*, Breb. Kemback.
„ *scabrum*, Breb. Mount Melville.
„ *margaritaceum*, Ehr. Peat End.
„ *polymorphum*, Breb. Tent's Moor.

Staurastrum inflexum, Breb. Tent's Moor.
,, *proboscidium*, Breb. Tent's Moor.
,, *gracile*, Ralfs. Tent's Moor.
,, *cristatum*, Näg. Tent's Moor.
,, *mesoleium*, Nordst. Tent's Moor.
,, *hirsutum*, Ehr. Tent's Moor.
,, *pilosum*, Näg. Kemback; Mount Melville.
,, *Brebissonii*, Archer. Tent's Moor.

Tetmemorus, *Ralfs.*

Tetmemorus granulatus, Breb. Tent's Moor.
,, *Brebissonii*, Menegh.
β. minor, De Bary. Peat End.
,, *lævis*, Kütz. Tent's Moor; Peat End.

Penium, *Breb.*

Penium lamellosum, Breb. Tent's Moor.
,, *Navicula*, Breb. Tent's Moor.
,, *polymorphum*, Perty. Peat End.
,, *minutissimum*, Nordst. Peat End.
,, *spinospermum*, Joshua. Peat End.

Cylindrocystis, *Menegh.*

Cylindrocystis Brebissonii, Menegh. Peat End.
,, *crassa*, De Bary. Tent's Moor.

Mesotænium, *Näg.*

Mesotænium Braunii, De Bary. Tent's Moor; Peat End.
,, *violascens*, De Bary. Tent's Moor.
,, *Endlicherianum*, Näg. Tent's Moor.

Gonatozygon, *De Bary.*

Gonatozygon Ralfsii, De Bary. Tent's Moor.

Docidium, *Breb.*

Docidium Farquharsoni, Roy. Tent's Moor.
,, *coronatum*, Breb. Tent's Moor.
β. nodulosum, Breb. Tent's Moor.
,, *Ehrenbergii*, Ralfs. Tent's Moor.

Closterium, *Nitzsch.*

Closterium Lunula, Müller. Tent's Moor.
,, *Ehrenbergii*, Menegh. Tent's Moor.
,, *moniliferum*, Bory. Kemback; Mount Melville.

Closterium Leibleinii, Kütz. Kemback.
β. Ralfs. Tent's Moor, with zygospores; Mount Melville.
,, *Dianæ*, Ehr. Tent's Moor.
,, *calosporum*, Wittr. Tent's Moor.
,, *Venus*, Kütz. Tent's Moor.
,, *incurvum*, Breb. Tent's Moor.
,, *parvulum*, Näg. Mount Melville.
,, *acerosum*, Schrank. Tent's Moor; Kemback; Mount Melville.
,, *costatum*, Corda. Tent's Moor.
,, *striolatum*, Ehr. Tent's Moor.
,, *arcuatum*, Breb. Tent's Moor.
,, *rostratum*, Ehr. Kemback.
,, *Kutzingii*, Breb. Tent's Moor.
,, *Cornu*, Ehr. Tent's Moor.

ZOOLOGICAL NOTES.

Rockall and its Avifauna.—In "Chambers's Journal" for March last there appeared at pages 161-163 an interesting, graphic, and circumstantial account of 'A Visit to Rockall' made in the summer of 1891 in the steam yacht "Norah." According to this narrative, a party landed and spent some time on the rock; the writer of the account paying special attention to the bird-life, hitherto practically unknown. The Kittiwake was the commonest species. Herring Gulls, Lesser Black-backed Gulls, Puffins, Razorbills, Guillemots, were numerous; and amongst them an occasional Little Auk was observed. Tiny Petrels had burrows in the guano-capped summit of the rock. Terns hovered among the Gulls, and a Skua and a Fulmar were noted. We were extremely interested in these records relating to the birds of this unique Atlantic rock, and through the kindness of Messrs. Chambers were put into communication with the anonymous writer of the article. To our great astonishment we received in due course the following reply to a letter requesting further information: "I am sorry you should have taken an imaginary description of a visit to Rockall—only meant to amuse—for a contribution to science. I never was at Rockall." We can only say that such an explanation of the article never occurred to us, and is irreconcilable with its whole tenor. We accepted it as a useful, *and truthful* contribution to the very scanty knowledge of Rockall. Now, we can only regard it as a very reprehensible bit of writing, for which the proprietors of the journal, it is hardly necessary to say, are in no way responsible.—Eds.

Notes on Birds in Barra.—The two following birds, which I have not observed in the two Uists or Benbecula, nest and remain during the whole year in Barra: Redbreast (*Erithacus rubecula*, L.) There are about half a dozen pairs of these now over the island, in gardens and young plantations, although three years ago I did not see a single bird. Last year a pair nested in the the Northbay garden, and this year I got two nests there, one on the 6th of May with six eggs. During the past winter, which was more severe here than usual, the birds were always seen about the garden and steading.

Hedge Sparrow (*Accentor modularis*, L.)—There are several pairs of these throughout the island, and I have got two of their nests this season. I never saw the bird in Uist.

Tree Sparrow (*Passer montanus*, L.)—This species is now very numerous on the island, especially in the garden at Eoligary, where it has been for at least forty or fifty years. This, no doubt, is the bird which Macgillivray mistook for the House Sparrow (*P. domesticus*, L.), which he says he found at the ruins of Kilbar, which are quite close to the Eoligary garden.

We have also a few pairs of the Reed Bunting (*Emberiza schœniclus*, L.) and the Stonechat (*Pratincola rubicola*) all the year, and the Greenfinch (*Ligurinus chloris*, L.) as a migrant, but these occur in Uist.—J. MacRury, Barra.

Unusual Nesting Place for the Dipper (*Cinclus aquaticus*, Bechst.)—Though the Dipper occasionally builds on the old moss-covered roots of trees supporting the banks of a stream, seldom or never does it do so on the tree itself; the following particulars may therefore be interesting and worth recording. The nest I allude to was found by Mr. Wood, of Freeland, on the River May (Perthshire) in the early summer of 1890. It was situated on the naked limb of an ancient alder overhanging the stream. The end of the limb had been formerly broken off, together with a considerable sized branch, leaving a jagged stump. On this the nest was constructed about four feet above the water at midstream, or about twelve feet from either bank. It appears as if during the previous winter floods some turfy matter had become firmly fixed and entangled on the stump, owing to the long grass attached to it, so as to have induced the birds to make use of it as a nesting place, possibly by way of deception, artfully blending the materials into the nest with some of the long grass hanging down so as to give the general effect to the unsuspicious passer by of a clod of earth, the remnants of some high spate, to which the May is very subject: the more especially would this be so, the entrance to the nest being only visible from underneath. Mr. Wood kindly had the portion of the branch with the nest on it undisturbed carefully sawn off so as to exhibit it in the exact position in which it was found, and presented it to the Museum

of the Perthshire Society of Natural Science in Tay Street, Perth, where it is now placed.—H. M. Drummond Hay, Seggieden, Perth.

Whitethroat (*Sylvia rufa*, Bodd.) **in Barra.**—On the 13th of this month (May 1892) I noticed a pair of Whitethroats in my garden here. At first they were very shy and difficult to observe, as they were continually moving about among the bushes, but after a day or two they got bolder, and I was in hopes they might nest in the garden. I have, however, missed them for the last few days; but as there is a small plantation near at hand, they may have gone there. I have never seen these birds out here before, but the shelter afforded by the trees that have been recently planted at several places on the island will no doubt induce many strangers to pay us a summer visit.—J. MacRury, Barra.

White Wagtail (*Motacilla alba*, L.) **in Barra.**—On the 9th of May 1891, I saw a pair of these birds on the west side of Barra, and about the end of the following August I saw numbers of them all over the island, but staying only for a few days. This year again, on the 4th of May, I saw two pairs of them on the farm of Eoligary, at the north end of the island; and the tacksman, Mr. William Macgillivray, told me he had noticed them a day or two before. To make quite sure of the species, I shot one, which was in splendid plumage, and which Mr. Macgillivray got preserved. During the following week I saw one other bird on the east side of the island and three on the west side.—John MacRury, Barra.

Swift (*Cypselus apus*, L.) **in Barra.**—On the 29th of June, and on the 27th of August, 1891, I saw a Swift in Barra, and on the 18th of July of the same year I saw another on the west side of Benbecula—all solitary birds. I do not remember of seeing any of them in these islands before, although swallows and sandmartins are frequently seen.—John MacRury, Barra.

Great Spotted Woodpecker (*Dendrocopus major*, L.) **in Stirlingshire.**—My attention being recently called to the disappearance of the Great Spotted Woodpecker, I may state that I saw what was certainly one of these birds. On Sunday, 27th September 1890, while on my way from Bonnybridge to Carron Glen, in Stirlingshire, while on an old road lined with trees, I heard a loud tapping sound, and immediately a large dark-coloured bird alighted on the body of a tree within a short distance of me and began tapping and turning bits of bark off, going upwards in a circle round the tree. I saw at once it was a stranger, and followed it about from tree to tree for fully ten minutes, having a good view of it, as it did not appear the least timid. It was about the size of a Blackbird, but longer and firmer-made. The back and wings were black and all spotted over with white, and white streaks appearing lengthwise above the eyes. I could not get a look at the under parts, as it always stuck close to

the boll of the trees, but the breast appeared to be of a pale slate or gray colour. It took flight in the direction of Carron Glen, but although I always kept a lookout I never saw it again.—FRED. LAIRD, Bonnybridge.

Whimbrel (*Numenius phæopus*, L.) **wintering in Barra.**—I have again to record the wintering of this bird in Barra. I saw it and heard its note on the 17th of September and on the 14th of October 1891, some distance to the south of the bay in which I used to see it, and in this same bay I met with it on the 17th of March and on the 9th of May of this year. On the latter date there was a flock of about a dozen of the same species in the bay, so that I could not be so sure of my old friend; but I noticed that one bird kept more with some oyster-catchers, and did not follow the flock about when they took wing, and that it was also wilder than the passing migrants, which are generally very tame on arrival.—J. MACRURY, Barra.

Buzzard (*Buteo vulgaris*, Leach) **in Forfarshire.**—In January last a keeper at Ethie, near Arbroath, observed a large bird of prey struggling on the ground. Approaching nearer, he found that it had a weasel (*Mustela vulgaris*) in its claws, and that the weasel had so far freed itself as to be able to grasp the bird by the neck. When the bird espied the keeper it relaxed its hold of the weasel, which still held on and prevented the bird from making off. Just as the keeper was about to seize hold, the bird gave a final struggle, shook off its opponent, and made off. The keeper set a trap for the bird, baiting it with a pigeon, and two days later found the bird caught by a hind toe. He kept it in captivity for several weeks, giving it a pigeon daily: a rabbit offered instead was left untouched for several days. On examination, I found the captive to be a male specimen of the Common Buzzard—a very rare species in this locality, only one or two having been procured for many years.—THOMAS F. DEWAR, Arbroath.

Note on the Sheldrake (*Tadorna cornuta*, S. G. Gmelin).—During the last eight or ten years, or more, this beautiful duck has increased in Solway in a most surprising way. This season they are more plentiful than ever. Along the sandy shores of the Firth, more especially from the mouth of the Nith round as far as Auchencairn Bay, they are very abundant indeed. A few days ago I counted close on 150 Sheldrakes scattered in pairs and singly over the sands. On the right bank of the Southwick Burn, and going a little further eastward towards Southerness Point, small parties of two or three pairs to as many as a score of pairs would be passed all along the beach. And perhaps as many more were away attending to the duties of incubation. The general opinion seems to be that within a very few years past the "Stockannets" have increased at least tenfold. Absence of molestation in the breeding season, caused

mainly by the restraining influence of the Wild Birds Protection Acts, and the restrictions imposed on certain classes by the necessity of taking out a gun license, have been the principal causes leading to a result so gratifying to all lovers of birds.—ROBERT SERVICE, Maxwelltown.

Nesting of the Water Rail (*Rallus aquaticus*, L.) in Perthshire.—In a corner of a quiet moorland loch in West Perthshire there is a small patch of tall rushes, growing in a floating bog, which is inaccessible except by means of a boat. The place being seldom disturbed, is consequently a favourite breeding haunt of many water-fowl. Here the Pochard, Mallard, Coots, and Moorhens may all be seen nesting within a few yards of one another. On the 11th May 1889, when landed there, I saw for a moment, a small brown bird creeping through the sedge grass like a rat—I felt sure that it was a Water Rail. We searched for the nest that day in vain, and looked for it in each succeeding spring without success, till this year, when, on the 3rd May, it was discovered. It was a neat nest, rather smaller than the Moorhen's, composed of the flat leaves of the sedge, built up to a height of a foot above the oozy mud, and contained seven eggs. One day, when visiting this spot, we came across two Moorhen's nests, one containing twenty-one and the other nineteen eggs, which were lying three or four deep in the nests. Some of the eggs were abnormally small. I was sorry to be unable to return to the place the same year, as it would have been interesting to have learnt the result of the incubation.—W. H. M. DUTHIE, Row House, by Doune.

The Food of the Great Skua (*Stercorarius catarrhactes*, L.)—The opinion of Mr. W. Eagle Clarke that the Great Skua seeks its food in more ways than one is confirmed by the testimony of three excellent ornithologists who had the best opportunities for studying the subject. My father, Dr. Laurence Edmondston, always said that the Great Skua should rank among birds of prey, for nothing came amiss to his rapacious maw. He would swoop on a feeble lamb if very hard pressed by hunger; young rabbits came not amiss to him and leaping trout were not beneath his notice; even carrion he did not despise. The Rev. Biot Edmondston, who has a marvellous faculty for taming wild creatures, kept a Great Skua for some years, and he says: "He had an excellent appetite, and was quite omnivorous, anything and everything eatable being gratefully received, from new-caught trout or herring and sheep's liver to cold potatoes and porridge. But I am afraid he did not always confine himself strictly to the fare provided for him; for it was pretty well known amongst us that several newly hatched ducklings which had disappeared mysteriously had passed into his greedy maw." The reverend gentleman also says he caught mice for his pet Skua, and presented them alive: ten or twelve formed a satisfactory breakfast.

Dr. Saxby in his "Birds of Shetland" says: "It is a fierce and formidable bird: not only does it compel other birds to supply its wants, by intercepting them when carrying fish and taking it from them by force, but it will sometimes make a prey of the unfortunate bird itself instead of its fish, killing even birds as large as a gull. The strong curved claws and powerful bill, hooked at the point, are weapons with which no bird that flies will care to have much to do, wielded as they are with such consummate daring. Skuas often procure food for themselves or their young by robbing the gulls' nests of the fish which are carried there by the old birds. Round one Skua's nest I once found thirty-nine full grown herrings, all headless." It is obvious that those three careful observers, who never took facts second-hand, did not regard the Great Skua as a mere parasite-bird. In a land where owls are seldom seen, hawks not numerous, magpies conspicuous by their absence, moles, stoats "and sich like" unknown, the Great Skua may be useful if he is admitted to be a destroyer of vermin. Doubtless he has his part to do in keeping nature's balances nicely adjusted.—JESSIE M. E. SAXBY, Edinburgh.

Eledone cirrosa, *Lamarck*, in the Solway Firth.—This species is well known to me as a rather infrequent visitor to places on the shores of more open waters than we have on our own coasts; and I have not hitherto seen or heard of it in the restricted waters of the Scottish Solway. It was therefore with pleasure that I received a specimen from Mr. Hugh Kerr, Newabbey, on the 20th of May last. It had been caught near Burnfoot by a "haafer." The specimen measured about twenty-three inches across its outstretched tentacles. This is an interesting addition to the list of Squids and Cuttles already noted as visitors to the Firth.—ROBERT SERVICE, Maxwelltown.

Diaptomus castor, *Jurine*, in the Braid Ponds near Edinburgh.—During a visit to the Braid Ponds in August 1888, I collected some Entomostraca, comprising Copepoda, Ostracoda, etc., and a few of the specimens were selected and put aside for after examination. Attention to other matters caused them to be forgotten, and it was only the other day, when I was looking over some odd things, that they were observed. On examining them I was able, with the help of Professor G. S. Brady's excellent "Revision of the British Species of Fresh-water Cyclopidæ and Calanidæ," lately published, to identify *Diaptomus castor*, Jurine, among the organisms from the Braid Ponds. This Calanid was formerly considered to be a moderately common species, and as a member of our fauna its distribution was believed to be, and probably is, co-extensive with the British Islands, but Professor Brady when preparing his "Revision" does not appear to have observed *D. castor* among any of the Scotch fresh-water Calanidæ submitted to

him, and therefore no reference is made in the "Revision" to any Scotch locality for this species. The specific characters of *D. castor*, like those of most other Copepoda, can only be satisfactorily made out by dissection, but when that is done, and the parts carefully mounted, there is comparatively little difficulty in distinguishing this from the other Diaptomids. In the "Revision" six species of *Diaptomus* are recorded and there are Scotch records for four of these, viz. *Diaptomus gracilis* (a moderately common species), *Diaptomus bacillifer*, *Diaptomus hircus*, and *Diaptomus serricornis*. *Diaptomus castor*, now recorded, makes the fifth. The sixth—the species not yet represented in the Scotch fresh-water fauna—is *Diaptomus sancti-patricii*, Brady, a species which has only as yet been obtained "in two small tarns in Connemara."—THOMAS SCOTT, Edinburgh.

BOTANICAL NOTES AND NEWS.

Fasciation in Austrian Pine (*Pinus austriaca*).—Eight or nine years ago I purchased two very healthy young Austrian Pines from a nursery at the foot of Inverleith Row, in Edinburgh. They were planted, one at each corner of the ground in front of my house at Rahane in the parish of Roseneath, on the west side of the Gareloch. The soil is rather poor, being of the mica-schist formation. The two trees were freely exposed to sunshine from the east and south; but a ridge of hills to the west partially shut off sunshine in the after part of the day. For a time they showed equal vigour, sending out long and strong branches from within a foot of the ground and upwards, so much so that want of space required the removal of some branches. One of the trees, when about eight feet high, began to develop strong fasciation in its top. A strong broad band, about two inches thick, began at the top, about eight feet from the ground. It grew to about eighteen inches long; and next year there shot out from its tip over a dozen shoots or false tops. These also began to become fasciated, giving the whole top a very confused and strange appearance. The broad fasciated band had a spiral twist in the direction of the movement of the sun, *i.e.* the same as the hands of a watch. I regret much that I did not allow the tree to remain; but, as it was getting somewhat too big for its position, I cut it down last September. When cut down the rings in the stump were nine or ten in number. Not having personally met with a case of this kind before, I thought it might interest readers of the "Annals."—W. FORGAN, Edinburgh.

Linaria minor, *L.*—In reply to Messrs. Kidston and Stirling's query as to the occurrence of the above species on railway banks,

my experience is that it is partial to them, or rather to the cindered paths often found by railways. By the Epsom railway, near this town, it often comes up in abundance, among the gravel between the rails, and on the edge of the cindered path alongside the line, but does not spread to the grassy bank on the opposite side of the path. The finest specimens I ever gathered were picked from the joints of the brickwork of a bridge over the railway near the village of Merstham in Surrey. I have seen it in Middlesex and Norfolk in similar situations. M. Alph. de Candolle, in his "Géographie Botanique," considered this an "introduced" species to Britain. In the second volume of the "Cybele," Mr. Watson considered it a native; but later he called it a colonist. The above reference is quite apart from its other habitats in this country, which are numerous.—ARTHUR BENNETT.

Linaria minor, *L.*, on Railway Banks.—In the "Annals of Scottish Natural History," p. 143, the writer of a note on this plant asks if it is not the case that in England it is very partial to railway banks. *L. minor* was recorded by Dr. Johnston, in his "Flora of Berwick" sixty-three years ago in one locality, viz. above the Union Bridge over the Tweed. In my younger days I have searched for it there many a time, and always in vain. In 1885 it was found by a young lady on the railway line, *i.e.* among the ballast between and beside the rails at Beal Station in Northumberland, nine miles to the south of this place. I have seen it there every year since. In 1886 I found it in great profusion at Marshall Meadows on the North British Line. Here it occurred not on the line at present in use, but on a disused loop where the rails had been recently removed and the ground thereby stirred up. Soon after I saw it at Velvet Hall on the Kelso line, and in 1889 at Ayton, Berwickshire, again on the North British. Neither I nor any of the local botanists have ever seen it elsewhere.—P. W. MACLAGAN.

Plants new to Scotland recorded in Botanical Journals in 1892 (see *Current Literature*).

Phanerogams (by F. J. Hanbury, in "Journal of Botany," May-June)—

Hieracium nigrescens, Willd., var. *commutatum*, Lindeb., from the eastern slopes of Cairntoul, and probably other mountains in the Cairngorms; *H. norvegicum*, Fr., var. *confertum*, Lindeb., from Glen Lyon and near Crianlarich; *H. cæsio-murorum*, Lindeb., from Linn of Quoich in Braemar, and from several stations in Perthshire; *H. protractum*, Lindeb., from Shetland; *H. murorum*, L., pt. var. *sagittatum*, Lindeb., from four Perthshire stations; *H. onosmoides*, Fr., from Braemar, Uig in Skye, and from Tain in East Ross; *H. Friesii*, Htn., var. *basifolium*, Lindeb., from Clova, from Kin-

craig in Inverness, and from Speyside near Kingussie; *H. reticulatum*, Lindeb., from Reay in Caithness; *H. prælongum*, Lindeb., from Linn of Campsie in Perth, and from Kinlochewe in West Ross; *H. angustatum*, Lindeb., from Ben Lawers, from Kingshouse in Argyle, from Clova, and from Craig-na-dala-beg in Braemar; *H. cinerascens*, Jord., from Strathpeffer, and from beside the Almond in Perth; *H. submurorum*, Lindeb., on mountains around Kingshouse in Argyle; *H. orarium* f. *lingulata* and f. *stylosa*, from beside the Almond; *H. corymbosum* f. *angustifolia*, from Linn of Campsie. *H. nigrescens*, Willd., var. *gracilifolium*, n. var., from Breadalbane Hills; *H. centripetale*, n. sp., from Glen Derry in Braemar, Glen More in Inverness, Moffat near Dumfries, and Glen Sannox in Arran; *H. Marshalli*, Linton, var. *cremnanthes*, n. var., from Meall Buidhe in Argyle, and Meall Ghaordie in Perthshire; *H. sinuans*, n. sp., from Ben Laoigh and other localities in Perth, and from Argyle, near Tyndrum; *H. callistophyllum*, n. sp., from mountains of Argyle and West Perth.

Algæ—

Ectocarpus minimus, Näg. in herb. (Sauvageau, in "Morot's Journ. Bot.," p. 125), on *Himanthalia lorea*, Berwick (Batters).

All the subjoined list are from the Clyde Deep-sea Area, recorded by E. A. L. Batters (see *Current Literature*) in "Journal of Botany," June: "*Chlorochytrium dermatocolax*, *Protoderma marinum*, *Ulvella lens*, *Monostroma fuscum*, *Acrochæte repens*, *Chætomorpha linum* f. *pulvinata*, *Ostreobium Queketii*, *Streblonema sphæricum*, *Leptonema fasciculatum*, *Ascocyclus fœcundus*, *A. fœcundus* f. *seriata*, *A. balticus*, *Ralfsia pusilla*, *Chorda tomentosa* f. *subfulva*, *Ascophyllum Mackaii* f. *Robertsoni*, *Erythrotrichia carnea* f. *investiens*, *Conchocelis rosea*, *Wildemania miniata* f. *tenuissima*, *Antithamnion boreale*, *Lithothamnion corallioides*, *L. colliculosum*. . . . *Conchocelis rosea* is the type of a genus new to science."

Fungi—

Agaricus (*Psalliota*) *hæmorrhoidalis*, Kalchbr., near Roxburgh, by Rev. D. Paul, and once near Forres by Rev. Dr. Keith.

Dædalea confragosa, Pers., near Roxburgh, Rev. D. Paul.

"**Grevillea**" is to be continued without "any material alteration, either in form or contents, and the sequence will remain unbroken. The editing has been undertaken by G. Massie, with the promise of assistance from well-known specialists. Mr. E. A. L. Batters will take entire charge of the section devoted to Algæ."

Messrs. J. B. Ellis and B. M. Everhart have just published an important contribution to mycology, under the title "*North American Pyrenomycetes*." The *Erysipheæ* have been wrought out by Professor

T. J. Burrill, and the fungi of Greenland, enumerated by Professor Rostrup, have been included. The authors have followed the system of classification employed by Winter in "Die Pilze" in Rabenhorst's "Kryptogamen-Flora." The book forms a handsome 8vo. volume of nearly 800 pages, with 41 plates of excellent figures. There are so many species of fungi common to North America and to Europe that this monograph will be found useful for frequent reference by the mycologists of Scotland.

"**Notes on the Flora of Stirlingshire**, with a short Geological Sketch of the Ground," by Col. STIRLING and ROBERT KIDSTON (a paper read before the Stirling Nat. Hist. and Archæol. Society, and now published as a pamphlet), is an interesting contribution to the flora of a county that till of late years was much neglected. "The total number of species recorded for the county is 712, to which must be added 43 varieties." The county has been divided into four districts, well characterised physically; and the distribution of each species is given in tabular form. The southern and central area is by much the richest in number of species. The absence of a seaboard necessarily reduces the number of native species considerably.

CURRENT LITERATURE.

The Titles and Purport of Papers and Notes relating to Scottish Natural History which have appeared during the Quarter—April to June 1892.

[The Editors desire assistance to enable them to make this Section as complete as possible. Contributions on the lines indicated will be most acceptable and will bear the initials of the Contributor. The Editors will have access to the sources of information undermentioned.]

ZOOLOGY.

Wild Cat in the West of Scotland. WM. YELLOWBY. *The Zoologist* (3), xvi. p. 190 (May 1892).—Female trapped in "Western Highlands."

Plague of Field Voles in the South of Scotland. *The Zoologist* (3), xvi. (May 1892), pp. 163-173.—A reproduction of the Report issued by the Board of Agriculture in March 1892.

Thrush with White Wings. W. DIGBY-OWEN. *The Field*, 4th June 1892, p. 838.—At Perth on the 29th of May 1892.

Wild Geese of Scotland and the Isles. R. SCOT SKIRVING. *The Field*, 30th April 1892, p. 626.—The Gray Geese of East Lothian are said to have been Bean Geese until 1870, and then the birds shot were observed to be Pink-footed Geese, and now appear to be all that species. Some notes are also given on other species.

Notes on British Lepidoptera. By RICHARD SOUTH. *The Entomologist*, xxv. pp. 86-90 (April 1892); pp. 111-114 (May 1892); and pp. 134-138 (June 1892).—Some Scottish specimens and forms of the genus Melanippe noted and described.

On some Macro-Lepidoptera collected at Rannoch in 1891. By ROBERT ADKIN, F.E.S. *The Entomologist*, Vol. xxv. (May 1892), pp. 105-110.—No new species for the district are enumerated; but some interesting remarks are made.

Collecting in Aberdeenshire. WM. REID. *The Entomologist*, Vol. xxv. pp. 123-124.—Experiences with Lepidoptera during the severe weather of the early spring.

Variation in Lepidoptera in Aberdeenshire. WM. REID. *Entomologist's Record*, Vol. iii. No. 6 (June 1892), p. 125.—Variation in Hadena adusta and Phigalia pedaria.

[Scottish Crambi.] WM. RIED. *Entomologist's Record*, Vol. iii. No. 6 (June 1892), p. 141.—Crambus prætellus, C. dumetellus, C. ericellus, C. furcatellus, C. margaritellus, C. myellus, C. pinetellus, C. perlellus, C. tristellus, C. cumellus, and C. hortuellus, with their haunts.

Annotated List of British Tachiniidæ. By R. H. MEADE. *Ent. Mo. Mag.* (2), Vol. iii. (May 1892), p. 130.—Masicera rutila recorded for Elgin.

British Schizopoda of the Families Lophogastridæ and Euphansiidæ. By the Rev. Cannon A. M. NORMAN, M.A., D.C.L., F.R.S., etc. *Ann. and Mag. Nat. Hist.* (6), Vol. ix. No. 54 (June 1892).—Enumerates the habitats of the Scottish species.

BOTANY.

The Dispersion of Seeds and Spores. Part ii. By ALEX. WILSON, M.A., B.Sc. (*Trans. Nat. Hist. Soc. Glasgow*, N. Ser. III. Part ii. 1892.)

Additional Notes on the Flora of Wigtownshire, with Notes on Moffat and Kirkcudbrightshire Plants. By JAMES M'ANDREW.—Includes a number of additions to the county records of flowering plants. (*Trans. Nat. Hist. Soc. Glasgow*, N. Ser. III., Part ii. 1892.)

Second Contribution to the Topographical Botany of the West of Scotland (read 20th December 1889), and **Third Contribution** to the same (read 29th April 1890). Both by P. EWING.—Additions are recorded to the county lists for Renfrew, Lanark, Argyle, Dumbarton, Bute, Cantyre, Islay, and Mull. (*Trans. Nat. Hist. Soc. Glasgow*, N. Ser. III. Part ii. 1892.)

Notes on the Rarer Plants of the Parish of Old Kilpatrick. By L. Watt (read 25th March 1890; *Trans. Nat. Hist. Soc. Glasgow*, N. Ser. III. Part ii. 1892).

Notes on Perthshire Plants. By Edward F. Linton, F.L.S., and Wm. R. Linton, M.A.—Is chiefly a rather full list of the plants observed in the lower part of Glen Lyon, and on the adjoining mountains. There are a few new vice-county records. (*Journal of Botany*, June.)

An Essay at a Key to the British Rubi. By the Rev. W. Moyle Rogers, F.L.S.—This is a very valuable monograph of a very perplexing genus. (*Journal of Botany*, April-June.)

Rubus ammobius, *Focke*. By F. Buchanan White, M.D.—Is a brief note of a plant found near Perth a few years ago, and believed by Professor Babington to be "probably the *ammobius* of Focke." (*Journal of Botany*, June.)

Further Notes on Hieracia new to Britain. By Frederick J. Hanbury, F.L.S.—In this paper there are numerous new records for Scotland, chiefly of "species" already known from Scandinavia, but also of new "species." See p. 204-5 of this journal. (*Journal of Botany*, May and June.)

Hieracium anfractiforme. Rev. E. S. Marshall proposes for this the name of *H. subanfractum*, the name *anfractiforme* being already in use. (*Journal of Botany*, June 1892.)

Juncus tenuis, *Willdenow* as a Scottish Plant. By P. Ewing (read 20th October 1889).—Contains records already published elsewhere. (*Trans. Nat. Hist. Soc. Glasgow*, N. Ser. III. Part ii. 1892.)

Sur quelques Algues Phæosporées Parasites. By M. C. Sauvageau.—This is an important paper on certain parasitic species of *Ectocarpus*, and of allied genera. In it several new species are described. Among these is *Ectocarpus minimus*, Näg. (in herb.), on "*Himanthalia lorea* ad littora Angliæ (Dover, Nägeli; Berwick, Batters)." (*Morot's Journal de Botanique*, VI. 1892, Nos. 1-7; Latin diagnosis of *E. minimus* on p. 125.)

Observations on British Marine Algæ. By R. Harvey Gibson, M.A., F.L.S.—*Polysiphonia elongella* Harvey noted as bearing antheridia (not previously known), in August 1871, at Connel Ferry, near Oban. They are of the type characteristic of the genus. (*Journal of Botany*, April.)

Additional Notes on the Marine Algæ of the Clyde Sea-area. By E. A. L. Batters, B.A., LL.B., F.L.S.—States the result of investigations carried on during the past year by a number of workers, and forms a supplement to the "Algæ of the Clyde Sea-area," which was published in the *Journal of Botany* in 1891

Besides numerous new records for the local area, the list enumerates "twenty species and varieties added to the British flora. . . . *Conchocelis rosea* is the type of a genus new to science." (*Journal of Botany*, June.)

List of Fungi, mostly Hymenomycetes, found in the neighbourhood of Roxburgh, and hitherto unrecorded from the district of the (Berwickshire Field) Club. By Rev. David Paul, M.A.—Fifteen species are enumerated, of which two appear not to have been previously recorded from Scotland. (*History of Berwickshire Naturalists' Club*, XIII. Part i. pp. 218-220.)

REVIEWS.

Supplement to Sowerby's English Botany (3rd Edition). By N. E. Brown, A.L.S., and Arthur Bennett, F.L.S. (London: George Bell and Sons.)

British botanists will all welcome the appearance of a supplement to the "English Botany." Though undoubtedly the most complete existing work on the flora of our islands, the investigations of the years that have passed since the publication of the earlier volumes have seen a considerable number of species added to our lists; and the nomenclature requires to be brought into accord with the conclusions reached by the specialists in the various groups. The Supplement under review aims at bringing the whole work up to date as regards both additions to our flora and corrections of nomenclature. As yet the first part only has been issued, though two other parts are said to be nearly ready for issue. Mr. Brown has prepared these three parts, but his duties elsewhere do not allow him time to complete the work. Mr. A. Bennett (to whose unwearied labours we in Scotland are so much indebted for his published "Additions to Topographical Botany") has undertaken to see to the remaining five or six parts of the Supplement—an excellent guarantee of the thoroughness of the work.

The Supplement will be found of great utility, though possibly some of the changes of nomenclature will scarcely be followed very willingly by some botanists.

The first part includes from *Ranunculaceæ* to *Celastraceæ* (Orders I-XXII), and is illustrated with six plates, of which five represent additions during recent years to the British list of flowering plants.

Unfortunately there appears to have been a considerable delay in publishing Part I, after a great portion of it was printed off. It is difficult on any other supposition to account for the length of the Appendix of additional information at the end of the part, which might have been more conveniently intercalated in the text. We

hope that the whole of the Supplement will appear at short intervals, and that the text throughout will be up to date, without requiring in its turn to be supplemented even before its issue.

Outlines of Zoology. By J. Arthur Thomson, M.A. (Edinburgh: Young Pentland, 1892.)

The announcement of a new textbook of Zoology is at the present day perhaps scarcely an event of sufficient novelty to attract more than passing notice, unless it bears the stamp of a master of the subject. The work before us, however, is decidedly above the average, and when its numerous excellent qualities become known, will doubtless attain the rank it deserves. Perhaps the most conspicuous feature of the book (one which will make it specially useful to students of Biology) is the addition of a description of some well-known type to the account of each group of animals—the types selected being in most cases those included in the zoological curriculum of the various universities. As everybody knows, the "type system" of study has in recent years been carried to an excess which is unfortunately resulting in the creation of an ever-increasing number of worthless cram-books, which cannot be too strongly condemned. Mr. Thomson, however, makes use of the "type" merely as a supplement to the general account of the class to which it belongs—a method of treatment which is to be highly commended, for the type-system when thus employed must be approved of by every one. The first seven chapters constitute a general "introduction" and deal with a variety of subjects, such as the general classification of the Animal Kingdom, the histology of tissues, the functions of organs and tissues, development, the past history of animals, geographical distribution and evolution. The remaining chapters—viz. viii. to xxv.—deal with the different classes of animals; the general characters in each case preceding the detailed description of the type. There is something unusually attractive about the style of the book throughout, and in almost every chapter we meet with interesting and useful information of a kind not usually met with in textbooks of this description. For example, we are supplied with concise accounts of such subjects as the inter-relations of animals and plants, the "courtship" of animals, the migration of birds, parasitism, sexual selection, the protective devices of animals, and a host of other facts concerning the habits of animals of which the student is usually left in ignorance. Great care has evidently been expended in bringing the book thoroughly "up to date" in every department, and we are glad to see that the sources of the more important recent "views" are given, for this is always very acceptable information to advanced students, and too frequently omitted.

The illustrations are not so good (from an artistic point of view) as we should like to see, and we think they might be multiplied with

advantage. The work is an excellent one, and we wish it the success which it merits. A. D.

The Lepidoptera of the British Islands. By CHARLES G. BARRETT, F.E.S. (London: L. Reeve and Co., 1892.)

Mr. C. G. Barrett's new work on "The Lepidoptera of the British Islands," two numbers of which have appeared, is very disappointing. The author has missed a magnificent opportunity of producing a much-needed standard work on the subject. The letterpress is far behind the scientific spirit of the age. With regard to the generic names, he omits in most cases to give any authority for their use; while in regard to the specific names he contents himself with stating the name of the authority, without giving any reference to the original description. In the text also he often refers to published papers without mentioning references. For this there can be no excuse, as he might, without trouble, have found exact references given in many of the older English works. The general arrangement of the work also leaves much to be desired. There are no headings to the paragraphs to indicate their nature, so that if any special piece of information be sought it becomes necessary to read the whole article. A very interesting subject that Mr. Barrett has only just touched upon is the distribution of species in the Palæarctic area, which, if properly detailed, would have been of the greatest service. The author seems only to aim at producing a book for the mere collector, and is very careful to give all the aberrations of colour and marking, and the description of hermaphrodite specimens in those collections he has had access to, calling them all varieties, which is a misapplication of the term. They may be of deep interest to collectors, but are of very little scientific value. The plates are decidedly the best part of the work, though far from perfection. The imagines of plates 3 and 7 are especially good; on the other hand, plates 4 and 8 are as bad as can be. Plates 1, 2, 5, and 6, can only be said to be fairly good. With regard to the figures of larvæ and pupæ, they seem to have been treated as odds and ends, and are as a rule very poor. It seems a pity that the author did not model his work on such treatises as those of Trimen or Edwards, which leave little to be desired. It is greatly to be hoped that Mr. Barrett may see his way to remedy in the succeeding numbers some of the more glaring defects exhibited by the first two.

E. W. C.

The Mammalian Fauna of the Edinburgh District: With Records of the Occurrences of the Rarer Species throughout the South-east of Scotland generally. By WILLIAM EVANS, F.R.S.E. (Edinburgh: M'Farlane and Erskine. 1892.) Pp. 123.

We are much pleased to find that Mr. Evans has issued his most excellent account of the Mammalia of the Edinburgh District in a separate and enlarged form. In this important contribution to

Scottish Natural History, Mr. Evans has brought together the results of many years personal observation, as well of exhaustive researches into the literature relating to the subject. Not only, however, are the mammals now or formerly inhabiting the district—forty-eight in number—and their past and present distribution treated of, but the author has added much that is interesting and original concerning the habits and life-history of many of the species that have come under his observation.

The book is of considerable importance to British zoologists, and it is with pleasure that we recommend this neat little volume to all who are interested in the subject, on which it treats so pleasantly and so well. The edition is limited to 200 copies.

Recent Additions to the Natural History Department of the Museum of Science and Art, Edinburgh.

The more important gifts received by the Natural History Department of the Museum during the past six months comprise :—A fine collection of European Lepidoptera, numbering 3000 specimens, presented by Mrs. Pearson, Glasgow. A number of mounted Birds from the Pacific Region and New Zealand, among which is a fine pair of the New Zealand Quail (*Coturnix Novæ Zealandiæ*, Quoy and Gaim.), now supposed to be extinct, presented by Mrs. James Stracey, Edinburgh, who has also given a number of Shells from the Pacific. A small collection of Corals presented by Miss Dalmahoy, and a collection of Shells given by General Dalmahoy, Edinburgh. Thirty Birds' Skins, presented by Mr. H. E. Dresser, London. A considerable number of British Birds and Mammals, presented by Messrs. J. A. Harvie-Brown, T. G. and D. G. Laidlaw, H. Knight Horsfield, P. Adair, W. Berry, T. Speedy, Bruce-Campbell, Wm. Evans, and Lieut.-Col. Duthie. A unique specimen of the dentition of a fossil Selachian (*Janassa*) from the Carboniferous Limestone of East Kilbride presented by Mr. J. B. Wise, Glasgow. From General Cadell, C.B., Cockenzie, the Museum has also received a specimen of a Lizard (*Lacerta Gallotti*) and of a Snail Shell (*Helix*) embedded in volcanic tuff from Teneriffe.

Among the purchases are : A fine set of Fossil Fishes from the Old Red Sandstone of Gamrie. A number of fossils from German localities, among which is a very fine specimen of *Hypsocormus* from Solenhofen. A number of skins of European Birds and Fishes—sixty-eight specimens in all. Seven series of Embryological wax models prepared by Dr. Ziegler of Freiburg, Baden. Fifty-six exotic Bird-skins. Also the skull and several of the vertebræ and bones of a large Grampus (*Orca gladiator*, Gray) recently found embedded in the sands of the Firth of Forth near Grangemouth.

R. H. Traquair, Keeper of Natural History Department.

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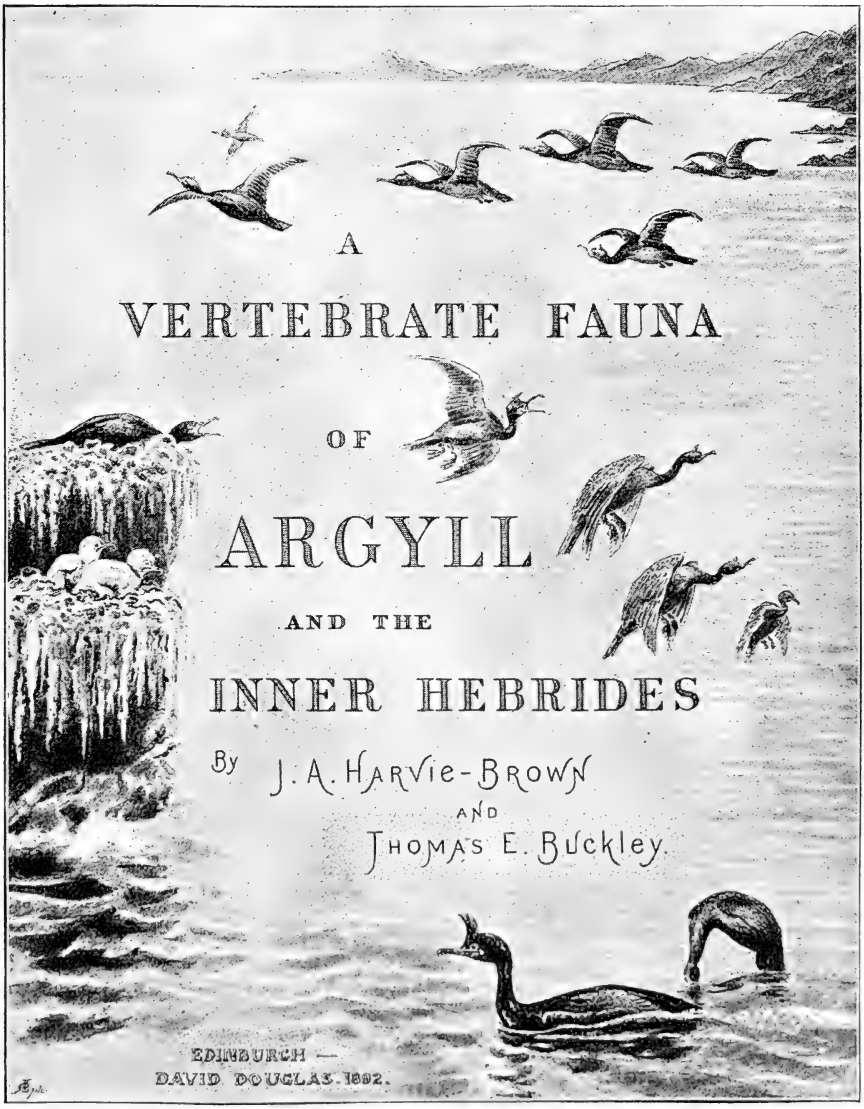

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"If Captain Marryat, instead of devoting his time after leaving the service to writing novels, had wandered off to a desolate island and turned wild-fowler and ornithologist, he might well have written such a book as that which the literary executors of the late H. D. Graham have issued under the sober title of 'The Birds of Iona and Mull.'"—*Spectator.*

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EDINBURGH: DAVID DOUGLAS.

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IS LEGISLATIVE PROTECTION REQUIRED FOR WILD BIRDS' EGGS?

By Rev. E. P. Knubley, M.A., M.B.O.U.

It may be well to state at the outset that at present certain birds are protected by a close time in the nesting season, during which it is illegal to kill them, but that this protection does not extend to their eggs. The eggs, in fact, of every kind of wild bird, whether common or uncommon, useful or otherwise, are liable to be destroyed through thoughtless carelessness, wanton mischief, or sordid greed.

At present there is nothing to prevent whole areas from being systematically plundered of every egg of every bird—and it is done. Again, certain of our British birds—for instance, the Great Skua and some of the Terns—nest in colonies in a few known localities; and as the law now stands there is nothing to hinder the taking of the eggs of these birds to such an extent as to prevent the hatching of a single young bird. It requires no prophet to foretell what will be the result of this system of pillage, if it is allowed to proceed unchecked.

The question has been asked, Has the time come when legislative protection is required for wild birds' eggs? A committee of the British Association was appointed at the Cardiff meeting, with a view to inquiring into this subject;

but it has not yet felt itself in a position to make any recommendations. The committee, which includes the names of Professor Newton and Canon Tristram, was re-appointed at the Edinburgh meeting; and it is hoped that next year it may feel in a position to offer suggestions on this extremely difficult subject.

This important question was, however, brought before the recent meeting of the British Association at the conference of the delegates of the corresponding societies, and after a most interesting discussion, in which the writer, Mr. E. B. Poulton, Canon Tristram, and others took part, the following resolution was carried unanimously:—"The conference of delegates having heard of the threatened extermination of certain birds, as British breeding species, through the destruction of their eggs, deprecates the encouragement given to dealers by collectors through their demands for British taken eggs, and trusts that the corresponding societies will do all that lies in their power to interest and influence naturalists, landowners, and others in the preservation of such birds and their eggs."

All will agree that if legislative protection for wild birds' eggs is asked for at all, it is not required for all species. Indeed, sweeping legislation would do more harm than good. There are certain groups—such, for instance, as the Passeres, that are very well able to take care of themselves and need no protection. Again, all will agree that it would be a mistake to pass laws which could not be enforced. Any general law against egg collecting would be easily evaded, and every one knows the demoralising effect of an unenforced rule.

Setting aside, then, all idea of a general prohibition of egg-collecting as impracticable, if not mischievous, there are still cases in which the maintenance of the present freedom from restraint appears to be open to doubt. As we have already stated, there are certain species which will shortly become extinct as breeders in the British Isles if steps are not taken by legislation or otherwise to protect them. What can be done for these?

It would perhaps be well to instance a few cases.

As the readers of the *Annals* (No. 2, April 1892) already know from Mr. W. Eagle Clarke's article, the only breeding

stations of the Great Skua (*Stercorarius catarrhactes*) in the British Isles are in Shetland. Here the nests are pillaged so regularly and persistently by the inhabitants that in 1890 not a single chick was reared by the whole Foula colony, and in 1891 practically all the eggs of the first laying were taken. Fortunately the owners of the islands on which the Great Skua nests have taken steps to protect the eggs as far as possible. This praiseworthy intervention has already met with a certain measure of success, for though Mr. Frank Traill, in speaking of the nesting season at Foula this year (1892), states that "apparently all the first laying of Bonxies' eggs were taken, and part of the second," and says that in Kirkwall he saw a dozen Bonxies' eggs "from Foula this season" at the modest price of half a sovereign apiece, he is able to add that there were about sixty or seventy young ones this year.

One ought not to leave the Shetlands without mentioning the persecution of other rare birds which nest on these islands. It is stated on good authority that extremely few pairs of the Red-throated Diver (*Colymbus septentrionalis*) have got off their young during late years. The Whimbrel (*Numenius phæopus*), too, whose few nesting stations in the British Isles are chiefly confined to Shetland, exists there in very limited numbers; and there are grave fears of the disappearance of the Red-necked Phalarope (*Phalaropus hyperboreus*) from its stations in the Shetlands. It is probable also that the Black-throated Diver (*Colymbus arcticus*) nesting sparsely in circumscribed areas on the mainland of Scotland, and in the Hebrides, will share the same fate. Who can wonder when collectors and dealers offer large prices for each egg which is sent to them?

Again, the Little Tern (*Sterna minuta*), nesting colonies of which exist on the Fifeshire and Banffshire coasts, will shortly disappear altogether. This is inevitable, at least so far as the Fifeshire colony is concerned, unless something can be done to prevent the constant plunder of their nests. Parallel cases might also be cited from the Yorkshire and Lincolnshire coasts, where these birds are sadly persecuted, and where the Arctic Tern (*Sterna macrura*), and the Oyster-catcher (*Hæmatopus ostralegus*), have practically ceased to nest, and the Ringed Plover (*Ægialitis hiaticula*), is much scarcer than formerly.

The Farne Islands show the value of protection. For there is no doubt, that, if it were not for the exertions of the Association of Ornithologists and others who lease the Farne Islands, these interesting bird nurseries would have been destroyed long ago.

Then again the Lapwing (*Vanellus vulgaris*) is fast disappearing, nor is the reason far to seek. A correspondent the "Scotsman," 19th August 1892, recently pointed out that in East Forfarshire it is the custom in the nesting season to pay boys 2s. per dozen for their eggs, for which 12s. 6d. is paid to their employers by London dealers, and that no less than fifty dozen are sent off at a time. And Mr. W. G. T. Watt, of Skaill House, Stromness,—in moving at a County Council meeting, held on the 11th of May, that a memorial be prepared and sent to Lord Lothian asking him to introduce a Bill empowering County Councils to make rules and regulations for the protection of wild birds' eggs,—said that many would remember about twenty years ago how the sky was frequently darkened by Lapwings, while now scarcely one could be seen. The bird was most useful to farmers, and grubs had increased immensely since the Lapwing got scarce. He attributed its scarcity to the fact that the eggs were gathered in thousands and tens of thousands and sent to London, Edinburgh, and Glasgow. Whilst acknowledging that some of the eggs came from Holland, he contended that many were gathered in England and the Lowlands of Scotland.

In addition to these individual species, the systematic sweeping of every egg of every bird from certain parts of Scotland should be instanced. The plan adopted is this. A dealer from a distance employs a local man to send him every egg he can procure. For these he gives half the prices quoted in the published lists. The local man employs all the "herdie" boys of the district to lay hands on every egg which comes within reach, and for these they receive 1s. a dozen. In 1890 one man sent one hundred and fifty dozen eggs collected in this manner from Stromness. By such an organised system are whole districts depleted.

It is the opinion of several Scottish ornithologists that if the Access to Mountains Bill is passed, it will greatly

facilitate the raids of the collector. Under such a law, they say, it will become impossible for proprietors to continue to afford that protection under the beneficence of which some of the rarest and most interesting of our British birds have alone maintained their position in our Islands.

Egg collectors have much to answer for. The craze for collecting clutches, and large numbers of eggs of the same species, is responsible for much destruction. Fancy fifteen clutches of the eggs of the Peregrine Falcon in the same collection, and twenty of the Chough; and what can we say of one collector whose boast it is to possess over one hundred Scottish taken eggs of the Golden Eagle (*vide* "Zoologist," 1889, p. 110). Would he take kindly to the suggestion of one of the members of the British Association that he should have the feathers of the birds presented to him, with the addition of a little tar?

There are other birds which might be mentioned, such as the Warblers and the insectivorous birds generally; the Bearded Reedling, the White-tailed Eagle, Osprey, Kite, and the three Harriers; the Kentish Plover, Dotterel, Ruff, and Black-tailed Godwit; and the Great Crested Grebe. But enough has been said to show that certain birds are persecuted, and that there are grave fears that some of them will cease to exist as British breeding species unless steps are taken to afford them protection.

Here the difficulties begin. What form of protection is the best? and to what species should such protection be extended? If it is eventually found necessary to have recourse to legislation, the most practical plan would probably be for the Imperial Legislature to grant powers to the County Councils from time to time, and as the necessity arose, to place certain portions of a district, such as mountains, commons, waste places, lakes and meres, or portions of cliffs or foreshores, under an Act for certain specified months in the year, say from April 1st to June 30th. Such a plan would be simple and it might be effective.

But very much more than any legislative protection, we want the sympathy and co-operation of landowners and occupiers in order to get them to protect the birds breeding on their property or occupation. The whole matter of the

preservation both of birds and their eggs ought to be better managed by those on whose property the various species nest than by any legislative restrictions. If landowners and occupiers, game-preservers and game-keepers, would only use whatever brains and common sense Providence may have endowed them with, and learn to discriminate between friends and foes, we lovers of birds for their own sakes should not have much to complain of. Farmers are beginning to know at last that all birds are not their enemies, and ideas of the same sort are working slowly into the brains of some few gamekeepers, and into those of a good number of their masters, so that the aspect of affairs is becoming more hopeful. The question is too delicate and difficult a one to be lightly thrown into the arena of party politics, and it is earnestly to be hoped that means may be found for the protection and preservation, when necessary, of our wild birds and their eggs without having recourse to further legislation.

THE FEATHER-BILLED ROOK: IS IT A RECENTLY DEVELOPED VARIATION OR HITHERTO OVERLOOKED?

By Robert Service, Maxwelltown.

It is now fourteen years since I was told by the head gamekeeper on a Dumfriesshire estate that he had just been exterminating a Rookery on his grounds. The reason given was rather a startling one. It was that "the Rooks" had all become crossed with carrion crows, and the resultant breed were destroying eggs and every small living thing they came across. Some of these alleged "crosses" were sent me, and sure enough their bills were completely feathered, as in carrion crows, but they were only Rooks, and not "crosses," as a very cursory examination proved. Since then I have paid a considerable amount of attention to our local Rooks, and find a startling proportion of them—I estimate it at about 20 %—retain the feathered bill of juvenility till at least their third year. Without going into any details, I find from correspondence with Ornithologists that the same thing has

already been noticed elsewhere, some being of opinion that the peculiarity is of recent development, and others that it has been simply overlooked. I am inclined to think that it is in some way closely connected with the undoubted recent adoption of carrion crow-like habits by the common Rook. For over a dozen years back gamekeepers, and many others, have been continually complaining of the injury done them by Rooks in the destruction of eggs, young birds, and young rabbits and hares. Farmers likewise state how frequently their chickens and ducklings are taken now. And every field Ornithologist will at once admit that his observations are also to the same effect. Rooks destroyed by poisoned eggs laid down in the usual way, are almost always those with feathered bills. I exhibited a dozen feather-billed Rooks to the members of the Vole Commission at their recent meeting in this neighbourhood, and advanced views that it was an outbreak of carrion crow-like habits amongst the Rooks that had perhaps led to this curious variation. I also stated that for years past the keepers had killed the Rooks wholesale owing to their bad habits, and that to this great destruction of Rooks might be attributed one of the minor causes of the vole plague, for no bird or animal is fonder of young voles than the Rook. It is curious how generally widespread is the notion amongst those connected with game interests that the feather-billed Rook is the produce of a *mésalliance* with the carrion crow. I should be glad if our field Ornithologists would give the readers of the Annals the benefit of their experience on this very interesting feature in the history of the Rook.

THE SHORT-EARED OWL (*ASIO ACCIPITRINUS*, PALLAS) AND THE KESTREL (*FALCO TINNUNCULUS*, LINNÆUS) IN THE VOLE PLAGUE DISTRICTS.

By PETER ADAIR.

EARLY this spring I learned that an Owl, strange to the district, had spent last autumn and the winter on certain of the vole-infested farms in Selkirkshire, where it was known

as the "new owl." The bird's advent was hailed with delight by those affected by the vole plague; and possibly for the first time in its long history every one, even the game-keeper and the schoolboy, vied with each other in giving protection to it and to its nest.

If the appearance of the bird has been advantageous to the suffering farmer, it has been no less interesting to the naturalist. While spending a few days in June at Tushielaw, Ettrick, I found that the stranger was the Short-eared Owl; that it was very plentiful on the farms on which it had settled, and that there were still nests. I subsequently ascertained that the bird was distributed over a considerable portion of the vole-infested area of the counties of Roxburgh, Dumfries, Lanark, and Kirkcudbright, and it occurred to me that if particulars and statistics could be obtained bearing on its appearance, haunts, habits, and numbers, valuable information might be gained. I accordingly sent to proprietors, farmers, and shepherds in the infested area, Lists of Questions for Replies; and I have been fortunate in getting a great number of responses. The results are embraced in the Appendix to this paper. Mr. W. Eagle Clarke has been good enough to check for me the Schedule, and the particulars stated may be taken as a correct summary of the information received. The total acreage of the respective farms has been stated. The acreage has, however, in some few instances, been only estimated, but the estimate may be accepted as sufficiently correct for all practical purposes. In a few cases the acreage has not been got, or I am not at liberty to make it public.

It is, of course, impossible to make a reliable estimate of the number of birds in the vole-infested area. That area is so extensive, the population is so small, the ground traversed by the shepherds in their daily rounds is so uniformly in the same line, except during the lambing season, and the birds sit so closely, that a small proportion only of the numbers on the ground has probably been seen. The idea of estimating the number of birds by the number of nests found on certain farms is also unsatisfactory, as, with the exception of Ettrick, I have particulars from comparatively a few farms on the vole-infested watersheds, and it would

be necessary to get returns from the whole or at least the greater part of the farms on these watersheds, as the birds may not be distributed over all the ground. This is the case in Ettrick, in regard to which I have returns from most of the infested farms from Kirkhope (seven or eight miles south of Selkirk) to Potburn at the head of the river. The result is that in the district between Kirkhope and Tushielaw—an area, roughly speaking, seven or eight miles long by three or four broad—many nests have been seen, and the bird is abundant, while in the district between Tushielaw and Potburn—about ten or twelve miles long by three or four miles in breadth—the Owl has up to the present month (September) been scarce; thus seeming to imply that the migratory flight had, last autumn, been arrested in its course, farther down the river, by the abundance of food there. There can be no question as to the abundance of the food supply in the upper district, which has suffered terribly from the ravages of the voles. Mr. M'Clure, Over Kirkhope, which is seven or eight miles above Tushielaw, has, however, just informed me that a great many birds have appeared on that farm within the last few weeks. As there is a very marked diminution in the number of voles over much of the infected area, this appearance of the bird on new ground may be taken as indicating that food is getting scarce on some of its late resorts.

Mr. R. Service, Maxwelltown, who has given much attention to the bird and to the plague, estimates that from 150 to 200 pairs remained to nest in Dumfriesshire and Kirkcudbright.

The following is a summary of the number of nests actually seen on the farms from which specific information has been obtained, as stated in the Schedule.

	No. of Nests.
I. In Teviot and Hawick district	117
II. In Ettrick	91
III. In Eskdalemuir	30
IV. In Yarrow	7
V. In Moffat	56
	301

But numbers of nests were most undoubtedly not seen, including many tenanted early and late in the season; and keeping this in view, it would not, I think, be unfair to double the number of nests on the farms in question for the purpose of arriving at an approximation of the number of young birds reared thereon during the present season. The result is 602 nests with, say, seven young in each nest, equal to 4214 young birds on these farms.

A few remarks bearing upon the haunts and habits of the bird may not be uninteresting. These are taken from the particulars which I have received, and, owing to their originality, have a special value attached to them. Except during the storms of winter, it frequents the vole ground, preferring boggy land covered with coarse grass or rushes, also bracken-patches, and high heather. In the severe weather of winter it seeks the shelter of plantations. Mr. Glendinning, Nether Cassock, informs me that forty to sixty spent last winter on some low-lying ground in his farm among willow-bushes; and Mr. Mitchell, Newburgh, Ettrick, notes that great numbers sought shelter in a young plantation on the neighbouring farm of Gilman's Cleuch, and that during the snowstorms, numbers occupied the bare spots beneath the overhanging banks of Scaur braes along the river. They also frequented similar resorts in quarry holes and on steep brae faces along hill burns.

The nests have been seen in all the usual haunts of the bird; and several, as the Schedule will show, contained an extraordinary number of eggs. The average number may safely be taken at eight to ten, and the number of young reared at seven. Few unfertile eggs have been seen, and the young are hardy. Nests have been found as early as the end of February and as late as July; but the greater number were found from the end of April till the end of May, being the lambing season, when the shepherds were constantly traversing the whole ground. I have been informed of several instances in which the bird has exhibited great boldness in the defence of its nest. On one occasion a bird struck Mr. Mitchell, Newburgh, a smart blow on the head while examining its nest. And in many instances dogs have been struck in passing the nest or the young. The young,

which are of different ages, leave the nest, or are expelled, as soon as they are well feathered, but before they can maintain themselves, and sit among the best available cover near the nest, where they are fed by the parent birds till they are self-supporting. After the nesting season, it is of common occurrence to flush the family parties. At present the birds are seen singly, or in pairs. Farmers and shepherds are unanimously of opinion that the birds have had two broods this season. In the company of Mr. William Evans, Edinburgh, and of Mr. John Scott, West Deloraine, I had the pleasure of inspecting two nests with young on the 9th of July. They were placed on a heathery slope, on the east side of Deloraine Burn, and were about half a mile apart. No attempt at the construction of a nest was discernible, simply a scrape under the shelter of the heather. One of the nests contained two infertile eggs, and five young birds, two of which were well grown and getting rudimentary feathers, while the youngest was only a few days old. The other nest (beside which lay two dead voles) also contained two infertile eggs and four young birds in nearly the same stages of growth as those in the nest first referred to. The shepherd informed us that three young of the first nest had already left the nest, and that two of the eggs in the second nest had been broken. In each nest the elder birds occupied the outsides, the youngest keeping to the centre, and being completely covered by its relatives. Both nests were occupied by the parent birds when we approached. One of the parent birds of the nest first referred to kept flying over and past us at twenty to thirty yards distance, exhibiting particular wrath at two dogs which accompanied us, and repeatedly drawing away one of them from the immediate neighbourhood of the nest by skilfully feigning lameness: its mate flew round at a height varying from eighty to one hundred and twenty yards. Only one of the parent birds of the nest second referred to was visible. She allowed us to approach within a few yards, then flew silently away and did not return.

The birds do the greater part of their hunting towards dusk. They appear in numbers in genial weather; but during rain storms few are to be seen. During the nesting

season, and in warm weather, and the "butterfly" days which precede a change, they frequently make excursions during the day, sometimes in numbers. I need scarcely remind naturalists that the bird is not affected by light to the same extent as our other indigenous species; and distributed as they are, during the breeding season, up to a high latitude (70° N.) their sight is adapted to the continuous day of an arctic summer. When viewed through a good binocular they exhibit an alertness and vivacity of expression which well indicates that light has little or no effect on them. On the 21st of the present month (September), in a bright sun, two birds repeatedly quartered a small meadow on East Buccleuch farm, west of Clearburn Loch, paying particular attention to the sides of the surface drains. At the same time three birds spent the afternoon quartering and requartering a small area not exceeding an acre on the east side of the loch near the Hawick road. The birds were most diligent, seldom resting more than a few minutes.

The birds seem to subsist principally on voles and mice; at all events, I have no information of their preying on birds. No doubt this arises from the vast abundance of the voles, great numbers of which are taken, particularly during nesting time. To give three instances:—Charles N. Dunlop, Esq., of Whitmuirhill, Selkirk, informs me that twenty-nine voles were removed from a nest on Hislop, and that next day twenty-seven voles were found in the same place. The shepherd at Dumfedling counted thirty-seven voles at a nest containing ten eggs found on that farm at the end of February. And Mr. Glendinning, shepherd, Howpasley, tells me that he counted twenty-seven at a nest on that farm containing ten young birds. In flushing a bird at the present time it is not uncommon to find a dead vole or two at the place where it rose.

It is pretty clear from the information received that the bird has during past years nested regularly in small numbers in the area embraced in Eskdalemuir and the top of Teviot and of its tributary the Borthwick. I particularly refer to the information specified in the Schedule obtained from Craich, Falnash, Hislop, and Redfordgreen in the Hawick district;

Glenkerry and Gair in Ettrick; and Castle O'er and Crurie, Nether Cassock, Glendearg, and Fingland on Eskdalemuir. Mr. D. Glendinning, Howpasley, states that specimens were seen and nests found in Liddesdale-head in 1887, and on the early afternoon of a day about the middle of June 1890 a bird spent half an hour quartering the rough grass in West Deloraine, to the north-west of Clearburn Loch, in close proximity to a fishing party of which I was a member.

That these birds should have mustered and bred in such numbers in the wide area indicated is in itself a most interesting fact, and one that goes far to prove the keenness of the struggle for existence among the feathered races. We all know that the homing instinct is almost paramount in all migratory birds, and yet the abundance of food in the vole counties has induced many mere winter visitors among these owls to settle at least for a while among us and to render services to the sheep farmer which cannot be over-estimated.

With reference to the Kestrel, I have given in the Schedule a statement of the details of value which I have received, and nothing requires to be added. In driving or walking over any part of the vole-infested area the bird is constantly in sight, sometimes several at once, and forms a most pleasing feature of the landscape.

I cannot close without acknowledging the kindness and courtesy of the gentlemen who were good enough to aid me in obtaining the particulars required to enable me to compile this article. I am particularly indebted to the following gentlemen for the trouble which they have taken, viz.:—Richard Bell, Esq., of Castle O'er; T. Scott Anderson, Esq., of Shaws; Charles N. Dunlop, Esq., of Whitmuirhill; Alexander Sturrock, Esq., banker, Edinburgh; R. Service, Esq., Maxwelltown; James Matheson, Esq., banker, Selkirk; Dr. Hamilton, Hawick; J. Scott, Esq., West Deloraine; Wm. G. Stewart, Esq., Barnhill, Moffat; Charles S. Grieve, Esq., Branxholm Park, Hawick; James Hobkirk, Esq., Broadhaugh, Hawick; and John Mitchell, Esq., Newburgh.

Farm.	Nature of Surface.	Estimated Acreage	Commencement of Vole Plague.	Short-eared Owl.						Kestrel.
				Period of nesting.	No. of Nests seen in 1892.	Eggs in each.	Estimate of Young reared from each nest.	When Birds first noticed on present occasion.	Previous Occurrences and Remarks.	Remarks.
I. Teviot and in Hawick District.										
Eilrig	Grass; no plantations	1120	Spring, 1891	May to July	10 at least	5 to 7	6	This year	In numbers in 1875-76 on occasion of former vole outbreak, but not so numerous as now; very rarely seen since 1876.	Very numerous; 15 counted in a ride of 5 miles.
Commonside .	Heather and grass	...	Eighteen months to two years ago	No nests seen	...	...	...	Last winter	Noticed before, but very few seen.	4 or 5 pairs on farm.
Carlenrig . . .	Heather and grass, with a good deal of plantation	610	In 1890	April	A few nests seen	9 to 10	8 or 9	...	...	More birds than usual.
Craick	Heather and grass, with plantations	3500	1891	March to August	About 40	6 to 10	About 8	...	Mr. Moffat, the tenant, states that there were always a few birds on farm since he recollects.	Very numerous; 30 seen together.
Falnash . . .	Heather and grass	3000	1890	April to July	27	8 to 12	9 to 11	In great numbers in Spring 1892	Mr. Rutherford, the shepherd, says that the bird has been on the farm since 1880, and that there has been a nest yearly.	...
Hislop	Rough grass and bent with a little heather. No plantation	1500	1891	...	18	6 to 11	9 to 11	Great increase last two years	Mr. Charles W. Dunlop of Whitmuirhill, who has been tenant of shootings in the district including	...

									this farm, informs me that the bird has been on the ground for the past 15 years at least: that he has seen it yearly for 9 or 10 years; that the nest has been found regularly on this farm every year during that period, though sometimes only a single nest; and that the birds leave the ground before winter, and return in spring.	
Howpasley . .	Heavy bog and grass with some heather. No plantation, but strip at farmhouse	3800	1890 and 1891	March to July	16	7 to 13, common number 11	Average 10	...	Seen occasionally; did not nest on farm till 1890.	Increase.
Redfordgreen, West	Grass	200	Since 1890	April to June	6	10	10, only one unfertile egg seen	In 1891	Mr. Walker states that there has always been one or two birds on his farm.	...
II. ETTRICK.										
Kirkhope . . .	Mostly heather; two acres birch	...	Dec. 1891	...	3 or 4	...	...	January 1892	Occasionally seen.	A few birds on farm.
The Shaws . .	Mostly grass, but patches of lea heather; about 20 acres plantation	3200	Four years ago	...	5 or 6	8	...	...	Occasionally.	3 or 4 pairs; and have increased since the vole plague began
Gilman's Cleuch	Grass; about six acres planted	1300	Nearly two years ago	April (end) to June	8	8 to 10	9	Spring of 1891	Never seen before.	8 to 10 pairs on farm.
Deloraine, West	Grass and heather.	2500	Nearly two years ago	March to August	13	8 to 10, very frequently 10	8	Autumn 1891	...	Increase.

APPENDIX—*Continued.*

Farm.	Nature of Surface.	Estimated Acreage.	Commencement of Vole Plague.	Short-eared Owl.						Kestrel.
				Period of nesting.	No. of Nests seen in 1892.	Eggs in each.	Estimate of Young reared from each nest.	When Birds first noticed on present occasion.	Previous Occurrences and Remarks.	Remarks.
Whitelaw Shiel .	Grass with heather	400	Nearly two years ago	March to June	7	8 to 11	8	Autumn 1891	...	Increase.
Newburgh . .	Grass; small wood at house; small open crow wood on hill	700	Nearly two years ago	February to June	6	8 to 10	8	Autumn of 1891		Great numbers; 6 nests in old crow wood.
Crosslee . . .	Heather and grass; young fir wood at house. Small open wood at roadside	1700	...	February to June	9	8 to 10	8	Autumn of 1891	...	Numbers.
Tushielaw and Cacrabank .	Grass; two small plantations	1700 700	Nearly two years ago	...	...	...	...	A number of birds on farm	...	Numerous; 7 or 8 seen together. Several nests on farm.
West Buccleuch	Grass.	3000	About two years ago	April to June	14	5 to 9, one 12	6 to 8	Great increase with voles	Mr. James Greeve informs me that he has seen the bird on his farm for forty years. It was numerous on previous visit of voles some 16 years ago.	Increase in summer.
East Buccleuch.	Grass, with some heather	3300	About two years ago	March to June	10 on Henwoodie Hirsel alone	10 to 11	9 or 10	July 1891, Increase noticed July 1891	Seen at least for 30 years; called "heather owl" because they built on the ground. Numerous 16 or 17 years ago.	Some birds on farm.
Ropalawshiel .	Heather and grass; no plantations	...	1891	End of April to July	10 to 12	8 to 10	6 to 8	Spring 1892	...	Few birds on farm.

Annelshope . .	Grass; one small plantation at house	900	Two years ago	March to May	4	8 to 10	...	After voles appeared two years ago	...	A number of birds on farm.
Wardlaw . . .	Grass; with plantations	1000	Two years ago	May to July	A few nests	6 to 10	8	...	...	Much more numerous than formerly
Ramsay Cleuch .	Grass; with plantations	2200	Spring of 1891	May to July	A few nests	6 to 10	...	...	None seen.	Great increase, 14 seen at same time.
Midgehope . .	Grass; with some wood	1347	Since Autumn of 1890	April to June	5	8 to 11	All	Since autumn of 1890	...	A number.
Glenkerry . .	Grass; with seven acres plantation	1500	Increased since 1888	...	1 or 2	6 to 8	...	...	Mr. William Grieve the farm manager, informs me that the nest has been seen yearly, among rough grass and rushes.	A great number.
Gair	Grass; no plantation	1000	Autumn of 1890	...	...	...	...	...	Mr. Alexander Laidlaw, the tenant, states that a few birds had always been observed on the farm, but that they had not increased with the late increase of voles. The nest had been seen in former years; one or two during the season, with 8 to 10 eggs in each nest.	Plentiful.
Dalgleish . .	All grass, no plantation	3000	Two years ago	...	...	...	...	...	Bird has been seen on farm.	A number last year; few this year.
Ettrickhall . .	Grass	940	1891	..	...	...	...	...	Few birds.	Great increase since vole plague began.
Shorthope . .	Grass.	1360	1891	...	...	...	...	...	Few birds.	Great increase since vole plague began.

APPENDIX—*Continued.*

Farm.	Nature of Surface.	Estimated Acreage.	Commencement of Vole Plague.	Short-eared Owl.						Kestrel.
				Period of nesting.	No. of Nests seen in 1892.	Eggs in each.	Estimate of Young reared from each nest.	When Birds first noticed on present occasion.	Previous Occurrences and Remarks.	Remarks.
Scabcleuch . .	Grass	600	Since 1891	...	...	...	...	...	A number of birds on farm; but no nests seen. Thinks they must have nested.	3 or 4 pairs on farm.
Over Kirkhope .	Grass; small plantation	1800	Two years ago	...	...	...	...	...	No birds reported before August 1892.	Increase. A number of pairs on farm.
Braedgarhill . .	Chiefly grass, a little heather	1355	Two years ago	...	...	...	...	...	No birds reported.	Increase. Two nests last year.
Potburn . . .	Grass; with small plantation	2800	...	...	...	...	...	...	No birds seen.	Increased.
III. Eskdalemuir.										
Castle O'er and Crurie.	Almost all grass 92 acres plantation	2700	...	First seen 29th February last	3	12, 7, and 5 eggs	All reared	Early in 1892	Mr. Bell of Castle O'er reports having seen nests on neighbouring farms in 1864, and in the early years of the seventies.	A number.
Nether Cassock and Glendearg	Grass and heather, 2 acres in plantation	...	...	March to May	10 to 12	9 to 14	...	Autumn of 1891	Mr. A. Glendinning reports that before 1891 a pair or two, were to be found on his farm; that he saw the nest 25 years ago.	2 or 3 pairs.

Fingland . . .	Grass; no woods .	3000	...	April to July	16	8 to 10, one 11	8	...	Mr. Thomas Glendinning states that there have always been a few birds on his farm for the last 30 years; that for the last two seasons there have been numbers of nests, and that a nest was seen in the end of February 1891.	Increased.
IV. YARROW.										
Eldinhope . .	Grass; no plantation	2000	In 1891	May	3	9 in each	All but one egg hatched	Autumn of 1892	Not seen before.	Increased.
Bowerhope . .	Grass and heather, two plantations	1300	In 1891	...	May have been 3 or 4 broods of young birds seen	...	...	In 1892	...	5 or 6 pairs, 15 counted in sight at once.
Sandhope . .	Grass and heather, with plantations	2400	In 1891	April	Only 1 nest seen; but over 100 owls on farm	9	...	...	...	Increased.
V. MOFFAT DISTRICT.										
Middlegill . .	Grass; no woods .	3000	Since 1890, great increase in 1891	March to July	20	7 to 9, one 11	7	January 1892	A couple about 1888.	Great increase, number on ground.
Howcleuch, Nether & Upper	Grass and heather, 12 to 14 acres of wood	5000 to 6000	Since 1890	March to June	14	6 to 12	4 to 8	1890	Never seen before 1890.	5 to 6 pairs on farm.
Rivox	Heather and grass, a few acres open wood	4000	Two years ago	February to June	7	7 to 9	7 to 9	Two years ago	...	A few pairs.
Holmshaw . .	Grass and heather, one plantation	1000	February 1891	...	...	...	...	Young birds seen, but no nests	Have always been on farm, increased a couple of years ago.	Increased.
Crookedstone .	Bog land, bent, and heather	4000	November 1890	March to July	15	5 to 12	5 to 8	December 1891	Not seen before.	Very plentiful.

General Note.—Mr. Robert B. Bell, Edinburgh, informs me that great numbers of Kestrels have nested at the top of Moffat Water and tributaries. In the Devil's Beef Tub alone there were 18 nests.

NEW SCOTTISH FOSSIL REPTILES.

[At the recent meeting of the British Association in Edinburgh, Mr. E. T. Newton, F.G.S., F.Z.S., communicated a preliminary notice "On some Dicynodont and other Reptile Remains from the Elgin Sandstone," in which he described some very remarkable forms new to science. The detailed description of these specimens is nearly completed, and will, it is hoped, be shortly published. The following is an abstract of Mr. Newton's communication to the Association.—Eds.]

At the Aberdeen meeting of the British Association in 1885 Dr. Traquair called attention to the skull of a Dicynodont which had been discovered in the Elgin Sandstone of Cutties' Hillock (= New Spynie). Since that time several other specimens have been obtained from the same place, some of which are the property of the Elgin Museum, while others belong to the Geological Survey of the United Kingdom. These specimens are now being worked out by the author, and this communication is a preliminary note on the interesting results which have been obtained.

All the reptile remains obtained from Cutties' Hillock are in the condition of hollow casts, the bones themselves having been dissolved away; this, it will be remembered, was the case with some of the examples of *Stagonolepis* from the Elgin Sandstone, described by Prof. Huxley, and the method of taking casts from the hollow cavities, which was adopted in that case, has been found of great advantage in the present instance. The blocks when brought from the quarry were more or less split open, exposing portions of the specimens. In some cases these cavities were traced out and developed with the chisel, while in others they were farther split open, thus allowing casts to be taken. In many cases these casts had to be made in several parts and afterwards fitted together. The time and labour involved in this task have been repaid by the restoration of the skulls and parts of skeletons of several *Dicynodonts* and one or two other equally remarkable forms of reptiles.

In most of these specimens, including that noticed by

Dr. Traquair, the skulls are similar in form, although differing in minor details, and have a general resemblance to the South African *Dicynodon* and *Oudenodon*, some of them having small tusks in the maxillary bones. With most of these skulls parts of the skeleton have been found. Two or three show the position of the vertebral column and ribs, but up to the present no definite centra have been traced ; besides this there is evidence of scapula, clavicle, humerus, radius, and ulna, the humerus having the characteristic anomodont expansion of the two extremities. In two specimens the ilia are preserved. These forms appear to be distinct from *Dicynodon*, and probably represent at least two or three species.

Another skull presents most of the characters of *Ptychognathus*, but has a short muzzle and no teeth. The last, and by far the most remarkable skull of this series, is about six inches in length, and has the outer surface completely covered in by bony plates, the nostrils, eyes, and pineal fossa being the only apertures. The chief feature of this skull is the extreme development of horns upon the face and cheeks, there being about thirty of these formidable defences, varying from a fourth of an inch to nearly three inches in length, besides some smaller bosses. The dentition is pleurodont, and resembles very closely that of the living *Iguana* ; the palate is lacertilian, but with the pterygoids united in front of the pterygoid vacuity. This skull reminds one very strongly of the living *Moloch* and *Phrynosoma*, but it probably finds its nearest ally in the *Pareiasaurus* from the South African Karoo Bed.

A NEW FOSSIL FISH FROM DURA DEN.

By R. H. Traquair, M.D., F.R.S.
Keeper of the Natural History Collections in the Museum of Science and Art, Edinburgh.

Some years ago, while looking over the magnificent collection of Dura Den fishes in the Museum at St. Andrews, Professor Heddle drew my attention to a specimen which, though bearing some resemblance in form to a *Glyptolæmus*, seemed

to him to differ essentially in the squamation, and was therefore probably new to science.

The form of the fish is long and narrow, and shows posteriorly two dorsal fins, behind the second of which the specimen is unfortunately broken off. Its measurements are,

From tip of snout to just behind origin of second dorsal,			$10\frac{1}{2}$ inches.
,,	,,	anterior margin of orbit . .	$\frac{3}{4}$,,
,,	,,	anterior margin of clavicle . .	3 ,,
,,	,,	origin of first dorsal fin . .	$7\frac{1}{2}$,,
,,	,,	origin of second dorsal fin . .	$9\frac{3}{4}$,,
Depth at shoulder and also at middle of body . .			$1\frac{1}{2}$,,

So far as exhibited, the external cranial bones are finely rugose-granulated on their surfaces; the circular orbit is very distinctly marked, and is $\frac{5}{16}$ inch in diameter. The gape is wide but only a few small conical teeth are exhibited. The opercular bones are wanting, a palatopterygoid bone of the usual Rhizodont shape being brought into view. There is also exhibited a clavicle of the same general form as in *Rhizodopsis*, etc. There are some remains of pectoral rays, but the ventral, anal, and caudal fins are not preserved.

The scales are unfortunately badly preserved; only enough is seen to show that they were thin and rounded, and that they exhibited the usual fine, concentric, and radiating markings of the scales in the Rhizodont family.

The head, the scales, the fins, all show that the fish belongs to the family Rhizodontidæ, but its generic position is not so clear owing to its deficient preservation. Unfortunately, with the single exception of the Canadian genus *Eusthenopteron*, very little is known of the Upper Devonian Rhizodontidæ in general, as their remains have hitherto occurred only in the most fragmentary condition, like the Russian remains named by Pander *Polyplocodus*,[1] and those from Clashbennie in Scotland, named by Agassiz *Bothriolepis favosus*, and now provisionally referred by Mr. A. Smith Woodward to Newberry's genus *Sauripterus*.[2]

There is, however, in the collection at St. Andrews,

[1] It has been usually supposed that Pander's *Polyplocodus* is synonymous with Agassiz's *Cricodus*, but I have already, in the first number of this Journal (p. 35), shown that Cricodus was founded on a tooth of Dendrodont structure.

[2] Cat. Foss. Fishes, British Museum, Pt. 2, p. 365.

another specimen of a Rhizodont fish from Dura Den, showing the hinder part of the body and tail; the caudal fin being well preserved and rhombic-diphycercal in its contour, which is thus conformed as it is in the Lower Old Red Sandstone genus *Gyroptychius* of M'Coy. There seems every reason for believing that this specimen is both generically and specifically identical with the one described above, as showing the head without the tail, though it may be doubted if the form of the tail alone is sufficient, considering the bad condition of the scales, to justify the reference of the species to the genus *Gyroptychius*. For the scales of *Gyroptychius* have a peculiar long ridge on the under surface which cannot be seen in the specimens under consideration.

The reference of this Dura Den Rhizodont to a genus can therefore meanwhile only be provisional, but as it closely resembles *Gyroptychius*, so far as its state of preservation allows us to judge, I propose to include it in that genus under the name of *Gyroptychius Heddlei*.

I have, in conclusion, to thank the Committee of the St. Andrews Museum for facilities kindly allowed me for examining and describing the fossil.

ADDITIONS TO THE AUTHENTICATED COMITAL CENSUS OF THE LAND AND FRESHWATER MOLLUSCA OF SCOTLAND.

Wm. Denison Roebuck, F.L.S.,
Hon. Sec. and Recorder to the Conchological Society of Great Britain and Ireland.

I have some further notes to submit in continuation of my paper in the "Annals of Scottish Natural History" for April 1892, pp. 104-107, mostly the result of the work of my friends Mr. William Evans, F.R.S.E., and Rev. George Gordon, LL.D.

6. **Helix rufescens on Stirling Castle Rock.**—This is an addition to the Stirlingshire list, and an important extension to the north-east of the Scottish range of the species. Mr. Evans collected

it on the 28th April last, in fair quantity, and sent them to me for examination, along with numerous examples of *Clausilia rugosa*, and odd ones of *Helix hispida*, *H. nemoralis* var. *libellula* 1 (23) (45), *H. rotundata*, *Vitrina pellucida*, *Zonites cellarius*, *and Z. nitidulus*.

7. **Mollusca in South Perthshire.**—Mr. Evans spent some little time last April in the neighbourhood of Callander, and to very good purpose. The following is a list of species I received from him, those marked * being additions to the records for the vice-county.

Arion ater.—Callander, one, small.
* *A. subfuscus.*—Callander, several.
* *A. hortensis.*—Callander, numerous.
A. circumscriptus (= *A. bourguignati* of my former papers).—Callander, a few.
* *A. minimus.*—Callander, a few.
* *Limax arborum.*—Callander, one, small.
Agriolimax agrestis.—Callander, common.
* *A. lævis.*—Port of Menteith, one.
Vitrina pellucida.—Callander, Bracklinn Falls, and Loch Lubnaig, a few.
Zonites cellarius.—Callander and Loch Lubnaig, several.
Z. alliarius.—Callander, Loch Lubnaig, Bracklinn Falls, Banks of the Keltie near Callander, and Callander Crags, numerous.
Z. nitidulus.—Port of Menteith, Loch Lubnaig, and Callander, not uncommon.
Z. purus.—Bracklinn Falls and Loch Lubnaig, a few.
Z. radiatulus.—Bracklinn Falls and Callander, several.
Z. excavatus.—Callander Crags, two.
Z. crystallinus.—Loch Lubnaig and banks of the Keltie near Callander.
Z. fulvus.—Port of Menteith, Bracklinn Falls, banks of Keltie, and Callander, common.
* *Helix lamellata.*—Banks of the Keltie near Callander, a few.
* *H. nemoralis.*—Var. *rubella* at the Pass of Leny, and vars. *rubella* and *libellula* at Callander, several.
* *H. fusca.*—Callander, a few.
H. rotundata.—Loch Lubnaig, Bracklinn Falls, and Callander, common.
Pupa umbilicata.—Callander, a few.
Vertigo edentula.—Bracklinn Falls and Callander, a few.
Clausilia rugosa.—Callander, a few.
* *Zua lubrica.*—Loch Lubnaig, and an irrigated meadow at Callander, a few.
Carychium minimum.—Pass of Leny, one.
* *Planorbis albus.*—Callander, one.
* *Pl. contortus.*—Callander, several.

Limnæa peregra.—Loch Lubnaig, one.
* *L. palustris.*—Irrigated meadow at Callander, several.
L. truncatula.—Irrigated meadow at Callander, a few.
* *Ancylus fluviatilis.*—Burn near Callander, one, large.
* *Pisidium fontinale.*—Loch Lubnaig and Callander, numerous.
P. pusillum.—Callander, numerous.

These additions bring up the total number of species fully authenticated for the vice-county to 39.

8. **Mollusca in Mid Perthshire.**—Another place to which Mr. Evans devoted attention during April and May was the immediate neighbourhood of Loch Tay, in the mid division of Perthshire, from which he sent me the following species, those marked * being new species-records for the vice-county :—

* *Arion subfuscus.*—Drummond Hill, common.
* *A. minimus.*—Between Fearnan and Kenmore.
* *Limax cinereo-niger.*—Drummond Hill, five obtained.
* *Agriolimax lævis.*—Fearnan and Lawers, both on Loch Tay side, a few.
Vitrina pellucida.—Fearnan, several.
Zonites cellarius.—Fearnan, and Drummond Hill between Fearnan and Kenmore, numerous.
Z. alliarius.—Fearnan, a few.
Z. nitidulus.—Fearnan, and Drummond Hill, numerous.
* *Z. radiatulus.*—Fearnan, a few.
* *Z. excavatus.*—Fearnan, one, juv.
Z. crystallinus.—Fearnan and Drummond Hill, a few.
Z. fulvus.—Fearnan, a few.
Helix lamellata.—Drummond Hill, several.
* *H. aculeata.*—Drummond Hill.
H. nemoralis.—Drummond Hill, vars. *rubella* and *libellula*, a few.
H. hortensis.—Drummond Hill, one.
H. arbustorum.—Lawers, a few.
H. hispida.—Fearnan, numerous.
H. rotundata.—Fearnan, a few.
* *H. pygmæa.*—Drummond Hill, a few.
Bulimus obscurus.—Pass of Lyon near Fearnan, several.
* *Pupa ringens.*—Drummond Hill, a few.
* *P. umbilicata.*—Fearnan, numerous.
* *Vertigo edentula.*—Drummond Hill.
Clausilia rugosa.—Drummond Hill, a few.
Zua lubrica.—Drummond Hill, a few.
* *Carychium minimum.*—Fearnan, and Drummond Hill, a few.
* *Ancylus fluviatilis.*—Fearnan, a few.
* *Pisidium fontinale.*—Curling-pond at Fearnan, a few.

These additions bring up the total number of species on authenticated record for the vice-county to 44.[1]

9. **Mollusca in Elginshire.**—In August 1891 Mr. Evans sent me the following species from Castle Roy, close to Nethy Bridge, which is politically in Inverness-shire, but really in Elginshire according to the Watsonian system of vice-counties which is followed in botanical and conchological work.

Arion circumscriptus (= *A. bourguignati* of my former papers), *A. minimus*, *Limax arborum* var. *nemorosa*, *Agriolimax agrestis*, *Vitrina pellucida*, *Zonites alliarius*, *Helix pulchella*, *Vertigo pygmæa*, and *Zua lubrica*, none of them being additions to the list.

From Grantown, about the same time, Mr. Evans sent me *Arion circumscriptus*, *A. minimus*, **Limax maximus* var. *fasciata*, *Agriolimax agrestis* var. *sylvatica*, *Vitrina pellucida*, *Zonites alliarius*, and *Zua lubrica*, the one marked * being the only additional species for the county, whose list now includes 53 species.

The Rev. Dr. Gordon has lately forwarded me examples of *Limnæa peregra* from Balnageith near Forres, Elginshire, and of *Agriolimax agrestis* from Clunymore, alt. 700 feet, in the neighbouring county of Banff.

10. **Helix caperata in North Aberdeenshire.**—Rev. Dr. Gordon sent me in May last three small examples of *Helix caperata* from Inverugie, an addition to the very scanty list of species we have seen from this vice-county, which is apparently one of the least worked parts of Scotland.

ENTOMOLOGISING IN AYRSHIRE.

By George W. Ord.

The Girvan district of Ayrshire does not appear to have been much worked by entomologists, so that the following notes on insects, taken during a fortnight's visit (27th June to 11th July) last year, may not be without interest. The weather was not of the best, as we had only three days of decent sunshine, and on this account our list, especially as regards butterflies, is perhaps smaller than it might otherwise have been. Our total captures of Macro-Lepidoptera numbered 83 species, of which 11 were Butterflies, 5 Bom-

[1] The occurrence of *Limax cinereo-niger* is of exceptional interest, as I have never seen the species from a locality so far south in Scotland before, and I have not seen it from the Lowlands or the western counties at all.

byces, 40 Geometræ, and 27 Noctuæ. The most notable butterflies were *Satyrus Hyperanthus*, L., *Lycœna Alsus*, Fab., and *L. Artaxerxes*, Fab., the first being very abundant on the damp ground along the Ballantrae Road. *L. Alsus*, we got plentifully on one small bank half a mile south of the town of Girvan, but it was seen in no other locality, so its range must be very restricted. Even on the spot mentioned it appeared to be confined to a small plot some twelve yards square, for within that radius three-fourths of our specimens were taken. *L. Artaxerxes* does not appear in the "Fauna and Flora of the West of Scotland" published by the Natural History Society of Glasgow, but, previous to our visit, it had been recorded for Ayrshire by Mr. Birchall ("Newman's History of British Butterflies," p. 128). It appeared to be common enough on the hills in the Girvan district. *Satyrus Semele*, L., and *Thanaos tages* were the only other butterflies taken which are worthy of mention.

Of the Bombyces the only species of any rarity was the Cinnabar Moth, *Euchelia jacobeæ*, L. Only one imago of this insect was taken, but the eggs and young larvæ were exceedingly abundant on Turnberry Sands. We brought a number of these to Glasgow and obtained a fair series of perfect insects from them.

The district appeared to be very rich in Geometræ, and to this family belong the bulk of our captures. Among the less common species were, *Venusia cambricaria*, Curt., *Cleora lichenaria*, W. V., *Acidalia fumata*, Steph., *Abraxas ulmata*, Fab., *Lomaspilis marginata*, L., *Emmelsia affiniata*, Steph., *E. alchemillata*, L., *E. decolorata*, Hub., *Eupithecia pygmæata*, Hub., *Thera firmata*, Hub., *Coremia propugnata*, W. V., *Cidaria corylata*, Thunb., *Cidaria silaceata*, W. V., *Eubolia palumbaria*, W. V., *Tanagra chœrophyllata*, L., etc., many of these being in great abundance. In Penwhapple Glen, for instance, the most abundant insect was *Abraxas ulmata*, a very rare insect in most parts of Scotland. It is to be found by day at rest on elm leaves, and is very conspicuous. It does not appear to be so obnoxious to birds as its relative the common Magpie Moth, *Abraxas grossulariata*, L., as we found the dry bed of the stream literally strewed with wings and other relics of the departed.

Our captures of Noctuæ included *Thyatira batis*, L., *Cymatophora duplaris*, L., *Leucania pallens*, L., *Axylia putris*, L., *Agrotis exclamationis*, L., *Noctua umbrosa*, Hub., *Euclidia mi*, L., etc. Sugaring did not pay very well, few insects ever approaching it. Many interesting insects belonging to other orders were also obtained, the most local being a female Glow-worm, *Lampyris noctiluca*, L.

ON CERTAIN NEW OR RARE ROTIFERS FROM FORFARSHIRE.

By W. T. Calman, University College, Dundee.

PLATE VIII.

Notops pygmæus, n. sp.

A MINUTE rotifer, which appears to be new, has occurred several times in the water supplied to Dundee from the Monikie reservoirs. It is at once remarkable for its brilliant colour. Through the thick but clear and transparent skin, the body of the animal appears of a light red colour, in the midst of which lies the stomach of a deep blue; and these colours are perfectly constant in numerous specimens that I have seen over a period of six years. The HEAD is completely retractile within the lorica, and the oral edges of the latter are curved inwards over it when it is withdrawn. The FRONT possesses apparently a single ring of cilia, near the ventral side of which the mouth opens. The foot may be retracted within or protruded from a long tubular sheath which passes obliquely backwards from its orifice. For some little distance from the orifice this sheath is thickened, and this portion of it survives with the rest of the lorical skin when the animal is treated with caustic alkali. Close to the orifice, a short rounded diverticulum is given off from the sheath. The FOOT is soft and flexible, and I have not seen more than a single pointed toe. The STOMACH is very large and studded with large oil-globules. Its upper portion fills the space between the great mastax and the sheath of the foot; below it curves round ventrally, and is succeeded by a narrower intestinal

portion of a lighter colour (devoid of the peculiar blue), lined with cilia, which in all probability opens at the base or inner extremity of the passage above described as the sheath of the foot. Close to the same point appears to be the orifice of the rather large contractile vesicle. Of the NEPHRIDIA, four ciliated funnels ("vibratile tags") on each side were seen, but no "convoluted tubes" could be observed. The BRAIN is large, oval, colourless, and transparent, though at the same time minutely granular. The EYE, which is of moderate size and brightly red, is situated (as for instance in *Mastigocerca carinata*), on the internal lower edge of the brain. The TROPHI are, compared with the animal's size, very large, and are peculiar both in shape and in position. The incus is forcipate, and lies, when the animal is extended, almost transversely to the length of the body, the fulcrum pointing in the direction of the foot. Both fulcrum and rami are long; at their junction with one another two lateral alulæ present themselves; they lie in the same plane with the rami, to which plane the fulcrum on the other hand is somewhat inclined in the direction of the foot. From the rami, a very long curved object runs towards the mouth, and can be protruded therefrom. That it has something to do with the malleus or mallei cannot be doubted; but there is no sign of division into uncus and manubrium, and I am even unable to say whether it be single or double. It may represent a single malleus, the other (small and unsymmetrical in for instance the Rattulidæ) being here perhaps quite absent; and the existent single one showing as a protrusible style. Just over the hinder part of the brain, but some distance to the right of the middle line, is placed a very minute *antenna* bearing apparently only a single bristle. On the sides of the body are the lumbar sense organs, also very minute, consisting of short rounded tubercles, probably setigerous, although this could not be satisfactorily determined. That on the right side is placed nearer the ventral and posterior edge of the body than that on the left. This unsymmetrical arrangement of the three setigerous sense organs is noteworthy. The total length of the animal when fully expanded is about $\frac{1}{250}$ of an inch, the breadth about $\frac{1}{350}$.

The only known species which at all resembles this is

a minute form recently described by Rousselet[1] as *Notops minor*, n. sp. Of this species the details given are as yet few. The two forms are similar in size, but the foot in Mr. Rousselet's species seems to be much nearer the posterior extremity: the two toes are conspicuous: and the blue colour of the stomach, so constant and characteristic a feature of ours, is not observed.

Copeus Ehrenbergii, Gosse = **Notommata Copeus,** Ehrenberg.

In Messrs. Hudson and Gosse's "Rotifera" (vol. ii. p. 28), Mr. Gosse notes that this rotifer, the first and typical species of his genus *Copeus*, has apparently not been re-observed since its description by its discoverer, though several other closely allied but distinct species are now known: of these the nearest ally appears to be *Copeus labiatus*, Gosse, which indeed Mr. Gosse at first referred to the true *Notommata copeus* of Ehrenberg. I have found in the neighbourhood of Dundee several specimens of a form which appears to be identical with that figured by Ehrenberg, and removes accordingly any doubt as to the validity of the original species.

According to Dr. Hudson ("Rotifera," App. p. 19), *Copeus Ehrenbergii* is (from its description) so like *C. labiatus*, when its auricles are withdrawn, that it might easily be mistaken for that animal: it differs from *C. labiatus* in the shape of the front, in the possession of large telegraph-like auricles, in the much smaller size of its ciliated lip, and in its foot having three joints instead of two.

Our species resembles *C. labiatus* in size and in general shape. When swimming, it is about $\frac{1}{40}$ inch long, narrow and cylindrical anteriorly, posteriorly broad and ventricose. The face is covered (as for instance in *Notommata aurita*) with short cilia, and runs downward exactly as in *C. labiatus* into a pointed, channeled lip, the groove in which is lined by a continuation of the same cilia. At certain times, when the animal is swimming freely in the water, the great lateral, "telegraph-like" auricles are seen

[1] "Journ. of the Quekett Microscopical Club," (2). iv. p. 359, pl. xxiv. figs. 9-10, Jan. 1892.

expanded. They are broad ovate arms, somewhat expanded at the ends, and, when fully extended, distinctly longer than the breadth of the head. They are furnished with rather long cilia, which cover their ends, and apparently their upper surfaces to the base; but as the animal swims with great rapidity when they are expanded, the exact distribution of the cilia is difficult to see. How these auricles are projected and retracted, and whether or not they are invaginated into pouches, I have not been able to determine. In their retracted state I have failed to see a trace of them. Sometimes a single auricle is expanded alone. On the dorsal side of the head is a short ANTENNA, broad below, then narrowing suddenly to a blunt point, crowned with a tuft of rather long sensory bristles. At the broadest part of the ventricose body spring two lateral tufts of much longer sensory bristles, in the position in which Gosse figures (*loc. cit.*) a pair of single bristles only in *C. labiatus*, but where a bunch of setæ has already been recognised in *C. pachyurus* (Hudson "Rotifera," App. p. 20, footnote). The TAIL is well marked, short, and transparent. It is narrower near the base than in the middle, where there is formed an abrupt shoulder, succeeded by a straight, blunt, apical portion. The FOOT is rather long, and consists of two joints, carrying a pair of straight pointed toes. A very fine covering of gelatinous mucus clothes the body of the animal, so transparent in its nature as to be scarcely detected save for the presence in it of minute adherent particles.

From this description of the external view it results that our species resembles the description and figure of *Copeus Ehrenbergii* in its general form, the size and position of the auricles, the size and shape of the tail, the position of the lumbar processes, and the possession of a gelatinous covering. It differs from the account of that species in not having the tips only of the auricles ciliated (Ehrenberg's figure suggests an attempt to make the ends of these organs look like the wheels of an ordinary *Rotifer*), in having only two joints to the foot, but in this matter, though Ehrenberg's description gives three, his figure only shows two; in the possession of two bunches of fine setæ in the lumbar region instead of a pair of single stout bristles, a difficult matter to define with

an imperfect instrument. The balance of characters seems to show that the two species are practically identical.

On the other hand, the general characters, and in particular the lip, are extremely like *C. labiatus*, in which species, however, Mr. Gosse, though he appears to have studied it repeatedly, never detected any protrusible auricles, nor any trace of gelatinous covering. At the same time, if our species were studied in only a small quantity of water, it might be examined over and over again and its auricles never seen. Mr. Gosse figures the lumbar sense-organs as single stout bristles, but he seems to have had some doubt on this point, as in the description he calls them "apparently single."

Proceeding to the internal structure:—The BRAIN, which is large and transparent, is formed apparently of three lobes as described by Gosse in *C. labiatus*. Two lobes are lateral, short, and each containing a well-defined rounded spot of dark pigment. The central lobe is long, dependent, enlarged at the extremity, and free from granular or pigmentary deposit. The red EYE, which is stated by Gosse to be situated in *C. labiatus* and *C. cerberus*, on the narrow waist of this central lobe, is here placed more anteriorly, in the very front of the brain. The TROPHI, of which I have not made a special examination, seem to correspond with the figure of *C. labiatus*. The ŒSOPHAGUS is very long, narrow, and transparent. The STOMACH is wide and large, but has never shown to me that peculiar appearance of being divided up by constrictions into squares which, according to Gosse, is in *C. labiatus* "not accidental but characteristic, being seen in every example that has occurred to me, and distinguishing the species from all its congeners." The two ovate GASTRIC GLANDS are present, perched on the anterior border of the stomach. The NEPHRIDIA (*branchiæ* of Gosse), are in the usual form of convoluted tubes, on each side of which I have seen at least four ciliated funnels ("vibratile tags.") In several specimens the ovary appeared as a single row of globular, nucleated, transparent cells.

Triarthra terminalis, Plate.[1]

A solitary specimen of this rotifer was found in sediment of Dundee tap-water. It does not seem to have been hitherto recorded in Britain, and, as Dr. Plate gives no figure, the accompanying sketches may be of interest. I have unfortunately no observations on its internal structure.

Explanation of Plate VIII.

Fig. I. *Notops pygmæus*, n. sp.
I. *a* Dorsal view.
I. *b* Front view of trophi.
,, II. *Copeus Ehrenbergii*, Gosse.
II. *a* Head with expanded auricles.
II. *b* Head with outline of brain.
II. *c* Head in lateral view, with retracted auricles.
,, III. *Triarthra terminalis*, Plate.
III. *a* Outline of the same, in contracted state.

a	Antenna.	*ls*	Lumbar setæ.
br	Brain.	*lt*	Left lumbar tentacle.
cv	Contractile vesicle.	*œ*	Œsophagus.
e	Eye.	*ov*	Ovary.
ft	Foot.	*rt*	Right lumbar tentacle.
gg	Gastric gland.	*t*	Toe.

PISTILLODY OF THE STAMENS IN THE "CHAMPION" POTATO

By James W. H. Trail, M.A., M.D., F.L.S.

For several years I have observed every season that pistillody of the stamens has been of very frequent occurrence in fields of potatoes near Aberdeen; and this year it has been extremely common and well marked in numerous fields within a radius of several miles. On inquiry I find that it seems in all cases to be the "Champion" variety that shows this curious sport in the flowers. Mr. Alexander Macdonald, in reply to an inquiry whether he had observed this condi-

[1] Dr. L. Plate, "Beiträge zur Naturgeschichte der Rotatorien" Jenaische Zeitsch. f. Nat. (Bd. xix. p. 19, 1885.)

tion in Durris on the south bank of the Dee, about twelve miles from Aberdeen, tells me that in five fields of "Champions" in his immediate neighbourhood he had found it common. It seems to have become habitual in this variety of potato in this vicinity. Has anything of the kind been observed elsewhere?

The flowers of the "Champion" potato vary much near Aberdeen, the variation depending on the extent to which pistillody has affected the stamens. Certain plants seem more prone than others to the alteration; but widely different degrees of it may be observed in the same inflorescence. The younger flowers in an inflorescence seem more liable to be affected as regards both frequency and degree. All the flowers show a marked tendency to fall off, either very soon after they open or while still in bud. I have not observed fully-developed fruits or "plums" on this variety of potato. In any case their production must be rare. The "Champion" potato is largely cultivated in the neighbourhood of Aberdeen; where it has a high reputation as yielding large returns, and resisting disease better than most other varieties. Possibly the vigour and healthiness of the organs of vegetation may be connected with the tendency of the flowers to fall off early.

Only a small proportion of the flowers are of the ordinary structure. In considerably less than one-half are the petals as large and well-formed as usual in potatoes; and in many even of these the stamens, though to a comparatively slight extent, show evident tendency towards pistillody. Even where the filament and anther are distinct, and where the anther is coloured as in the healthy stamen, and produces pollen, one very often sees the connective prolonged into a small style with a minute stigma; or the stigma may arise from the inner surface of the connective, near the base. More often one or more, or all, of the petals are dwarfed into narrow segments, little longer than the sepals; in which case they very often remain greenish white. The inner organs of such flowers are often visible externally while in the bud. The aspect of the inflorescence is changed so much as to become recognisable from a distance of a good many yards.

In the more extreme cases the stamens are so greatly metamorphosed as quite to assume the appearance of carpels, each having a well-developed ovary, style, and stigma. On making a cross section of the ovary one finds usually numerous ovules crowded on a single placenta. Very seldom is the placenta double as in the true pistil. Frequently the inner surface of the connective bears near its base a placental wart covered thickly with ovules. One finds at times one side of the anther still producing pollen and the other metamorphosed, and bearing ovules on such a placenta as that now described. The ovules produced on the modified stamens vary from a rudimentary to a well-developed condition. In many of the flowers the true pistil differs from the five or six staminal pistils around it in little save its rather larger size and more regular form. All the pistils may enlarge for a time; though even the true pistil seldom reaches the size of a small pea before the young fruit falls off. Occasionally one meets with flowers in which one or more of the staminal pistils become lobed, each lobe bearing an ill-formed style and stigma.

I am not aware of any record of so abnormal a condition as pistillody of the stamens becoming habitual on so wide a scale in the potato or in any other species of plant. The tendency to it certainly appears to be already habitual in the "Champion" potato, and to become more marked in the successive generations.

CONTRIBUTIONS TOWARDS A FLORA OF CAITHNESS. No. II.

By Arthur Bennett, F.L.S.

In the "Scottish Naturalist" for 1888 Mr. Grant and myself published a list of Caithness plants, using as far as then possible such materials as we had in our possession. Since then I have tried to gather together any matter that seemed to assist in building up the records for some future Flora of the county.

In the first place, some apology is needed to Dr. R. Brown of Campster; inasmuch that his two papers (afterwards named) were not consulted.

When reading the life of Robert Dick of Thurso, it seemed to me that if those who so persistently asked him for the Holy-Grass had only been as keen in the advancement of Botany as in the greed for specimens they might have been the means of some use being made of Dick's knowledge of the Caithness Flora:—that he would communicate with any one who he saw was really anxious was seen by the hearty and laborious way in which he helped Hugh Miller in geology. Since his death two more remarkable men have made the Flora their part study:—Mr. Henderson, a shepherd (of whom a sympathetic notice appeared in "The Northern Ensign," by my friend Mr. Grant), and Mr. Rosie, a postman; to both of whom Mr. Grant and myself are much indebted.

The flora is far from being exhausted, I feel sure. So far as the Cryptogams are concerned little has yet been done. Dick's fine series of Mosses were sent to Liverpool 13 years ago to be named, and have never been returned. To whomsoever they went, it is a downright bit of dishonesty not to return them, even if they could not be named.

The papers by Dr. R. Brown were published in "The Transactions of the Edinburgh Botanical Society," 1860, p. 328; and 1863, p. 8. Beyond these the principal paper is one by Dr. Craig "On the Excursion of the Scottish Alpine Club to Sutherland and Caithness in 1888," "Trans. Edin. Bot. Soc.," 1889, p. 379.

I give such notes below as I have accumulated.

Thalictrum majus, *Crantz.*—Dunnet, *J. Grant! Dick.*

"Thalictrum flavum."—Sandside, Caithness, *T. J. Cowie*, fide H. C. Watson, in "Outlines of the Geogr. Dist. of Brit. Plants," p. 79 (1832), "Probably a form of minus"; Watson in "Geogr. Distrib.," p. 49 (1843).

T. maritimum.—Reiss, Murkle.

Ranunculus confusus.—*R. Brown,* in Catalogue sent to H. C. Watson.

Ranunculus aeris; var. **tomophyllus** (*Jord.*).—Sandy cliffs; Sandside Bay, Reay.

Caltha palustris; var.—*Dr. Ward*, sp.!

Papaver dubium.—Cornfields, Reay, *W. F. Miller.*

Fumaria officinalis.—Potato field, Dunnet, *W. F. Miller.*

F. parviflora.—*R. Brown*, l.c. p. 8.

Subularia aquatica.—Loch at Calam, *T. Henderson*, 1889.

Cochlearia danica.—*R. Dick*, in Brown's Cat. to H. C. Watson.

† **Camelina sativa.**—Ballast heap, Wick, *R. Brown*, l.c.

? **Cardamine impatiens.**—*R. Brown*, in Cat., l.c. p. 329.

Viola lutea, amœna.—Dunnet Hill, 1889, *W. F. Miller.*

Hypericum quadrangulum.—*R. Dick*, fide R. Brown, l.c. p. 329.

Tilia parvifolia.—*R. Brown*, in Cat., l.c. p. 328.

Linum catharticum, *L.*; var. **condensatum**, *Lange.*—Reay Links, *Messrs. Linton.*

† **Acer Pseudo-platanus.**—Fairly grown trees in seed; several plantations about Thurso and Reay, *W. F. Miller.*

Lathyrus sylvestris.—Cliffs near Berriedale, *Messrs. Linton*, J. B., 1889, p. 209.

Rubus hemistemon, *P. J. Müll.*—Dunbeath, *Mr. Linton*, J. B., 1889, p. 209.

Rosa canina, *L.*; var. **Watsoni.**—Near Dunbeath, *Messrs. Linton*, J. B., 1889, p. 209.

Dryas octopetala.—In his second communication Mr. R. Brown remarks on this plant "During the last two years I have searched every likely locality, especially limestone rocks which it affects, but have never seen a trace of it." He goes on to say that "through the kindness of Mr. Peter Anderson of Inverness, one of the authors of the "Guide" (where *Dryas* was reported), and the Rev. Dr. Gordon of Birnie, who revised the list of Highland plants, I have been favoured with a perusal of the original M.S. and localities; and I find no locality is given for *Dryas*; and the introduction of it into the Caithness list must have arisen from oversight." Yet the plant comes so near the Caithness border, at Melvich, that it might be expected between there and Downreay, where the *Oxytropis* grows. Dick also states he had many hunts for it.

Rosa canina, *L.*, var. **Andevagensis**, *Batard.*—*Miller*, 1889.

R. canina, *L.*, var. **glauca**, *Vill.*—Berriedale, *W. R. Linton*, 20th July 1888.

Pyrus Aria.—*R. Brown*, l.c. p. 329.

P. Malus.—*R. Brown*, l.c. p. 328.

Saxifraga aizoides.—*R. Dick, fide* J. Grant in Cat. at Kew.

S. oppositifolia.—*R. Brown*, in Dick's Cat. at Kew.

† **Ribes alpinum.**—*R. Brown*, l.c. p. 328.

Scleranthus annuus.—For several years round Wick, *C. W. Peach.*

Chœrophyllum temulentum.—*R. Brown*, l.c. p. 329.

Valeriana dioica.—*R. Brown*, l.c. p. 329.

Solidago virgaurea, var. **cambrica.**—Cliffs at Dunnet, *W. F. Miller.*

Chrysanthemum Leucanthemum.—Rare 20 years before 1881. Dick had found only three specimens. *Grant*, in Cat. to H. C. Watson.

Anthemis nobilis.—*R. Brown*, l.c. Was formerly grown in the "kail-yards" at the back of the cottages, so likely enough escaped.

Matricaria maritima, *L.*—Ackergill sandhills, *Rev. E. Marshall.*

Arctium majus.—*R. Brown*, l.c.

Eupatorium cannabinum.—Cliffs between Dunbeath and Berriedale, *R. Rosie.*

Saussurea alpina, *D.C.*; var. **macrophylla** (*Gren. et Godr.* sp., *non* Sauter !).—Near Thurso, *J. Grant!*

Hieracium murorum, *L.*; var. **basifolium,** *Almq.*—

„ „ var. **crassiusculum,** *Almq.*—

H. anglicum, var. **longibracteatum,** *Hanb.*—Reay.

H. proximum, *Hanb.* (non Norrlin) ("= var. *farinosum*, Lindbg.," in "Scot. Nat.")—Isauld burn and Thurso river, *W. F. Miller.* Mr. Hanbury published his name about six weeks before that of Norrlin appeared.

H. scoticum, *Hanb.*—Thurso river, *W. F. Miller.*

H. caledonicum, *Hanb.*—Scrabster, *W. F. Miller.*

H. oreades, *Fr.*—Strathsteven, *J. Grant!* Berriedale, *W. R. Linton.*

H. Friesii, *Hartm.*; var. **vestitum,** *Lindeb.*—Lybster, *J. Grant!*

H. auratum, *Fr.*—Reay, *W. F. Miller.* Sandside, Isauld Burn, *W. F. Miller.*

Leontodon autumnalis, var. **pratensis.**—Loch Winless, *Fox & Hanbury.*

† **Campanula rapunculoides.**—Stirkoke !

C. rotundifolia, var. **lancifolia,** *Koch.*—Dunnet Hill, *W. F. Miller.*

Polemonium cœruleum.—Near Thurso; *Dick's herbarium.* On a moor on the middle of Dunnet Head; see Report of Scot. Alp. Club, by Dr. Craig, in "Trans. Edin. Society," 1889, p. 379.

Convolvulus sepium.—*R. Brown*, l.c.

† **Anchusa sempervirens.**—*R. Brown*, l.c.

Veronica Anagallis.—*R. Brown*, l.c.

var. **anagalliformis,** *Boreau.*—Dunnet, *W. F. Miller.*

Euphrasia Rostkoviana, var. **borealis.** Townsend, *W. F. Miller!* Along the coast.

Salsola Kali.—Sandy shore, Reay, *W. F. Miller!* Freswick Bay, *Mr. Peach.*

[**Chenopodium Bonus-Henricus.**—"Very common in some places along the shore," *fide R. Brown*, l.c.—Some error?]

Rumex sanguineus.—*R. Brown*, l.c.

Salix cinerea × **aurita.**—(× *S. lutescens*, Kerner), Caithness, *E. F. Linton, fide* Dr. B. White.

Salix repens, var. **argentea.**—Dunnet Hill, *F. W. Miller!*

[**Hippophae rhamnoides.**—Abundant at Reay, *Dr. Davidson, in litt.* 10th August 1887. Some mistake?]

Typha latifolia.—Duran, 1863, *R. Dick.*

Potamogeton nitens, var. **latifolius.** Tisel.

P. natans, var. **lanceolatus.** Fieber. Thurso River, *Grant, Hanbury.*

P. heterophyllus, *Schreb.*, var. **graminifolius.**—Thurso River, *Grant!*

Luzula Forsteri,—*R. Brown*, l.c. When Dr. Brown reported this to the Edinburgh Society, naturally enough doubt was expressed (January 12th, 1860). In November of the same year Dr. Brown, in a second communication, remarked that he "had in company with Mr. Drummond very carefully examined specimens of the plant from the locality, both by comparison with English specimens and with published descriptions, and I believe it to be the true plant." May not the explanation be, that some other species, neither *pilosa* nor *Forsteri*, was gathered. Unfortunately, I have failed to trace the specimens.

Potamogeton plantagineus.—This fails to reach mid-Scotland, *fide certain* published records (Argyle?); but it reaches the provinces of Blekinge and Gotland in Sweden; so that there is no great improbability that it may be found in the north of Scotland. Robert Dick's specimens, seen by Mr. Grant, are said to be *polygonifolius*; I have not yet seen them myself.

P. pectinatus, *L.*—Wick River, *J. Grant.*

Schœnus nigricans, var. **nana,** *Lange.*—Loch Winless, pasture by the sea, east of Reay, *W. F. Miller!*

Carex pauciflora.—Morven, *R. Dick.*

C. Goodenovii, var. **juncella,** *Fr.* (sub. *vulgaris*).—Thurso river near its mouth, *W. F. Miller!*

C. salina, *Wahl.*, var. **Kattegatensis,** *Fr.* (*Sp.*)—Mr. Nicolson of Wick writes me that this "was sent to Prof. Dickson at Edinburgh, but was not recognised by him."

C. paludosa.—Isauld Burn, *W. F. Miller*, 1889.

Hierochloe borealis.—Once found in the Forss Water near the mill, *R. Dick.*

Alopecurus fulvus.—Near the salmon pool, Thurso, *R. Brown*, l.c. Not on record north of Chester; but reported from Fife and Forfar, not confirmed. It is reported from many places in Norway north to Varanger. But there is another plant it might have been, lately described as a new sub-species by A. Blytt; *i.e. A. intermedius* (=*geniculatus—fluitans* Blytt, in "Norges Flora," p. 68; *an* L?). But we have no specimens to decide from.

Agrostis alba, var. **subrepens,** *Bab.*—Breakwater, Wick, *J. Grant.*

Deyeuxia strigosa.—*Robert Dick* found this at Duran in 1863. Specimens were sent to Prof. H. Balfour, and were named by him "*Calamagrostis stricta.*" Dick, however, evidently did not agree with this determination, as he calls it "The Lapland Rush."

Poa trivialis, f. **grandiflora,** *Hackel.*—Westerseat, *J. Grant.*

Athyrium Filix-fœmina, var. **rhæticum.**—Dunnet Head, *R. Dick.*

Lastrea fœnisecii.—Dunnet Head, *R. Dick.* Would need to be gathered again.

Polypodium calcareum.—Morven, *R. Dick.* Like the last species, this would need to be again gathered before it could be safely accepted.

Chara fragilis, var. **delicatula.**—Loch on Holborn Head, *Reeves and Ward.*

There are still some 30 to 40 species that should occur in the county, as they nearly all occur either in Sutherlandshire, the Orkneys, or Shetlands.

NOTES ON "ENGLISH BOTANY, SUPPLEMENT."[1]

Parts I. and II.

By G. Claridge Druce, M.A., F.L.S.

This the supplement to [Boswell] Syme's English Botany is to be prepared by Mr. N. E. Brown as far as Dipsaceæ. Mr. Arthur Bennett is to complete the work, which it is expected will reach to eight or nine parts.

The first part gives coloured plates of *Ranunculus flabellatus* (*R. chærophyllos*), *Arabis alpina*, *Polygala amara*, *Claytonia sibirica* (*C. alsinoides*), and *Lavatera cretica* (*L. silvestris*). A good plate of *Brassica Napus* to replace the old one in "E. Bot." is also supplied. Although dated on the title-page 1891, I do not think this part was issued till 1892; in fact all along there has been great neglect in properly dating the publications of the parts of "English Botany," which should not occur in works of this importance.

The compiler apparently dates his citation of species from the first edition of the "Systema Naturæ," of 1735. I have elsewhere[2] pointed out at length the objections which exist to going back to that date, and have suggested that the date taken should be 1753; when the binomial system was first consistently applied in the first edition of the "Species Plantarum." If the date chosen, 1735, had been rigorously followed, very many generic names would have had to be altered from those employed in "English Botany."

An innovation which (although followed by some eminent foreign botanists) is not altogether pleasing is that of commencing all specific names, except those derived from persons, with a small letter. British custom has almost been universal in writing names which have been used in a generic or appellative sense with an initial capital.

The compiler must be congratulated, however, on the much more complete and correct citation of authorities than was to be found in Syme's portion of the work; and it is to be

[1] "English Botany," Supplement to the Third Edition, Nos. 90 and 91. By N. E. Brown, 1891-92. J. Bell and Co., No. 90, 5 plates; No. 91, 1 plate.

[2] "Pharm. Journal, Mar." May 1892.

wished that it might be followed not only with the synonyms but also with the botanical names of the plants and of their genera.

The species of *Thalictrum* receive a complete revision; and the arrangement is certainly now more natural, and nearer the facts than are the names given in the "London Catalogue."

Anemone nemorosa, L., has two varieties now given, viz. var. *rubra* and var. *cærulea*; but the authority given (Pritzel, in "Anem. Revis.") is antedated by that of De Candolle in "Fl. France," v. p. 884, (1805), where they are described as var. *cærulea* and var. *purpurea*. See "(Verhandlungen des Bot. Verein der Prov. Brand.," xxxiii. 1892). The latter I have seen in its most typical form from Staffordshire.

R. auricomus, L.—Surely the var. *apetalus* of Wallroth is scarcely worth including as a variety, since the same plant may show the various stages.

The forms of *R. acris* have not received sufficient attention. The true *R. acris* I have seen in Berks and Hants; but the common buttercup of the Highlands is *R. vulgatus*. Jord. I still think the var. *pumilus*, Wahl., worth varietal distinction, as this plant still keeps true in cultivation; while montane *vulgatus* reverts to the type in cultivated ground.

Under *Glaucium phœniceum*, Crantz, and *G. flavum*, Crantz, the respective synonyms of *Chelidonium corniculatum*, L. ("Sp. Pl. 506) and *C. Glaucium*, L. (*l.c.*) might have been quoted.

Mr. Brown changes the generic name of *Corydalis*, D. C., to that of *Neckeria*, Scop.; but Adanson's name of *Capnoides* (adopted by Medikus, Gärtner, and Mönch), although a faulty word, has the priority; moreover, it has already had two species of the De Candollean genus described under it. If *Neckeria* be chosen some purists will be wanting to change the name of the moss genus *Neckera*.

Mr. Brown, however, leaves the invalid genus *Nasturtium* of Robert Brown, notwithstanding the priority of Scopoli's genus *Roripa*.

Sisymbrium altissimum, L. ("Sp. Pl." 659). Dr. G. R. Beck in "Flora von Nieder-Österreich," p. 477, queries this being equal to the plant we have been accustomed to call

S. pannonicum, Jacq. He uses the name *S. Sinapistrum*, Crantz, "Stirp. Aust.," Ed. ii. I. 52 (1769), and says it is not the *S. altissimum* of the Linn. Herb.

Erysimum perfoliatum, Crantz. If the "Gen. Plantarum" be followed, this should be called *Conringia*, and should stand as *C. perfoliata*, Link, "Enum. Hort. Berol.," ii. 172 (1822), = *C. orientalis*, Andrz., in De Candolle's "Systema," ii. 138 (1827).

Cardamine bulbifera, R. Br., is still cited; but the name will be found in Crantz's "Crucif.," p. 127, of a much earlier date.

Cardamine pratensis, L. The variety should be *Hayneana*, Neilr., not *Heyneana*, as spelled here and in the last edition of Bentham and Hooker's "Flora." Under *C. pratensis*, it is stated that *C. dentata*, Schultes, is merely a condition of the plant. No mention, however, is made of *C. palustris*, Peterm., which is the common British plant, and which is figured by Smith, and also in Syme's "English Botany."[1] True *C. pratensis* of Linn. Herb., and of "*Flora Danica*," is a much rarer plant, which as yet I have seen only in Berkshire.

Arabis petræa, Lamk., var. *hispida*, DC., will I think be found to be an error. Kerner has identified this plant with *A. hispida*, Mygind, which is equivalent to *A. Crantziana*, Ehrh., and has longer pods than our British plant. So far I have seen no British specimens of *A. hispida*, Mygind. Mr. Brown, in "Additions and Corrections," p. iv., speaks of the Ben Laoigh plant (var. *grandifolia*, Druce) as "merely a state." Had he seen it growing I do not think he would have come to that conclusion. It is so different in appearance from the Cairngorm plant as to lead one to doubt their specific identity. It keeps quite true in cultivation. Nor, although I have searched the Cairngorms with some degree of thoroughness, have I ever seen any specimens from that range which are identical with the Ben Laoigh plant. I hope later on to give further particulars about Lamarck's *Arabis petræa*.

Draba verna, L., is still kept up as the name of the Whitlow grass. Adanson's name *Ganshium* is not alluded

[1] See Kerner's "Schedæ Fl. Exs. Aust.-Hung. (1884), 73.

to, although its priority is undoubted. *Gansbium* is, however, rejected by the Berlin Committee in favour of the later name *Erophila*, which should replace *Draba* for this plant, if the "Genera Plantarum" of Bentham and Hooker be followed.

It would have been very interesting to learn the exact reasons which induced Mr. Brown to say that *Polygala amarella*, Crantz, is doubtless the same plant as *P. calcarea*, Schultz, since Dr. Beck, in "Fl. Nieder-Österreich," uses it for the Teesdale plant; and he gives the reference to Crantz, "St. Aust." v. 438 (*zum Theil nach der Beschreibung*). Neither Nyman nor Beck gives *P. calcarea* as a native of Austria. Koch and Neilreich consider *P. amarella*, Crantz, to be *P. amara*, L. (*i.e.* the Kentish plant); but it does not agree with the stations given by Crantz, who, it may be said, describes his plant "caules ex multicipiti radice plures suberecti." Mr. Brown also states "The specimens of *P. amara* from locality 1 of Kerner's 'Flora Exsiccata,' No. 512, [are] distributed under the erroneous name of *P. amarella*." This statement rests upon Mr. Brown's identification of *P. amarella*, Cr., with *P. amara*, L. I might also point out that his statement that "*P. amara*, Jacq., is . . . according to the figure given in Jacquin's "Flora Austriaca," vol. v. p. 412, identical with *P. amarella*, Cr. is one I cannot accept. The figure, although the flowers are large, does not convey the idea of *P. calcarea* to me; and the description given by Jacquin that the stems are upright is opposed to what Schultz in "Bot. Zeit," 1837, distinctly says of his plant, that it is prostrate. I think we must wait further evidence before we replace the well-known name of *P. calcarea* by that of *P. amarella*, Crantz.

Respecting the caulescent state of *Drosera intermedia*, noted in the "Additions and Corrections," p. v., it may be well to call attention to the account of it which may be found in Hull's "British Flora," 1799, where it is described as "var. 3, caulescent. This is in every respect like var. 1, except that there is a stem which, in some instances, is full two inches in length, with numerous leaves. I have always found it growing with *Sphagnum* in moist bogs or heaths; and at first thought that the plant pushed up to a greater

height on account of the moss growing quickly around it, and that this appearance of stem was rather to be considered as an elongation of the root; but I have doubted of this since I have found a stem leafy; and that the other two species of *Drosera*, though growing exactly in the same situation, and within a few inches of the *longifolia*, do not assume this caulescent form." Dr. Hind noticed this, which he thought "a new variety if not a new species," near Killarney, and reported on it in the "Phytologist," *n.s.*, vol. ii. 1857-58, pp. 26, 27, where it is figured; and later on he gave it the varietal name *caulescens*, so that Dr. Hind, not Mr. Melvill, is the author of the varietal name. Following recent examples *D. longifolia*, L., would seem to be the name we should use for the species.

Under the "Cheddar Pink" the synonym or name of *D. gratianopolitanus* is mispelled *grantianopolitanus*.

The very weak varieties, if such they can be called, of *Silene gallica* from the "London Catalogue" are not only included, but add one more to our list of synonyms.

The large-flowered variety of *Cerastium vulgatum*, L., is called *C. triviale*, Link., var. *Serpentini*, Boswell (Syme). Mr. Brown says "it is one of a series of forms that seem to completely connect these two species," *i.e. C. alpinum* and *C. vulgatum*. Last year I noticed on the Spean hills how numerous were the intermediate forms, and how difficult it was to define the limitations of *C. arcticum*, *C. alpinum*, and *C. vulgatum*. Respecting the statement made by Mr. Brown that the var. *alpinum* of *C. vulgatum* has "the petals not much longer than the sepals," this is not according to my idea of the plant. Dr. Boswell labelled as his var. *alpestre* a form of *C. vulgatum* from West Ross, with the flowers much longer than the sepals, indeed nearly as large as ordinary *C. alpinum*. A great many plants are called var. *alpestre* or var. *alpinum*, with short petals; but I do not think they represent the views of Dr. Boswell Syme.

No notice is taken of the fact that the suggested mistake of Sherard in that he mistook *Spergula pentandra* for one of the winged *Lepigonums* is without foundation, since all Sherard's specimens of *S. pentandra* are correctly named.

Corion, Mitchell, 1748, is substituted for *Lepigonum*,

Fries, 1818. If the rule I have suggested be acted upon, *Corion*, as published before 1753, will be inadmissible.

In Allione's "Flora Pedemont." the two forms of *Montia fontana* are described as var. *minor* and *major*. The varietal names will be also found in Roth's "Tent. Germ.," 1788.

The name *H. quadratum*, Stokes, is substituted for that of *H. tetrapterum*, Fries; but an earlier name than either is that of *H. acutum*, Mönch., "Meth." (1794), p. 128.

Acer campestre. Mr. Brown has overlooked the note on this plant in "Journ. Bot.," Dec. 1891, where I pointed out that the type of the Linnæan Herbarium was the pubescent form named *hebecarpa* in the "London Catalogue," and that I had seen the glabrous form from Oxford and Berks.

The prostrate form of *Sarothamnus scoparius* is given as a variety. But so many of our plants when growing by the sea assume this habit that it makes one doubt if it be worth characterising by a varietal name.

If it be considered worthy of such a name, then we must so name *Prunus spinosa*, L., var. *prostrata*, which may be seen on the shingle near Port William in Wigtownshire. Of this I noticed a specimen in the British Museum Herbarium, labelled as *Salix*, nov. sp. (!), from the south-west of Ireland.

Curiously enough, all notice relating to *Trifolium agrarium*, L., and to *Lupinus perennis* is omitted. To Scotch botanists this will be a surprise, since both are met with in the north-east counties [abundantly in many places.—Ed.]

Alchemilla vulgaris, L. Under this we have no notice of the occurrence of the glabrous form in Britain. I have found it in Glen Spean and elsewhere. It is the var. *glabra*, Wimm. et Grab. "Fl. Sil.," i. p. 135. The Linnæan type is pubescent. It remains to be seen if we have the var. *hybrida*, L. in Britain.

With reference to the synonymy of *Potentilla verna* and *rubens* it may be said that Zimmeter takes a very different view. He contends that the plant in the Linnæan Herbarium, labelled *P. verna*, is the plant we have been calling *P. maculata*, Pourr.[1] In the first edit. of "Sp. Pl." *P.*

[1] Prof. Aschenberg identifies the plant of the Linn. Herb. as *P. verna*; it has the number referring to that species. It is what we have been erroneously calling *P. maculata*.

verna is, he says, "eine collectiv Species. In Europæ pascuis siccis frigidioribus." The light thrown on it by the Linnæan Herbarium, by the "Flora Suecica," and by the second edit. of the "Sp. Pl.," shows that *P. verna* is the name to be applied to *P. maculata*, Pourr., as Ruprecht long since pointed out. Our *P. verna* is, according to Zimmeter, *P. opaca*, L. ("Sp. Pl.," ed. ii., 713, 1762),=*P. verna*, auct. plur.,=*P. minor*, Gilib. The *P. opaca*, which was one of the plants recorded from Scotland, therefore becomes dispossessed in turn of its name, which Zimmeter says should be *P. rubens*, Crantz, "Stirp. Aust.," fasc. ii., p. 75, 1769, non. Vill.

Hartmann also, in his account of the Scandinavian species in the Linnæan Herbarium ("Acts of the Stockholm Acad.," 1849-51), unhesitatingly pronounces two of the specimens with the number of *P. verna* to be the plant named by various authors *P. sabauda*, *P. salisburgensis*, *P. alpestris*, et. *P. maculata*; but of the third specimen, which has the name written under it, he says, "De cetero cum *P. verna* sensu recentiorum convenit, pars vero caulis infima minus et patenter pilosa est, quasi immaculata." Prof. Ascherson considers the specimen also to be the *Potentilla* which is *here* termed *P. verna*.

The small pretty form of *Potentilla Anserina*, which is just as much a variety as *P. reptans*, var. *microphylla*, is unnoticed; as is also the densely pubescent form of *Potentilla palustris*, which appears to be quite worthy a varietal name; especially when we see such given to the shades of colour of *Oxalis* and *Anemone*, and the varieties of *Rubus Idæus*, etc.

The only plate given in the second part is one of an introduced plant, *Potentilla norvegica*. The mass of the text in this part is made up of a compilation of the so-called *species* of *Rubus* and the varieties, etc., of the genus *Rosa*, regarding which we may say that the distribution given of the various forms mentioned is by no means exhaustive.

Among the omissions from these two parts may be mentioned the Poppy gathered by Mr. Nicholson, which appears to be intermediate between *P. Rhœas* and *P. dubium*. The fact of our *Helleborus viridis*, L. being indigenous in the chalk woods of Bucks and Oxford might have

been pointed out, as well as that it is the western plant, the *H. occidentalis* of Reuter.

Brassica sinapioides, Roth., "Man.," ii. 957 (1830), is an older name than *B. nigra*, Koch., ed. ii. (1833), for the Black Mustard.

Caltha radicans, Forst., has been found near Rescobie, Forfar, where the writer has seen it, and also near Loch Morlich, Easterness.

Chelidonium majus. The varietal name *laciniatum* will be found in Stoke's edition of Withering, 1787.

As I have already said, the generic name *Roripa*, Scop. ("Fl. Carn.," p. 520, 1760), antedates Brown's *Nasturtium.* Our plants will be

Roripa Nasturtium, Beck ("Fl. Nied.-Öst.," p. 464).
var. *microphylla*, Beck, *l.c.*
siifolia (Reich).
Roripa silvestris, Bess., "Fl. Enum. Pl. Volhyn.," 27.
R. palustris, Bess., *l.c.*
R. amphibia, Bess., *l.c.*
var. *indivisa*, Beck ("Fl. Nied.-Öst.," ii. 465).
variifolia, Beck, *l.c.*
auriculata, Beck, *l.c.*

Sagina apetala, L., should be *Harduini.*

Respecting *Oxalis Acetosella*, L., var. *subpurpurascens*, DC., in the "Flora of Shropshire" Mr. Leighton says that it is constant in cultivation.

LIST OF THE HIERACIA OF PERTHSHIRE.

By F. Buchanan White, M.D., F.L.S., F.E.S.

Not since the period when the late Mr. James Backhouse (the father of British hieraciology) established a scientific basis for the study of the Hawkweeds of Great Britain have these plants commanded so much attention as they have during the past few years. Partly as the result of this attention, and partly as producing it, we have Mr. F. J. Hanbury's beautiful Monograph of the genus. This fine

work is now appearing in parts (of which a few only have as yet been published), and ought to be supported by every botanist who can afford to do it. As its author has remarked elsewhere, the British Hawkweed flora is a very rich and interesting one; we may thus expect that, by the time the Monograph is completed, we shall have a large gallery of lifelike portraits of these beautiful but difficult plants.

Till of late years the *Hieracia* of Perthshire have been, on the whole, neglected, or at least not been studied as they deserve. Mr. Backhouse's Scottish explorations were chiefly amongst the mountains of Forfarshire and Aberdeenshire, the granitic formation of some of which seems to make them peculiarly grateful to certain species. In north-east Perthshire there is a similar formation, and here also some of the granite-loving species appear. When this rather inaccessible portion of the county is more thoroughly explored, it is probable that other species will also be found to occur. In the meantime the schists and similar rocks of highland Perthshire have proved to be by no means unproductive of the alpine species; whilst the mountain valleys, and the banks of the Tay and other streams, both lowland and highland, have afforded a rich harvest of those forms which are not restricted to a high altitude.

I think that hitherto there has not been any attempt to bring together in one list all the species of *Hieracium* which have been observed in Perthshire. It has therefore occurred to me that, considering the central position of the county and its botanical importance, such a list may be of some interest and value. It must not, however, be taken as a complete and final list, for, apart from the species which will probably yet be discovered, there are at least half a dozen which have still to be "worked out," amongst which there may be some "novæ species." The distribution I have indicated merely by the "Watsonian vice-counties."[1] A more detailed account (with authorities for the localities) will be given in the Flora of Perthshire, when that long-delayed work

[1] As usual, there is occasionally some haziness in the records for that portion of Perthshire draining into Loch Lomond which some botanists refer to Mid Perth and some to West Perth, though it properly belongs to neither. In the meantime I have put it into Mid Perth as is, I think, most frequently done.

appears. In the meanwhile those interested will find various notes, which include mention of some of the rarer Perthshire species, by Mr. Hanbury and other writers in the "Journal of Botany." Personally I may say that I have seen most of the species in a living condition, and can vouch for the correctness of the distribution indicated—the determination of the plants, in the majority of cases, being due to the kindness of Mr. Hanbury.

The total number of species in the list is 54. Of these West Perth has 16, Mid Perth 48, and East Perth 25. Two are as yet restricted (in Perthshire) to West Perth, 24 to Mid Perth, and 3 to East Perth.

What relation the Perthshire list bears to the British is as yet uncertain ; but it is probable that not less (and very possibly more) than 75 per cent of the British species occur in the county. In the latest (1886) edition of the "London Catalogue" the number of British *Hieracia* is given as 40, (including 5 naturalised species). Of these 31 occur in Perthshire. There has thus been in this short period an addition of 23 species to the Perthshire list.

For convenience of reference I have placed the species in the subjoined list in alphabetical order.

Hieracium—

aggregatum, *Bckh.*, 88 Mid Perth.

amplexicaule, *L.*, 89 East Perth (naturalised on a wall).

anglicum, *Fr.*, 87 West Perth, 88 Mid Perth, 89 East Perth.

var. *longibracteatum*, F. J. Hanb., 88 Mid Perth, 89 East Perth.

angustum, *Lindeb.*, 88 Mid Perth.

var. *elatum*, Lindeb., 88 Mid Perth.

argenteum, *Fr.*, 87 West Perth, 88 Mid Perth, 89 East Perth.

aurantiacum, *L.*, 88 Mid Perth (naturalised in several places).

auratum, *Fr.*, 87 West Perth, 88 Mid Perth, 89 East Perth.

bifidum, *Kit.*, 88 Mid Perth.

boreale, *Fr.*, 87 West Perth, 88 Mid Perth, 89 East Perth.

Breadalbanense, *F. J. Hanb.*, 88 Mid Perth.

buglossoides, *Arv.-Touv.*, 88 Mid Perth.

cæsio-murorum, *Lindeb.*, 88 Mid Perth.

Hieracium—

cæsium, *Fr.*, 89 East Perth.

calenduliflorum, *Bckh.*, 88 Mid Perth.

callistophyllum, *F. J. Hanb.*, 88 Mid Perth.

chrysanthum, *Bckh.*, 88 Mid Perth, 89 East Perth.

cinerascens, *Jord.*, 88 Mid Perth.

commutatum, *Koch*, 88 Mid Perth.

corymbosum, *Fr.*, 87 West Perth, 88 Mid Perth, 89 East Perth.
f. *angustifolia*, Lindeb. (= *H. æstivum*, Fr.), 88 Mid Perth.

crocatum, *Fr.*, 87 West Perth, 88 Mid Perth, 89 East Perth.

Dewari, *Bosw.*, 87 West Perth, 88 Mid Perth.

duriceps, *F. J. Hanb.*, 88 Mid Perth.

euprepes, *F. J. Hanb.*, 87 West Perth, 88 Mid Perth.

eximium, *Bckh.*, 88 Mid Perth.
var. *tenellum*, Bckh., 88 Mid Perth, 89 East Perth.

Farrense, *F. J. Hanb.*, 88 Mid Perth, 89 East Perth.

floccolosum, *Bckh.*, 88 Mid Perth.

globosum, *Bckh.*, 89 East Perth.

gothicum, *Fr.*, 88 Mid Perth.

gracilentum, *Bckh.*, 88 Mid Perth, 89 East Perth.

hibernicum, *F. J. Hanb.*, 89 East Perth.

holosericeum, *Bckh.*, 87 West Perth, 88 Mid Perth, 89 East Perth.

iricum, *Fr.*, 88 Mid Perth, 89 East Perth.

lasiophyllum, *Koch*, 89 East Perth.
var. *euryodon*, F. J. Hanb., 88 Mid Perth.

lingulatum, *Bckh.*, 87 West Perth, 88 Mid Perth, 89 East Perth.

Marshalli, *Linton.*
var. *cremnanthes*, F. J. Hanb., 88 Mid Perth.

murorum, *L.*, 87 West Perth, 88 Mid Perth, 89 East Perth.
var. *ciliatum*, Almq., 88 Mid Perth.
var. *micracladium*, Dahlst., 88 Mid Perth.
var. *sagittatum*, Lindeb., 88 Mid Perth.
var. *sarcophyllum*, Stenstr., 88 Mid Perth.
var. *silvaticum*, L., 88 Mid Perth, 89 East Perth.

nigrescens W., 88 Mid Perth, 89 East Perth.
var. *gracilifolium*, F. J. Hanb., 88 Mid Perth.

Hieracium—

norvegicum, *Fr.*

var. *confertum*, Lindeb., 88 Mid Perth.

orarium, *Lindeb.*, 88 Mid Perth.

pallidum, *Biv.*, 88 Mid Perth, 89 East Perth.

Pictorum, *Linton*, 88 Mid Perth.

Pilosella, *L.*, 87 West Perth, 88 Mid Perth, 89 East Perth.

præaltum, *Vill.*, 87 West Perth (naturalised).

prælongum, *Lindeb.*, 88 Mid Perth.

prenanthoides, *Vill.*, 87 West Perth, 88 Mid Perth, 89 East Perth.

reticulatum, *Lindeb.*, 88 Mid Perth.

senescens, *Bckh.*, 87 West Perth, 88 Mid Perth.

sinuans, *F. J. Hanb.*, 88 Mid Perth.

sparsifolium, *Lindeb.*, 88 Mid Perth.

strictum, *Fr.*, 88 Mid Perth.

subanfractum, *Marshall*, 88 Mid Perth.

tridentatum, *Fr.*, 87 West Perth [88 Mid Perth?].

vulgatum, *Fr.*, 87 West Perth, 88 Mid Perth, 89 East Perth.

var. *nemorosum*, Bckh., 88 Mid Perth.

var. *nemorum*, Fr., 88 Mid Perth.

umbellatum, *L.*, 88 Mid Perth, 89 East Perth.

[NOTE.—In a paper on "**Strathearn Hieracia**" in the August number of the *Journal of Botany*, Mr. J. C. Melvill, M.A., F.L.S., enumerates several "species" as from localities all in West Perth (87). As some of the plants have not been recorded from West Perth this may give rise to erroneous vice-county records, the localities named by Mr. Melvill being all in Mid Perth (88).—ED.]

NEW SCOTTISH GALLS.

By JAMES W. H. TRAIL, M.A., M.D., F.L.S.

THE series of papers on Scottish Galls in former years has apparently left but few forms unnoticed, if I may judge by the small number that have been added since I

last wrote on this subject, in January 1890. I have, however, four additions to record for the years 1891 and 1892. It need scarcely be said that specimens of galls will be welcomed from any part of the country, as helping to extend our knowledge of their distribution. Information with regard to the nature and the makers of the galls will gladly be given, so far as is in my power, in response to inquiries accompanied by specimens such as will permit identification.

Thalictrum dunense, *Dumort.* (= *T. minus*, L., var. *maritimum*, Syme).—On the coast of Benholm, in Kincardineshire, among shingle, the pseudo-galls of one of the gall-midges (? *Cecidomyia*) occurred not very plentifully in August. They consisted of segments of the leaves, rendered somewhat fleshy, and so folded or contorted as to furnish a retreat to the larvæ of the gall-maker. Otherwise the segments showed little change in aspect or in size. Occasionally two or three segments were included in a single gall; or all the young leaves in the terminal buds of the stem were affected. Unfortunately the galls, when found, were already abandoned by their inmates; but in some of them were a few empty small white cocoons,—evidently those of a gall-midge. The fruits were not affected in any way; and the gall is evidently different from that recorded by myself from Kinloch Rannoch (Scot. Nat., 1884, p. 206) on *Th. flexuosum* (*T. minus*, L., var. *montanum*, Syme): I have not found any record of a gall-midge with such habits having been reared or named from this food-plant.

Sambucus nigra, *L.* (Common Elder, or Bourtree).—In July Dr. Buchanan White sent to me from his garden, near Perth, flowerbuds of the elder still closed, but swollen to twice or thrice their usual bulk, and become somewhat fleshy. The petals were white or, less often, greenish; and the stamens, styles, and stigmas were fleshy and functionless, or were in part abortive. A careful search showed only a single larva in one gall of an orange colour, not quite like a gall-midge larva in form, and larger than these usually are. Possibly it may have been an inquiline or guest. There can be little doubt that the galls were the work of a gall-midge. Not improbably they belong to *Diplosis lonicerearum*, Fr. Löw, which forms galls of quite similar structure on *S. nigra* and *S. Ebulus*, as well as on other species of the Caprifoliaceæ.

Campanula glomerata, *L.*—In the months of August and September 1891 I found at St. Cyrus, near Montrose, several examples of this plant in which the inflorescence had undergone, in

whole or in part, the change in structure known as virescence. The flowers were replaced by dense clusters of ill-formed green leafy structures covered with hairs, and contorted. Similar galls have been described from Lorraine by Abbé Kieffer as found on *C. glomerata*, and on several other species of *Campanula*. They are the work of mites (*Phytoptus*). The mites in the similar galls on *C. rapunculoides* have been described and figured by Nalepa as *Cecidophyes Schmardæ*.

Scrophularia nodosa, *L.*—In August 1891 I found, beside the burn of Benholm in Kincardineshire, a plant of Figwort several of the flowers of which were galled, evidently by gall-midges (? *Cecidomyia*). The galled flowers were swollen to twice or thrice the size of healthy buds, and rendered somewhat fleshy; and among the abortive sexual organs lived a few larvæ. *Asphondylia Verbasci*, Vall., galls the ovaries of deformed flowers of *S. nodosa*, and of various allied plants, in several countries in Europe; but the larvæ live singly in the deformed ovaries; hence there is room for doubt as to the maker of the galls in Scotland.

ZOOLOGICAL NOTES.

Daubenton's Bat (*Vespertilio daubentonii*, Leisler) **in Banffshire.**—On the 16th of July last I received for identification, through the kindness of the Rev. George Birnie, Manse of Speymouth, Fochabers, a living bat. Mr. Birnie informed me that the specimen was obtained by Mr. Webster, the gardener at Gordon Castle, when smoking the greenhouses, in which it and others of its kind seek shelter. Here these bats take up their quarters behind a structure which has a width of one and a half inches between it and the wall. They enter the greenhouses by way of the crevices near the eaves, and crawl down to the narrow space above described. Mr. Birnie also tells me that a few years ago he used to see bats in the castle grounds on fine mild evenings "in great numbers about the pond." The specimen sent is a female *V. daubentonii*. The above notes have a further interest since they place on record the most northerly occurrence of this species in the British Islands, as well as an addition to the fauna of Banffshire.—Wm. Eagle Clarke.

Water Shrew (*Crossopus fodiens*, Pallas) **in Argyllshire.**—During a short stay with Mr. Mason, the forester on Ardtornish estate, in the parish of Morven, Argyllshire, I had an opportunity of seeing that district and obtaining a few specimens from it. On the 22nd of July while a field of hay was being cut at the head of Loch Aline, I

had brought to me a shrew mouse which I recognised as the Water Shrew. The ground on which it was got was close to the loch, and almost of the nature of a marsh. I immediately sent it off to Mr. Eagle Clarke, who informs me that my capture is an interesting one, because this species, though naturally supposed to be present in Argyllshire, has not hitherto, it is believed, been recorded for the county.—CHARLES CAMPBELL, Dalmeny Park.

Habits of the Mountain Hare (*Lepus variabilis*, Pallas).—Bell ("Brit. Quad.," Ed. 2, p. 340), and MacGillivray ("Brit. Quad.," p. 284) both make the positive statement that the Mountain Hare does not burrow. This may be true in a general sense; but that it is not universally true I had ample evidence while spending a few days in the southern section of Inverness-shire during the early part of the present summer. I had all but reached the top of a hill fully 3000 feet high when I observed a burrow in the peaty soil which covers the greater part of the hill to a considerable depth. Turning to the keeper who had appeared upon the scene a few minutes before, I remarked, that surely it was unusual to find rabbits in such a locality. "There are no rabbits here," he replied, "that hole has been made by a Blue Hare." He then informed me that according to his experience, which, however, was limited to that part of the country, it was quite a usual thing for these hares to make burrows. In them he had many a time found the young ones concealed, and he had often heard it said that they were used by the animals as a place of refuge on the approach of the eagle. While they are probably made in the first instance for the reception of the young, there can be little doubt they are at all times used as a shelter from particular kinds of danger. On examining the burrow above referred to, I found that it measured fully five feet in length, and some six or seven inches in diameter. In front of it there was a quantity of newly excavated soil, and there was enough fur adhering to the sides to prove that a Blue Hare had been at work. The keeper, at my request, afterwards took me to a peaty flat near the foot of the hill where there were five burrows all within the space of three or four square yards, and varying from two to four feet in depth. We started a Blue Hare from the spot on our approach, but instead of seeking safety in the burrows it at once made off across the heather. —WILLIAM EVANS, Edinburgh.

Black Rat (*Mus rattus*, L.) **in Orkney.**—It would appear that the Black Rat is not, as yet, uncommon in any of the Orkney Islands. I say, *as yet*, for it is quite likely that since the Brown Rat has got a footing there, the other species may experience the same fate as it has in other places, and die out. A correspondent kindly sent me a specimen which I sent to the Cambridge Museum, and Mr. Barrett-Hamilton has kindly sent me the following dimensions, which, as the species is rare, may prove of some interest. Head and body,

6.5 (inches); Head, 1.75; Ears, .87; Tail, 7.5; Forefoot and Claws, .75; Hindfoot and Claws, 1.25. Mr. Barrett-Hamilton further adds that the specimen was a small male.—T. E. Buckley, Inverness.

The occurrence of the Hooded Seal (*Cystophora cristata*, Erxleben) **in Orkney.**—Mr. W. F. Dennison kindly informs me that a seal of this species was shot by Mr. B. Swanson in Otterswick Bay, Sanday, on the 6th of December 1890, and that another, apparently of the same kind, was seen in the bay at the time. Mr. Swanson presented the head of the specimen to Mr. Dennison. An accurate description of the teeth was submitted to Mr. Thomas of the British Museum, who named the seal as above. The example was 8 feet 2 inches in length. T. S. Peace, Kirkwall.

[This seal has hitherto only had a place among the species reputed to have occurred in Orkney, *vide* "A Vertebrate Fauna of the Orkney Islands," by Messrs. Buckley and Harvie-Brown, 1891, pp. 71-72.—Eds.]

Whin Chat (*Pratincola rubetra*, L.) **in Barra.**—When riding round the island on the 16th of June last I saw two of these birds, one on the east side, and one on the west. I have never met with any of them in the long island before, although I believe they have been noticed in Lewis and Harris. I believe they were passing migrants, as I saw no more of them after this date.—John MacRury, Barra.

The Wood Wren (*Phylloscopus sibilatrix*, Bechstein) **in West Ross.**—The wood wren was seen and heard on three several occasions in the latter part of May and early June, the localities being birch woods at the head of Loch Shieldaig, and at Camas-an-Eilean on the south shore of outer Loch Torridon. The above facts may be worthy of record, since it is thought they indicate an extension of the known range of this species; which has not hitherto, we believe, been noticed as occurring so far north-west on the mainland of Britain.—Lionel W. Hinxman, and W. Eagle Clarke.

Great Grey Shrike (*Lanius excubitor*, L.) **in the Stewarty of Kirkcudbright.**—I saw in the hands of a bird stuffer a specimen of the Great ash-coloured Shrike (*Lanius excubitor*), killed this spring in the neighbourhood of Castle Douglas. Some years ago it used to occur not uncommonly in that neighbourhood, but I have not seen one since. My attention was called to them by a man who saw one with a robin in front of it, torn to bits and hung on the thorns.—Adam Skirving, Dalbeattie.

Kingfisher (*Alcedo ispida*, L.) **in Barra.**—The occurrence of this bird has, so far as I am aware, only been once recorded from the Outer Hebrides, namely a specimen which was found in Rodel

Glen in an exhausted state after a severe storm, in March 1884, and which is noted in "A Vertebrate Fauna of the Outer Hebrides," by Messrs. Harvie-Brown and Buckley. I was therefore not a little pleased to meet with one in very beautiful plumage in this island on the 25th of July last. It was in a small plantation, through which a stream well stocked with sticklebacks and small trout flows, and owing to the rapid way in which it darted in and out through the trees whenever I approached, I thought at first there were two birds, but could not make sure of this. I contrived, however, to drive one bird out beyond the plantation. The weather was very fine at the time, and as the locality was favourable, I thought it would have remained with us at least for a time, but although I went back to the place several days in succession, I failed to see the stranger again.—JOHN MACRURY, Barra.

Nesting of the Stock Dove (*Columba œnas*, L.) **in Banffshire.**—In April last I obtained two nests of the Stock Dove in the braes of Glenlivet—one in a crevice among the rocks on the summit of Caen Dregnie, at an elevation of nearly 2000 feet; the other in a hole in the heathery bank of a burn on the face of Caen Suidhe. The keeper on the Blairfindy shootings also informed me that he had often seen their nests among the heather on the steep face of the Bochel, an isolated hill in the upper part of the glen. There is little evidence to show whether this is a recent extension of breeding range, as the bird may hitherto not have been distinguished from the Ring Dove, which is very abundant in the locality.—LIONEL HINXMAN.

Turtle Dove (*Turtur communis*, Selby) **near Wick.**—A male Turtle Dove was obtained near Wick on the 7th of June. I note that one of these birds usually occurs in this district about once in every fourth year.—LEWIS DUNBAR, Thurso.

Turtle Dove (*Turtur communis*, Selby) **in Sutherland.**—On Sunday, August 31st, I observed a Turtle Dove near the mouth of the Strathy River in the north of Sutherland. Luckily I had my glass with me, or should not have been able to make out to what species the strange bird belonged.—T. E. BUCKLEY, Inverness.

Occurrence of the Ruff (*Machetes pugnax*) **in Tiree.**—Mr. P. Anderson writes us as follows:—"I beg to enclose a bird which I take to be a Ruff or Reeve. But I don't know for certain. It is a new bird for Tiree, whatever it is. I saw it feeding in a marsh on Sunday, where it stayed until Tuesday morning, when I shot it. It was very tame, and instead of flying away it lay flat, and tried to hide when wounded. Its note was a sort of Hick-Hick or Kick-Kick."—EDS.

Ruddy Sheld Ducks (*Tadorna casarca*, L.) **in the Moray Firth.**—A pack of six Ruddy Sheld Ducks appeared near the mouth of the

river Findhorn early in July, and fed in the Buckie Loch. If disturbed they generally made out to the sea. One, a female, was shot on 6th July by a salmon-fisher there, and sent to me to be preserved. I have been inquiring after the birds but as no one has seen them for some weeks I expect they have left our coast.—James Brown, Forres.

[There appears to have been an undoubted westerly migration of this species to the British shores in the past summer; since the bird has been recorded from Cumberland, Lincolnshire, Suffolk, Hampshire, and several localities in Ireland.—Eds.]

Wild Swans (*Cygnus musicus*, Bechstein) **in Tiree.**—Mr. Peter Anderson, gamekeeper in Tiree, whose knowledge of the birds of that island I consider to be very perfect indeed—has written to me regarding the increase of the Wild Swans on the lochs of that island. This has been due to the steadfast determination of the proprietor, His Grace the Duke of Argyll, to prevent all molestation of the noble birds, a clause being inserted in leases to the shootings, providing for their strict preservation. Mr. Anderson writes:—"The number that come here have certainly increased greatly since I came in 1886. I did not notice the increase much until 1889-90, when there would be over 80 swans on the island at one time, and in 1890-91 there would be over 150 here at one time, while last year (his letter is dated July 29th, 1892) there were quite as many if not more. They feed on all the lochs more or less except Loch Vassapol, which they seldom stay on. They are more partial to Loch Balephriel and Loch Riaghar than any of the others. I have also seen them in Gott Bay during hard frost. They usually arrive here about the middle of November and leave the beginning of March. A young whooper came here last winter. It stayed *alone* all winter and has continued here all summer, at least it was still here about a week ago, when I saw it last. It seemed to be strong enough on the wing, but I suppose it must have some weakness." In a forthcoming volume of the "Vertebrate Fauna of Argyll and the Inner Hebrides," a sentence at page 123 is somewhat affected by the above notes by Mr. Anderson. From notes received from Captain Savile G. Reid and Colonel Irby, it would appear that "in Tiree their favourite haunts are Loch Vassapol and Loch Riaghar," and they add:—"Those frequenting the former were almost certainly Wild Swans of the larger size, but those on the latter were almost as certainly *C. bewicki*." The above notes by Mr. P. Anderson were received too late for insertion in the volume, and we take this opportunity of inserting them in the "Annals."—J. A. Harvie-Brown.

The Introduction of Dace into Linlithgow Loch, and of Grayling into Cobbinshaw Loch.—About a year ago I observed a quantity of Dace (*Leuciscus vulgaris*) exposed for sale in the shop of

Messrs. Anderson, fishmongers, Castle St., Edinburgh, and was informed they were from Linlithgow Loch, where the species had been introduced and was now abundant. Considering it desirable that the facts connected with the introduction should be ascertained and placed on record, I called on Mr. A. G. Anderson in April last and learned from him that the introduction took place in 1883, the fish having been obtained by him from England for the purpose.

Mr. Anderson at same time informed me that about fifteen years ago he introduced Grayling (*Thymallus vulgaris*) into Cobbinshaw Loch in the extreme west of Midlothian.—William Evans, Edinburgh.

Supposed Cannibalism in the Slow-worm (*Anguis fragilis*, L.)—Two years ago a fine specimen of the slow-worm, mangled and partially eaten, was found on Ailsa Craig—where the species is abundant—and beside it a similar-sized individual, which seemed to be devouring the remains. Thinking this a curious trait in the species, Mr. Dawson, the Assistant Lighthouse Keeper, sent it on to me with an explanatory note of the circumstances under which the specimens were found. On opening the box I found the living specimen had a firm grip on its dead comrade to which it held with much tenacity, and which it relaxed with considerable reluctance. The mangled state of the dead specimen evidently was due to its having been eaten by *some* creature, but that its companion was the culprit I am not inclined to believe. Having kept slow-worms for years and bred them in confinement, I have never found these gentle and inoffensive reptiles exhibit any cannibalistic tendency, nor do I remember any author charging them with such a character, nor would their weak jaws and teeth be sufficiently powerful, in my opinion, to tear such a comparatively tough body as one of their own species. Perhaps the individual in question had developed a new taste. At any rate, I should be glad to hear of any similar case which may have come under the notice of any one. I have since that time experimented with the specimen above mentioned (which I still have alive), and others, and have not noted any recurrence of the act.—J. MacNaught Campbell, Kelvingrove Museum, Glasgow.

Strangalia armata (Herbst) **in Kirkcudbrightshire.**—Towards the end of July I took one specimen (♀) of *Strangalia armata* near here. I believe this longicorn beetle has only once or twice been recorded in Scotland. I also found here a single specimen of *Syncalypta* which seems to be the true *setigera*, Ill., and which therefore slightly extends its limited range.—W. D. R. Douglas, Orchardton, Castle-Douglas.

Larentia flavicinctata (Hb.) **as a Garden Insect.**—This pretty grey and yellow moth is so essentially (with us) a Highland species that I could scarcely believe my eyes when first one and then

another specimen turned up in my garden, which is within the municipal boundaries of Perth. The species does not occur within many miles of Perth, so that it must have been introduced in some way—probably with plants from one of its mountain habitats. At the same time I have no recollection of having *recently* brought into the garden any plants on which there would likely be the eggs or larvæ. It is possible, therefore, that it may have been brought some years ago, and established itself amongst the Saxifrages (its food plant), of which I have a number growing. It will be interesting to see if it appears another season. The specimens were rather smaller and darker in colour than Highland individuals.—F. Buchanan White, Perth.

Argissa (Syrrhoe) hamatipes (Norman) **in the Firth of Forth.**—This apparently rare amphipod has been obtained in the Forth during the past summer. The only previous British records for it known to me is that given by Rev. A. M. Norman in his Shetland Report for 1868, and that published a short time ago by Mr. David Robertson in the proceedings of the Natural History Society of Glasgow. *Argissa hamatipes* (= *Argissa typica*, Boeck) resembles *Ampelisca* in form, and might be mistaken for a member of that genus, but an examination of the eyes of *Argissa* reveals a very curious structure that at once distinguishes it from *Ampelisca*. The eye consists of four pairs of lenses arranged at about equal distances round the edge of a somewhat circular patch of diffused pigment. In the male also, the median dorsal part of the third last segment of the pleon is produced backward over the next segment in the form of a free tooth-like process, and is one of the more obvious characters by which the species may be identified. G. O. Sars describes and figures *Argissa* in his "Crustacea of Norway," vol. i. page 141 (1891).—Thomas Scott, Leith.

Modiodicola insignis (Aurivillius) **in the Firth of Forth.**—Some time ago, when examining specimens of the "Horse Mussel"—*Mytilus modiolus*,—from the Firth of Forth, several specimens of a prettily coloured copepod were observed which appeared to be *Modiodicola insignis*, Aurivillius. It seems to be a commensal rather than a parasite of the mussel, and is found harbouring about the branchial lamellæ. It is frequently of a brilliant pink colour when alive, even the ovisacs when present being of the same colour. *Modiodicola* is closely allied to the genus *Lichomolgus* from which it differs in the form of the footjaws and in one or two other characters. Several specimens of this copepod are sometimes found in a single mussel, and fully half the number of mussels examined contained specimens. It may be of interest to state in contrast to this example of commensalism or semiparasitism, that though many specimens of the common (edible) mussel—*Mytilus edulis*—from various localities have been examined, no copepod has hitherto been

observed associated with that species. *Modiodicola* has been obtained in the horse mussel at various parts both of the East and West coasts.—THOMAS SCOTT, Leith.

Ilyocryptus sordidus (Lievin) **in Lochend Loch, Edinburgh.**—This curious *Cladoceran* was found to be moderately common in material collected some time ago with a hand net on the south-east side of the loch. In form it somewhat resembles *Daphnia*. It appears to be incapable of swimming, and therefore need scarcely be looked for among the free-swimming organisms. Its usual habitat is among the muddy vegetable debris that collects about the shallow grassy margin of lochs, and, the test being rather hirsute, adult specimens are often coated with mud. *Ilyocryptus* was obtained in considerable numbers in a similar gathering made on the south shore of Loch Leven, Kinross-shire, in 1890.—THOMAS SCOTT, Leith.

BOTANICAL NOTES AND NEWS.

Rediscovery of Sagina alpina (another plant of George Don's) in Scotland.—While botanising last summer on the Cairngorms with Mr. G. Robertson of Burnside, Forfar, a small *Sagina* was gathered on the steep cliffs of Corrie Sneachda, and also on a rock near the waterfall which enters Glen A'an from Ben Muich Dhu (*i.e.* in Easterness and Banff), which appeared to be Don's *Sagina alpina*. Mr. Arthur Bennett says he does not see what else it can be. I have compared it with Don's specimens in Herb. Brit. Mus., in Herb. of J. E. Smith, and in Miss C. E. Palmer's collection, and have come to the conclusion that it is the same plant.

Some of Don's plants are only *S. maritima*, of which he was one of the earliest discoverers in Great Britain. Some of his specimens are cultivated ones; and he says of the alpine plant that it keeps its character in cultivation. It will be remembered that Don said he gathered *S. alpina* near the summit of Ben Nevis in 1794. The specimen in the herbarium of J. E. Smith in the possession of the Linnean Society is dated 1803. In the same collection is a specimen of *Sagina maritima* labelled "New Sperg. saginoides, but perhaps differs, J.E.S. Marshy ground on the coast three miles to the west of Ardbigland in Galloway, J. Mackay, 1800." A specimen of Don's from the Aberdeen coast, dated 1803, is worth further study; it appears rather to be a maritime form of *S. apetala*, but I have seen it only in bad light.

Near Loch Morlich, Easterness, I gathered a plant which is, I believe, identical with *Caltha radicans*, Forst. It may be worth noting that *Ranunculus bulbosus* was gathered near Boat of Garten, in the same vice-county.—G. C. DRUCE.

Strobilomyces strobilaceus in Perthshire.—During a recent excursion of the Perthshire Society of Natural Science to Kincardine Glen, near Auchterarder, I found a curious fungus which my father tells me is the very rare *Strobilomyces strobilaceus*, Berk., and which has been found before in Scotland only near Crieff. We saw one specimen only.—M. BUCHANAN WHITE, Annat Lodge, Perth.

First Records of Scottish Flowering Plants.—In the valuable series of "First Records of British Flowering Plants," compiled by Mr. WILLIAM A. CLARKE, and in course of publication in the "Journal of Botany," there are included a number of Scottish Records. In the instalments published since our last issue the following are included. Full references are given by Mr. Clarke. We extract only the names of the species, the date of publication as found in Scotland, and the place and date of discovery with the name of the discoverer. *Lychnis Viscaria*, L., 1670, on rocks in Edinburgh Park, by Thos. Willisel. *L. alpina*, L., 1811, Clova in 1795, G. Don. *Cerastium trigynum*, Vill., 1794, Ben Nevis in 1792, by James Dickson. *Alsine sulcata*, Schl. = *A. rubella*, Wahl., 1828, Ben Lawers in 1793 by G. Don. *Arenaria norvegica*, Gunn., 1838, Unst in 1837, by T. Edmonstone. *A. sedoides*, Schultz, 1774? on Baikval, in Rum. *Sagina maritima*, Don, 1810, in 1794 by G. Don, near Aberdeen and on Ben Nevis. *S. Boydii*, B. White, 1887, by W. B. Boyd, in Braemar. *S. Linnæi*, Presl = *S. saxatilis*, Wimm., 1800, on Ben Lawers in 1847, by Prof. Balfour. *Ononis reclinata*, L., 1835, on the seashore near the Mull of Galloway. *Melilotus alba*, Desr., 1830, in cornfields at Aberlady, near Edinburgh, by Mr. Lloyd.

Hieracia new to Scotland.—In the continuation of Mr. F. J. HANBURY'S "Further Notes on Hieracia new to Britain," in the "Journal of Botany" for July, the following are described, viz. *H. euprepes*, new species, first gathered on Snowdon by Prof. Babington in August 1847. In Scotland it has been found in some abundance on the banks of the Almond, at Loch Voil, near Tyndrum, on Clach Leathad in Argyllshire, in Glen Dole, and beside the Dee in Braemar. *H. lasiophyllum*, Koch, var. nov. *euryodon*, found on Moncrieff Hill and in other Perthshire localities, near Loch Lee in Forfarshire, and on Little Craigindal. *H. rubicundum*, n. sp., from Lochinver in West Sutherland, and Moffat in Dumfriesshire. In the September number are described :—*H. hibernicum*, n. sp. "A plant collected by Dr. White in 1875, from Glen Tilt, Perth, may, I think, be referred to this species; but the only specimen I have is immature and not well dried." *H. murorum*, var. *sarcophyllum*, Stenstr., "has been found by Dr. White on the banks of the Tay at Murthly Castle, and by the Messrs. Linton at Black's Hope, Moffat, Dumfries." *H. murorum*, var. *micracladium*, Dahlet., has been found by Col. J. S.

Stirling in a corrie at the head of Balglass, near Denny, Stirling; by Mr. D. A. Boyd on subalpine rocks at Largs, Ayrshire; and by the Allt Dubh Ghalair, Glen Lochay, Perthshire, by F. G. H. *H. duriceps*, n. sp. It is abundant on the miniature rocky cliffs of some of the burns of Sutherlandshire. "It also occurred sparingly near Kingshouse, Argyll; and Mr. Marshall gathered it last year from Ben Chaistel, near Tyndrum, and from Stob Garbh, West Perth. Mr. Beeby has found it in Shetland, while specimens, which I believe to be referable to this species, were sent me by the Rev. W. R. Linton from Sneasdale, Uig, Skye." *H. breadalbanense*, n. sp. "This species, first gathered in 1888, appears to be confined to the Breadalbane range proper."

"Grevillea" has, under Mr. Massee's editorship, commenced its twenty-first volume with the number for September 1892. As already announced, it is continued with no material alteration in form. The chief difference observable is in the greater prominence assigned, under Mr. Batters' charge, to the Algæ. There would have been cause for regret had the only journal in Britain devoted to the Botany of Cryptogams been discontinued.

British Fungus Flora. By GEORGE MASSEE. We read in the September number of "Grevillea" as follows: "It is expected that the first volume of the above work will be ready in August. It contains a short introduction to the study of fungi, also descriptions, accompanied by critical notes from various authors, of all British species included in the following groups: Gastromycetes, Tremellineæ, Clavariæ, Thelephoreæ, Hydneæ, Polyporeæ, and the black and purple spored species of Agaricinæ. The genera are illustrated. The following numbers justify the appearance of a new book on the subject. It is now twenty-one years since the last complete British Mycological Flora was published—Cooke's "Handbook of British Fungi"—the number of species therein described being 2810, whereas the species now number 4895, and are distributed as follows: Basidiomycetes, 1980; Ascomycetes, 1275; Sphæropsideæ, 685; Hyphomycetes, 580; Uredineæ and Ustilagineæ, 230; Phycomycetes, 145." Dr. Stevenson's "British Fungi, Hymenomycetes," and Dr. Plowright's "British Uredineæ and Ustilagineæ" have within recent years given us excellent monographs of these groups; and Dr. Cooke in his "Handbook of British Fungi, Revised Edition," of which the first volume has been published as supplements to "Grevillea," has still more recently revised the British *Agaricini*. Mr. Massee himself, in 1891, issued a monograph of the British Phycomycetes and Ustilagineæ, to which we have already referred in this journal. In view of these facts it may be questioned whether monographs of the remaining groups of British Fungi would not be far more desirable than another mycological flora, which, indeed, it is now scarcely within

the power of one man to render of the first rank. The *Ascomycetes* stand in great need of revision in our flora; and the groups of imperfect forms (*Sphæropsideæ* and *Hyphomycetes*) require discussion from the sides alike of life-histories and of classification. A Mycological Flora of the British Islands will be valuable in proportion as it supplies information with regard to groups not recently treated of by competent writers, that information being reliable and complete up to the date of issue.

It may be pointed out that the advance in the number of recorded British species is even more striking than the above extract from "Grevillea" shows. In the 2809 species in Cooke's "Handbook" are included upwards of 100 species of *Myxogastres*, a group not included in the second enumeration just referred to.

CURRENT LITERATURE.

The Titles and Purport of Papers and Notes relating to Scottish Natural History which have appeared during the Quarter—July to October 1892.

[The Editors desire assistance to enable them to make this Section as complete as possible. Contributions on the lines indicated will be most acceptable and will bear the initials of the Contributor. The Editors will have access to the sources of information undermentioned.]

ZOOLOGY.

On a Black variety of the Water Vole (*Arvicola amphibius*). By H. A. Macpherson and O. V. Aplin. *Zoologist* (3), Vol. xvi. pp. 281-293 (July 1892).—Scottish distribution given at pp. 283-286.

Blackbird pairing with Thrush. J. K. Dobbier. *Zoologist* (3), Vol. xvi. p. 270 (August 1892). In an Edinburgh garden.

Grasshopper Warbler in S.W. Scotland. Robert Service. *Zoologist* (3) Vol. xvi. p. 333 (September 1892). Several nests found near Dumfries.

Late nesting of the Lapwing. Robert Service. *Zoologist* (3) xvi. p. 333 (September 1892). In S.W. Scotland owing to the dryness and coldness of the Spring.

Notes from St. Andrews Marine Laboratory. No. XIII. By Prof. M'Intosh, M.D., LL.D., F.R.S., etc. *Ann. and Mag. Nat. Hist.* (6) Vol. x. pp. 97-108. Plate viii. (July 1892). On the Eggs and young stages of the Sand-eels. On the Ova and Larvæ of certain Pleuronectids. On *Cymene ebiensis*, Aud. and Ed. On the Atalanta-like Larval Mollusc.

On some new or rare Crustacea from the Firth of Forth. By Thomas Scott, F.L.S., and Andrew Scott. *Ann. and Mag.*

Nat. Hist. (6) Vol. x. pp. 201-206. Plates xv. and xvi. (September 1892). *Lichomolgus agilis* described as new. ? *Enterocola eruca*, Norman. *Bathyporeia norvegica*, G. O. Sars, *Cerapis crassicornis*, Spence Bate, and *Petalomera declivis*, G. O. Sars (Cumacean) recorded.

On the British Mysidæ, a Family of Crustacea Schizopoda. By the Rev. Canon A. M. NORMAN, M.A., D.C.L., F.R.S., etc. *Ann. Mag. Nat. Hist.* (6) Vol. x. pp. 143-166, Plates ix. and x. (August 1892) and pp. 242-263 (September 1892). Gives the habitat of the Scottish species.

A Second Contribution towards a Catalogue of the Amphipoda and Isopoda of the Firth of Clyde and West of Scotland. By DAVID ROBERTSON, F.L.S., F.G.S., etc. *Trans. Nat. Hist. Soc., Glasgow*, Vol. iii. pp. 199-223. Sixty species new to Scotland added to the previous Contribution.

Coleoptera taken at Loch Awe in June 1892. A. J. CHITTY. *Ent. Mo. Mag.* (2) Vol. iii. p. 216 (August 1892). List of thirty-three species.

Eros (Pyropterus) affinis, Payk, etc. in the North of Scotland. G. C. CHAMPION. *Ent. Mo. Mag.* (2) Vol. iii. p. 243 (September 1892). At Aviemore in July. New to Scotland. Other species of Coleoptera are recorded.

Colias edusa, Fb., in Wigtonshire. J. HENRY STOCK. *The Field*, Sept. 3rd, 1892, p. 368. Two seen at Luce Bay on 23rd of August 1892.

[Vanessa antiopa at Forres] "Current Notes." *Ent. Rec.*, Vol. iii. p. 177 (August 1892). Seen by Mr. Reid.

Variety of Polyommatus Agestis, var. Artaxerxes, with four white spots above. CHAS. G. BARRETT. *Ent. Mo. Mag.* (2) Vol. iii. p. 245. (September 1892). Specimens captured in Fifeshire during 1891 and 1892.

Notes on Collecting at Aberdeen. A. HORNE. *Ent. Rec.*, Vol. iii. pp. 161, 162 (July 1892). Records of Lepidoptera captured.

Notes on Collecting at Lanark. Rev. J. A. MACKONOCHIE. *Ent. Rec.*, Vol. iii. p. 210 (Sept. 1892). Records of Lepidoptera.

Notes on Collecting at Perth. J. WYLIE. *Ent. Rec.*, Vol. iii. p. 210 (Sept. 1892). Captures among Lepidoptera recorded.

Drepanopteryx phalænoides. KENNETH J. MORTON. *Ent. Mo. Mag.* (2) Vol. iii. p. 194 (July 1892). Captured near Cleghorn on the 6th of June.

BOTANY.

On Natural Hybrids. By WILLIAM H. BEEBY, is an interesting contribution to a much-discussed question (*Journ. Bot.*, July).

Species, Varieties, etc., described or observed in Great Britain and Ireland since the publication of Babington's Manual, Ed. 8. (1881) and Hooker's "Student's Flora," Ed. 3 (1884). By ARTHUR BENNETT, F.L.S. This is a very valuable enumeration of the above additions to our flora, with brief notes of the characteristic features, and references to the original notices of their records as British. The arrangement is that of the "London Catalogue," Ed. 8, and the list extends to *Potamogeton coriaceus*. The many new records under *Rubus*, *Epilobium*, *Hieracium*, and *Salix*, are not detailed, as of interest to few save specialists, but the sources of information are stated. ("Science Gossip," Sept.)

First Records of British Flowering Plants (*Continued*). Compiled by WILLIAM A. CLARKE, F.L.S. (*Journ. Bot.*, July-September). The numerous records include several for Scotland (see this Journal p. 272). We are informed that this series of records is to be published in separate form.

On Cochlearia grœnlandica, *L.* By the Rev. EDWARD S. MARSHALL, M.A., F.L.S. The true species is here illustrated on plate 326 A, and is distinguished from *C. alpina*, formerly regarded as *C. grœnlandica* in British floras. It was first discovered in Shetland in 1886 by Mr. W. Beeby, and afterwards at Lochinver in 1890, and at Tain in East Ross in 1891, by Rev. E. S. Marshall, all on the sea coast. (*Journ. Bot.*, Aug.)

Sagina Boydii. This plant, named and described by Dr. BUCHANAN WHITE (*Trans. Bot. Soc. Edin.*, 1887, xvii. pp. 32-35). from a plant found by Mr. W. B. Boyd in Braemar (? on Ben A'an), is here illustrated, on plate 326 B), from a specimen supplied by Mr. Boyd; and Dr. White's description is quoted in full. (*Journ. Bot.*, Aug.)

Key to British Rubi. By Rev. W. MOYLE ROGERS. In the continuation of this valuable key the only direct reference to Scottish plants is the remark under "28 *R. latifolius*, Bab.," that "Professor Babington's own specimen (Cramond Bridge, near Edinburgh, July 30, 1850), in the Borrer Herb. Kew, looks to me very corylifolian." (*Journ. Bot.*, July-Sept.)

Further Notes on Hieracia New to Britain (*Continued*). By FREDERICK J. HANBURY, F.L.S. Five "species" and one variety from Scotland are recorded as new, and two varieties of *H. murorum* from Scotland are noted as new to Britain, as are also several other "species" and varieties from other parts of the British Islands. The new forms are fully described. (*Journ. Bot.*, July and Sept.) *See* p. 274 of this Journal.

Strathearn Hieracia. By JAMES COSMO MELVILL, M.A. F.L.S. This is an enumeration (with localities, of the Hieracia found by the author since 1875, chiefly on and near Ben Chonzie

and in Glen Artney. See note on p. 264 in this Journal. (*Journ. Bot.*, Aug.)

British Moss-Flora. By R. BRAITHWAITE, M.D. Fam. xv. Bryacea, Part II. This newly issued part of Dr. Braithwaite's most valuable monograph treats of the mosses of the genera *Pohlia* (replacing *Webera*), and *Plagiobryum* (replacing *Zieria*), and includes 25 species of the genus *Bryum*. As was to be looked for a few changes are shown to be necessary in nomenclature. As the work is indispensable to all students of mosses it would serve no useful purpose to detail these changes. The plates are, as always, distinguished by their excellence.

A new British Hepatic. By W. H. PEARSON. Records *Marsupella conferta* (Limpricht), Spruce, as found, by Mr. W. West, on 12th August 1880, on Ben Nevis at about 4000 feet. It "grows in depressed tufts, or struggling among mosses." The species is fully described; and plate 327 is devoted to its illustration. It is found in Alpine situations on the Continent of Europe. (*Journ. Bot.*, Sept.)

A new Marine Lichen. By GEORGE MASSEE. This paper is an account of a small collection of marine Lichens of the genus *Verrucaria* made by Mr. E. A. L. Batters between tide marks. It includes a new species *V. lætevirens*, found at Berwick-on-Tweed, Loch Goil, Cumbrae, and Gare Loch. The species is described, and excellently figured on plate 324. The other species noted in the paper from Scotland are *V. marina* (Deak), Leight., from Berwick-on-Tweed and Loch Goil (ascus and spores figured), *V. mucosa*, Whlngb., from Loch Goil; and *V. maura*, Whlngb., from Cumbraes and Lochgoilhead on the west, and Burnmouth and Eyemouth on the east of Scotland (ascus and spores figured). (*Journ. Bot.*, July.)

New British Moss. On 7th April 1892 Mr. R. H. Meldrum announced, at a meeting of the Perthshire Society of Natural Science, the discovery by himself in July 1891, on limestone on Ben Lawers, of *Hypnum procerrimum*, Molendo, an alpine species confined to limestone. At the same time he gathered another limestone species, *Pottia latifolia*, not previously recorded from Ben Lawers.

New or Critical British Algæ. By E. A. BATTERS, LL.B., F.L.S. *Ascophyllum Mackaii*, Holm. and Batt., *F. Robertsoni*, Batt., is described and illustrated (on plate 183), and its relations to *A. nodosum* are discussed fully. Mr. Batters thereafter describes a number of forms recently recorded, including those referred to on p. 205 of the *Ann. S. N. H.* In addition to the above he describes the following new or rare species from Scotland:—*Microchæte ærugenia* (Batt., *Journ. Bot.*, xxx. p. 86), from shallow sandy pools near high-watermark at Berwick, *Pogotrichum filiforme*, Rke., forma nova *gracilis*, in the Gare Loch; *Ascocyclus globosus*, Rke., on *Cladophoræ* in the Gare Loch; ("Grevillea," September).

REVIEWS.

A Vertebrate Fauna of Argyll and the Inner Hebrides. By J. A. Harvie-Brown and Thomas E. Buckley: (Edinburgh, David Douglas, 1892). This is the fifth volume of the fine series at present being issued by Mr. David Douglas in connection with the fauna of Scotland.

The geographical position of the special faunal-area dealt with by the authors may be briefly defined as the greater part of the political division or county of Argyll and some portion of Inverness, with the islands adjacent which pertain to the two counties, embracing Canna, Rum, and Muck to the north and Jura and Islay to the south, altogether an area of 838 square miles.

From page 22 to page 84 of the introductory topographical sketch we have a clear and most charming description of the physical features of Argyll and the Inner Hebrides; this is especially interesting as the authors have avoided the beaten tracks of the guide-books, steamers, and tourists, and depicted the wilder glens and more remote fastnesses, and the lone and rarely visited islets of the sea,

> "Where no human road yet travels,
> Never tourist's foot hath come;"

spots doubly attractive from their exquisite scenery and remoteness from the haunts of men.

The chapter dealing with the mammals contains much that is quite new in connection with the indigenous feræ of the district. The wild cat is totally absent from the Isles, and, although not extinct on the mainland, has receded to the least accessible districts. The marten is local and becoming very scarce, so also the foumart. The otter is still abundant on the mainland and isles; and the badger on the former only, but less so than in the past. Much interest attaches to the notice of the common, harp, and grey seals, and it is pleasant to learn that the latter are for the most part protected, as far as is possible, from disturbance in the few localities where it is still to be found.

Of the 368 species included in the avi-fauna of Great Britain, 210 are at present ascertained to be resident or occasional visitors to Argyll and the Isles. In recent years the extension of woods and plantations has favoured the increase of some species, as the resident *Turdidæ*, redstart, which latter has increased vastly in recent years, the spotted fly-catcher, wood-wren, and grasshopper-warbler. So also the starling and jackdaw, and in some instances no doubt the latter aggressive species is answerable for the diminution of the old-fashioned chough. The rook also is increasing, and

at the same time developing destructive and carnivorous propensities. The raven continues to hold its own.

On the other hand the goldfinch is becoming local and rare; the yellow-hammer reported as decreasing rapidly in the neighbourhood of Inverary. The lesser whitethroat and chiff-chaff are of doubtful occurrence, as also is the yellow wagtail. So far the advancing stock-dove has not found a place in the fauna, the snow-bunting is recorded as probably nesting on Ben Nevis. We much regret that limited space forbids us further to follow the authors through the remainder of their list, having reference to the game birds, owls, eagles, falcons, hawks, geese and ducks, waders, gulls, terns, divers, and petrels, pages containing much which is of the greatest interest to ornithologists; indeed every part is full of new and original matter, and every attainable scrap of lore, past or present, written or oral, has been carefully utilised.

The concluding portion of the volume is taken up with notices of the reptiles, amphibians, and fishes. There is a chapter by Mr. Henry Evans on the deer of Jura, and another by Professor Heddle on the Geology of the Inner Hebrides.

Regarding this volume we had looked for much, but the results, as now set forth, have greatly exceeded our expectations. The illustrations which embellish the work are of high merit, and along with the maps and charts add much to the value of the text. We can most sincerely congratulate the authors on the publication of their admirable volume, which is a credit to all who have been connected with its production. JOHN CORDEAUX.

British Birds: Key List. By Lieut.-Colonel L. HOWARD IRBY, F.L.S. Second Edition. Revised and enlarged. (London: R. H. Porter. Pp. 69.)

This work aims at supplying in a few words the essential characters by which each species of British bird may be recognised, whether male or female (in summer or winter dress), or young. The scientific name, the faunal status, and the true habitat of the rarer visitants, are also given. As a *vade mecum* the "Key List" will be found most useful to the travelling ornithologist, and it is also convenient for general reference. The fact that a second edition has been called for in so short a time affords the best evidence that such a little book was wanted, and also indicates in no small degree that Colonel Irby's excellent method of treating the subject has been much appreciated, and deservedly so. Two plates explaining the technical terms employed have been added to this edition, which has also been otherwise enlarged and improved.

The Museum of the Perthshire Society of Natural Science.

The Members of the Perthshire Society of Natural Science are about to make an extensive addition to their Museum—the Perthshire Natural History Museum—the rise and progress of which were duly chronicled in the *Scottish Naturalist*. For some years past it has been but too evident that the accommodation provided for the collections was quite inadequate, and that an extension of the building was urgently needed. The Society is fortunate in possessing ground at the back of the present building, and on this it is purposed to erect a hall (41 feet by 32 feet), surrounded by a gallery, and lighted from the roof. A new laboratory will also be put up, and space found for a herbarium room. The new building will be devoted to the collections illustrative of the Natural History of Perthshire, while the present museum hall (55 feet by 22 feet) will be chiefly occupied by the Index Collection or guide, by means of typical specimens, to Natural History in general. To meet the cost of building, furnishing, and specimens, the Society wishes to raise a sum of between £2500 and £3000, and, has just issued a circular asking for subscriptions. In the meantime a few kind friends have already promised upwards of £1700, so that there is every prospect of the extension being carried out. We are requested to state that donations of specimens to either department of the Museum will be gratefully accepted. They should be sent to the Museum, Tay Street, Perth.

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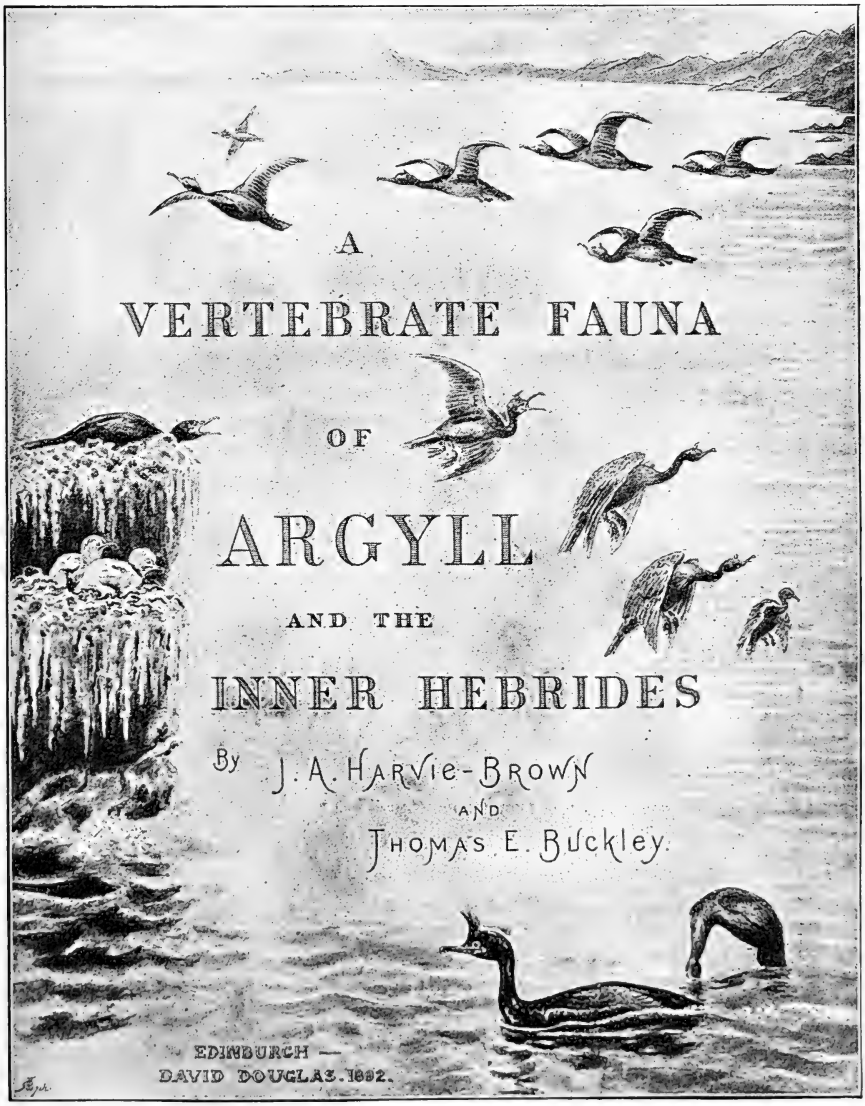

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RISSO'S GRAMPUS (*GRAMPUS GRISEUS*) IN THE SOLWAY FIRTH.

By Robert Service.

On 28th of September last I read in our local newspaper, the "Dumfries Courier," a short paragraph to the effect that on the 24th of that month a "young bottle-nose whale" had been captured near Annan. Knowing that the dimensions given were very unlikely to apply to that species, I lost no time in writing for further information to my obliging friend, Mr. Wm. Wright, Annan, who in due course replied, giving the following particulars:—The animal had been seen, when the tide ebbed, floundering in a pool on the sands of the Dumfriesshire Solway at a spot close to Battlehill, near Annan, by Mr. Wm. Blake, fisherman, who with assistance, and after a considerable struggle, killed it. Its dimensions were, length 10 feet 3 inches; girth at thickest part 5 feet; flippers 7 or 8 inches wide, 16 or 17 inches long; it had two bumps right on the nose, one on each side with hollow between; the bumps were like one's fist and could be taken hold of. The shape from the dorsal to the tail "went away to nothing." Three teeth in each side of the front of lower jaw, and no teeth whatever in upper jaw. Colour of upper parts described as somewhat greenish in hue when alive and

in the sea ; after death the back was exactly the colour of "dark blue Welsh slates." Under parts white. The animal was a female. On making subsequent inquiry about the white stripes usually present as a distinguishing character of Risso's Grampus, I was informed that "it had little faint gray streaky marks, $\frac{1}{8}$ inch in width, and some were long, and some were short," but as Mr. Wright had to prompt his informant on this point, I conclude these marks must have been inconspicuous. When requested by Mr. Wright, the lower jaws were very kindly presented to me by Mr. Blake. Before removing the mass of adherent flesh, I made a close examination of the dentition. Taking the left mandible, I found embedded in the flesh, at the point of the jaw in front of the three mandibular teeth, a couple of very small denticles, so soft as to be scarcely calcified, and quite easily cut through with the knife. They appeared on the surface as roughish points hardly to be seen, but easily felt with the finger. Then behind the three mandibular teeth were at regular intervals two small openings into the gum. These were about the diameter of an ordinary knitting wire. On shaving slices off the gum these openings were seen to widen out into tooth sacs of the calibre of an ordinary lead-pencil, and half an inch deep, and they were quite filled with a very soft, white, pasty substance with no signs whatever of calcification, except in the walls of these sacs, which were of tolerably hard cartilaginous matter, harder than the surrounding gums. The two front denticles had small, rough, shallow sockets in the bone, but the tooth sacs described had no visible sockets in the bone of the jaw, as was ascertained when the flesh was all removed. The right jaw had the couple of small denticles, the three mandibular teeth, and the two tooth sacs in the same order and position as on the left jaw. The mandibular teeth seemed remarkably loose in their sockets, and with the finger and thumb could be moved quite easily in any direction, the great depth and width of the sockets when compared with the size of the teeth perhaps accounting for this. Each of them was exactly half an inch above the gums ; when removed from their sockets and cleaned, the front one on each side measured $1\frac{1}{8}$ inch in total length, the others were all alike

in measurement—1¼ inch. All of the six teeth had their summits bent inwards, had apparently been tolerably sharp at one time, but had become much worn and chipped. It may be worth pointing out that the dentition of this animal might be variously described as $\frac{0}{3}$ $\frac{0}{3}$ or $\frac{0}{5}$ $\frac{0}{5}$ or as $\frac{0}{7}$ $\frac{0}{7}$ according to the inclination of the observer.

Not trusting my own identification of this Cetacean as Risso's Grampus, I forwarded the jaw, after it had been cleaned, to Mr. Eagle Clarke, who promptly informed me that he had "compared it with the perfect remains of *Grampus griseus* in the Anatomical Museum of the University of Edinburgh, under Sir Wm. Turner's charge. The jaw belongs, undoubtedly, to a young specimen of that species." Before leaving this Annan specimen, it should be added that the oldest and most experienced of the Annan fishermen declared that none of them had ever seen a "whale" of the same kind in the Solway before.

On Monday, 17th October, I was told that a "small whale" had been killed on the previous Saturday evening at Carsethorn, a little fishing hamlet about fourteen miles from Dumfries, but situated in the adjoining county, on the shores of the Stewartry Solway, a little to the westwards of the mouth of the Nith. Following on the recent occurrence of the rarity at Annan, my interest in Cetaceans was now thoroughly aroused, and within a few hours after the notice reached me I was at Carsethorn. I had no anticipation whatever that I was so soon to hear of another example of the same species, and it was therefore with the most pleasurable feelings that, after walking down the beach from our gig, the friend who accompanied me and I saw, when the old sail had been lifted off the animal we had come to see, that we had before us another veritable Risso's Grampus. This one had been caught at the mouth of the Kirkbean Pow, at a little distance above Carsethorn village. It had been seen stranded in the shallow water when the tide receded, and was captured by Mr. Robert M'Call, fisherman, with the assistance of the villagers. One man who was present described it as grunting very loudly, another said it barked like a mastiff dog, and snapped viciously at anything or anybody that came within its reach,

while a third individual said it squealed! It had been stabbed in the throat and bled in the same way as pigs are slaughtered, and when I examined it, the body was positively undamaged in any way, with the exception of the cut under the throat. I made the following notes of its appearance on the spot:—

Dimensions.—Total length, 8 feet.
Girth in front of dorsal, 54 inches.
„ midway betwixt snout and dorsal, 52 inches.
„ „ „ dorsal and tail, 22 „
„ just before expansion of tail, 13 „
Flipper.—Length, 16½ inches.
„ Width, 5 „
Dorsal.—Length, 16 „
„ Height, 10½ „
„ Breadth in middle, 7 inches.
Tail fins from tip to tip, 18 inches.
Lower jaw from point to angle of mouth, 9¾ inches.
Upper „ „ „ 10 „

Sex.—Female.

Colours.—Eye, dark brown; pupil round and black. General colour of upper parts of a dark slaty tinge, greenish in certain lights, bluish in others. Colour of upper parts passing through the different shades from slate colour to grayish at the median line, and gradually passing to pure milky white from vent to flippers, but becoming darker on the under side betwixt the flippers. Flippers deep black. White on throat extending to gape, and then over the upper jaw, covering all the nose and forehead except a deep black moustachial patch of pretty regular outline, beginning over the upper part of the nose and extending downwards on each side. Round each eye was a large deep black patch of irregular outline shading off to gray at the edges. The white lines usually assigned as a specific character were altogether absent, with the exception of a silvery white line lying obliquely across the back of the neck. It was about 8 inches long and enclosed a deep black line along its centre half an inch in width. There was one group of seven black spots on left side midway between dorsal and belly. The largest of these spots was the size of a half-crown, the smallest the size of a threepenny piece, and they looked precisely as if some one had been throwing ink on the skin. There was a large number of scattered white spots the size of peas, just behind vent and a little to left side. Three white spots outlined in deep black were situated just above middle of left upper lip; several white spots were also to be seen along the edge of left under lip. There were no other spots or lines anywhere on the beast, and those described were anything but conspicuous.

Dentition, etc.—The sides and front of tongue were fringed by a row of upright papillæ of rather horny consistency. No teeth in upper jaw. No teeth visible in lower jaws, but on feeling the left under jaw very carefully with the fingers two hard spots were felt. On cutting into them, these hard spots were found to conceal a couple of small teeth, and behind them another tooth was also discovered embedded in the gums. The other under jaw was not cut into.

Appearance of Head.—Lips very thick and fleshy, but no depression between the snout and lips such as has sometimes been described as seen in other specimens of this Grampus. The great swelling lumps on each upper cheek, continuing down to and including the lips, was an extremely conspicuous feature, and gave one the strong impression that the swollen appearance was the result of injury or disease. Snout rounded in upper jaw; much pointed in lower jaw.

Skin.—The whole skin smooth and shining, transparent looking in some lights. Very soft and velvety to the touch, the outermost cuticle easily abraded or rubbed off. The skin was easily lifted in little folds betwixt finger and thumb.

There is not much more to say about the Carsethorn specimen of this rare Cetacean, except that I was glad to be the medium of securing its skeleton for the Museum of Science and Art, Edinburgh. A gentleman resident in the village who was present when the bones were divested of their flesh preparatory to being despatched to Edinburgh, and who examined the stomach, informs me it was quite empty. The same friend also had the curiosity, not to say temerity, to cut off a suitable piece of the flesh and have it cooked. He tells me "it was dark in colour and tasted not unlike the flesh of a hare, or between that and beefsteak. It was a little peculiar in flavour, but not unpleasant." The blubber produced a little over six gallons of good oil, which is used in the same way, and for the same purposes, as the fishermen and others in this neighbourhood use porpoise oil.

Whether the two specimens of Risso's Grampus described in the foregoing pages entered the Solway in company can only be a matter of conjecture. I have been unable to hear of any of our whammle-net men who noticed such animals in the Firth before their capture, and the fishermen in question are distributed over the comparatively narrow limits of the Solway at every tide. One thing seems very certain to me that any such Cetaceans once passing inside

Barnhourie Bank and the Robin Rigg would hardly escape many hours from being stranded on one or other of the numerous sandbanks that stretch for hundreds of thousands of acres in every direction, when the surges that swell up with the famous tidal flow of old Solway have once more ebbed again with equal swiftness back into the Irish Channel.

DESTRUCTION OF WILD BIRDS' EGGS, AND EGG-COLLECTING.

By Lieut.-Colonel W. H. M. Duthie, R.A.

It is gratifying to learn from Mr. Knubley's interesting paper in the "Annals" of last October, that some well known members of the British Association have taken up the subject of the destruction of wild birds' eggs, and are considering the question, whether legislative measures should be recommended for their protection.

There is evidently no time to be lost if we wish to preserve as breeders in the British Isles some of our fast diminishing species; and it seems to be the duty of our Natural History Societies and Field Clubs throughout the country to use their utmost endeavours to educate and interest the public within their several spheres of influence, and thus co-operate with the British Association in its laudable efforts to stem the tide of egg-destruction which has set in.

In seeking for the cause of the mischief complained of, we naturally turn our attention, first of all, to the egg-collectors, all of whom, in a greater or less degree, must be held responsible; and we feel sure that if they could be reasonably controlled, there would be little left for the British Association to do.

There are three kinds of collectors who require to be specially dealt with, viz. the Aimless, the Greedy, and the Mercenary Collector.

The Aimless Collector should be *discouraged.* He is generally a person who knows little or nothing about birds or their habits. His collection is an accumulation of un-

authenticated specimens stowed away in ill-arranged boxes, totally regardless of order, species, or locality, and is useless to himself and of no interest to science.

The Greedy Collector should be *restrained.* He should be satisfied, as a rule, with one clutch of eggs of each bird, with an occasional addition of an abnormal clutch or egg for the sake of comparison.

The Mercenary Collector should be *abolished.* He it is who is mainly responsible for the extermination of species and waste of eggs. His collection is the result of gold, changed into silver and copper as it filters through the hands of dealers, gamekeepers, shepherds, herd-boys, and others, who, often in direct disobedience of orders from their employers, have robbed many an important eyrie, and with indiscriminating ignorance have swept some of our bird nurseries bare. The size and value of this collector's store depends upon the length of his purse, and while proud to tell the market value of a particular egg, he may be unable to describe the bird that laid it, or the nest in which it was found.

The True Collector should be a Naturalist, acquainting himself with birds, their habits, flight, migration, language, and breeding haunts; his egg-collecting being only one of the means of acquiring this knowledge. He should collect for himself, and should never receive an egg into his cabinet unless authenticated by an individual in whom he can implicitly trust. To him, therefore, no dealer need apply, and under these conditions egg-collecting has all the excitement of sport, and the final acquisition of a rare egg, after perhaps years of waiting and watching, is a triumph, and the egg itself is a trophy of which the possessor is justly proud. The collection, whether large or small, should be perfect as far as it goes, all eggs being arranged according to order, genus, and species. Every specimen should be marked with a number and registered with a corresponding mark in a book kept for the purpose, in which should also be recorded the date, locality, and authority, and any note of interest taken at the time. The chief aim should be accuracy; and the journal, if properly kept, is a mine of useful information. It and the cabinet are inseparable, and the

two together may form a valuable addition to a museum. Besides its ornithological value, the collection is deeply interesting to the collector himself on account of its recorded memories. That large white egg stained with brown, lying on a piece of dry seaweed, recalls a day on the Bass Rock, when eye and ear are bewildered by the constant movement and sound of countless hosts of Gannets and other wild sea-birds floating in the air and on the waves, or diving beneath the surface of the water, their shrill cries making a strange discord with the music of the sea, as it rolls its deep-toned accompaniment along the base of the stupendous cliff. Again, the clutch of Buzzards' eggs speaks of the solitude of the mountains, of a bulky nest set on a ledge of a steep overhanging rock at the head of a Highland glen, with a peat-stained burn below winding its way through a world of heather and moss. And so on all through the cabinet, every clutch has its story, each egg its tale to tell, and every drawer breathes its own separate associations: the shady woods and breezy uplands, the swift-running brooks and sluggish streams, the lake and mountain tarn, the misty glen, the sandy shores and rocky coasts, the hedgerows, and shrubberies, and eaves, and every nook and corner where the birds come, from far and near, to rear their offspring in the joyous days of spring—all are represented here in the lovely and varied relics which lie displayed in systematic order before us. When once the eggs of a particular bird have been obtained they are rarely required again; but the breeding haunt being known, the return of the birds may be looked for in each succeeding year, and their habits watched and noted during the whole period of incubation.

If we could confine our Collectors to the true type, which I have attempted to describe, the Egg Dealers would cease to exist, and with them would also disappear the tribe of hangers-on which they maintain, there being no need for their services, and no demand for their supplies; and with the attainment of this happy result, legislation for the preservation of wild birds' eggs would become unnecessary.

CONTRIBUTIONS TO A FAUNA OF THE SHETLAND ISLES.

AUTUMN NOTES.

By J. A. Harvie-Brown, F.R.S.E., F.Z.S.

Two visits paid to a far southerly portion of the Shetland Isles convinced the writer of these notes that the district is almost a *terra incognita* to the working Field-Naturalist during the autumn.

Dr. Saxby's "Birds of Shetland,"—excellent as in many respects it is,—and his earlier first notes in the "Zoologist," cannot be held as relating to Shetland generally, and indeed as only referring to the much more restricted area of Unst.

Since Dr. Saxby wrote, we have scarcely a record from Shetland, except of summer observations, of which latter, however, there is no lack.

We spent several weeks, first in October and November 1891, and again in September and October 1892, at the Southern extremity of the Shetland Isles, in the parish of Dunrossness, to which portion of the main island the accompanying notes principally refer.

During the first of these visits we only met with 56 species of birds. During our second visit we added considerably to this list, making a list of and notes upon 84 species.

In 1891, migration along our whole East Coasts—Scottish and English—was at a minimum, on account of the prevalence of westering winds throughout the season, culminating in a gale of great force and severity from S.S.W., which ranged over our coasts for the space of seven days, beginning moderately (in Shetland) on the night of the 8th October, continuing strong over the 9th to 13th, and reaching its maximum strength on the 14th. On the 15th, I find in my journals that the united roar of surf and wind "had gone down to a 'hum,'" and that it was windless on the 16th. All the time previous to the latter date, the wind had been westerly. In 1892, migration bulked much more heavily all down our East Coasts, even as far north as North Ronaldshay in Orkney, and at Girdleness in Aberdeenshire, whilst on the

East English Coasts it was quite phenomenal. But Shetland appears only to have been brushed, as it were, by the outermost primaries of the right wing of the flight, and only a few "dropped feathers"—a few solitary migrants—helped us to swell our list. The direction of the wind prior to the 4th October was southerly, veering to S.S.E. and S.S.W., and few migrants were observed. But on the 5th, and night of 5th and 6th, migration became more noticeable, both as observed at the lighthouse, and by ourselves in the open. This was the fringe of a vast migration, which will be found duly recorded by other observers farther to the southward. The wind had been northerly and strong, but during the night a sudden shift took place to S.E., and increasing to a gale, whipped up the migrants which had already started on their passage of the North Sea, and drifted them on our shores. But in Shetland we only got a slight waft of this change, and it did not last long enough to flood the islands with migrants. Such were the conditions of migration during the two visits we made to Shetland in 1891 and 1892.

Of the place itself we must be very shortly descriptive. The area we treat of contains the hill and cliffs and high plateau of Fitful Head (928 feet), and the "scattald" or taxed land which lies around it.

It also contains the links of Quendale, the sandhills, and long washed sands of Quendale Bay, the rocky points of Sumburgh Head and Garthness, and, out in the bay, the holms of Quendale. It includes the more important lochs of Spiggie, and Brow, and Hillwell, as well as a few other minor sheets of water, with the marshes and marshy meadows, peat "cuts" and "banks," which connect or surround them. Then there are the rocky, or sandy, or muddy voes of the South Coast, and the rockier voes of the west side. Between the pastured hills are glens and green-edged or marsh-edged burns. When we add to the above description the stunted heather of the high "fields," the short grazing of the "scattalds," the wind-swept scalps, showing the disintegrating granitic rock in rapidly recurring stripes or succeeding terraces, with the "plantie cruives" or small enclosures in which young cabbage-plants are protected from the storms, which are dotted over the otherwise bare landscape, and the "farm-toons" with the

agricultural land around them, and the long dividing walls and fences, we have, sufficiently for our present purpose, indicated the nature of the country in which we observed the following birds and mammals.

HEDGEHOG (*Erinaceus europæus*).—When staying at the manse of Tingwall, three miles from Lerwick, I was informed, very much to my surprise, that the Hedgehog exists along the shores of Loch Tingwall (fresh water), and is perfectly well known to Mrs. Bayne, who told me also that, "when we put them into the garden they usually die." These animals were introduced at Veersgarth by the farmer there, and he planted whins for their protection. They are supposed to have been introduced into the island of Burra by means of a cargo of empty casks, or in the ballast of a vessel (*v.* "Annals S. N. H." 1892, p. 132). In 1892, whilst staying at Sumburgh House, we obtained further account of the Hedgehog in Shetland from our friend Mr. John Bruce, who first heard of the animal occurring around Cunningsburg in the following manner. He had heard of some mischievous boys tormenting an old woman by putting a Hedgehog in her bed. Mr. Bruce had then asked the lads to bring him the next one they found, which they did, and Mr. Bruce obtained two, and had them alive in Sumburgh Garden; but they escaped, and have not been seen or heard of around Sumburgh since. They are stated to be far from uncommon around Cunningsburg, and to frequent the high "fields" and driest ground among heather. As yet I am unable to trace any reliable history of their original introduction, which, however, is currently believed and spoken of as having been effected fifty years ago.

THE COMMON FIRTH SEAL (*Phoca vitulina*) is very abundant about the Quendale Holms.

OTTER (*Lutra vulgaris*).—Many Sea Otters occur all over the district, as is evinced by the fine skins which Mr. John Bruce obtains.

STOAT (*Mustela vulgaris*).—Not rare. We saw skins in the possession of Mr. George Bruce of Sand Lodge. The actual distribution throughout the isles has not, to our knowledge, been worked out. We are credibly informed, however, that it occurs in some islands but not in others, and our friend Mr. Allan Briggs tells me it does not occur on North Ronaldshay, the nearest of the adjoining group of Orkney.

BLACKBIRD (*Turdus merula*).—Not observed at all abundantly. Only one seen in October (15th) in 1891, in a turnip-field up the Mill Glen of Quendale—a favourite shelter ground of migrants. In 1892 I shot a female up the burn which flows

into Garth Wick, 30th October, and saw another sheltering in nettles near Garth Crofts on Sunday 6th October. One or two others were observed around Sumburgh and Quendale, but not prior to 5th October.

Song Thrush (*Turdus musicus*).—My cousin, who accompanied us in 1892 to Quendale, Mr. Adrian Forrester, who is a keen collector, saw several thrushes, and we observed two near Garth on 9th October.

Redwing (*Turdus iliacus*).—One; the only one seen up to date of 12th October 1891. I shot amongst the peat "cuts." Only single birds seen among the peat cuts, or in the "plantie cruives," up till 20th, when about a score were found sheltering in a flock in the Mill Burn Glen, close to Quendale. In 1892 a few single birds seen on and after 5th October. One or two seen nearly every day for a week or so.

Fieldfare (*Turdus pilaris*).—In 1891, only a few solitary birds seen scattered among the more sheltered hollows. In 1892, they did not arrive or show up with Redwings or Thrushes during October; but early in November a flock was reported to us by Captain M'Farlane, as seen in the angle formed by two walls, close to the Established Church—a favourite place for newly arrived migrants.

Wheatear (*Saxicola œnanthe*).—A few scattered birds, natives of the district, remained into October, and until about the 14th, but not later than this in 1891, except one—a passing bird, or a lingerer—on the 19th. In 1892, most of the Wheatears disappeared earlier, or about the 6th October.

Whinchat (*Pratincola rubetra*).—We did did not meet with the Whinchat in 1891; but in 1892, Mr. Adrian Forrester shot a young male on Fitful Headland on 8th October.

Stonechat (*Pratincola rubicola*).—We did not meet with the Stonechat in 1891; but a male was obtained on the Mill Burn, and a young bird on Fitful, 6th October 1892.

Redstart (*Ruticilla phœnicurus*).—A single male seen in Mill Glen Burn, and a female seen previously, between the sea and Quendale Links, on the 2nd October 1892. Not observed in autumn of 1891.

Hedge Accentor (*Accentor modularis*).—Not in our 1891 list. Only one seen in nettles at Garth Banks, 9th October 1892.

Blackcap (*Sylvia atricapilla*).—A female observed within a few paces, skulking and sheltering amongst nettles, inside old croft at Garth Banks, on Sunday, 9th October 1892.

Willow Warbler (*Phylloscopus trochilus*).—Not noticed in 1891. Several seen, one at Garth Banks, 6th October, 1892, on the

sea slope, and others about the same dates, but not before. Again one in Sand Lodge garden, on 21st October.

Gold-crest (*Regulus cristatus*).—Gold-crests were reported to us by Mr. Youngclause as appearing at the lantern of Sumburgh Head Lighthouse previous to 29th October 1891. But there are no returns during October 1892 in Mr. Youngclause's schedules, although they appeared so abundantly at more southern stations.

Common Wren (*Troglodytes parvulus*).—Not very abundant. In 1891 only one seen in "plantie cruives" near Spiggie. Shot one in Garthwick Burn, and saw a family party in Moussa, one of which was shot, and is now in Edinburgh Museum. The other, of which I have the skin, I took the following measurements of: base of bill to end of tail, $4\frac{3}{8}$ inches; wing from carpal joint $1\frac{5}{16}$ inches. These Shetland Wrens appear to be large and large-footed, light-coloured, and much vermiculated, both on back and under parts.

Meadow Pipit (*Anthus pratensis*).—Not very abundant. In 1891, appeared to be almost confined to the limited marshy edging of the Hillwell Burn, by the base of Fitful, and the valley behind "The Cleap"; and there only singly or in pairs, up to about 3rd October. In 1891, we made the note on the date of 3rd October, "Meadow Pipits and Larks are now flocking," and "Meadow Pipits not common, and very local." Most seen about 3rd or 4th October.

Rock Pipit (*Anthus obscurus*).—Seen commonly, even abundantly, in its usual haunts, especially around the fish-curing station at Garth Banks; occurring also, however, inland, up the Eel Burn, and on the shore of Loch Hillwell. Observed no increase of numbers at any date, either in 1891 or in 1892.

Swallow (*Hirundo rustica*).—A solitary bird seen at Loch Hillwell on 17th October 1891. In 1892, two seen flying over Loch Brow, 8th October. The Swallow was reported to us by Mr. George Bruce as unusually abundant in the summer of 1892, along with Swifts.

Sand Martin (*Cotile riparia*).—One seen hawking over upper Culsetter Marsh, near Hillwell Burn, on 8th October 1892; and another seen at Spiggie on 13th October.

Robin (*Erithacus rubecula*).—In 1891, only one seen close to Garth fishing-station. In 1892, five or six seen, one at Hillwell Farm on 8th October.

House-Sparrow (*Passer domesticus*).—Common at Quendale Farm, and indeed at most, if not all, the farm-towns from Sumburgh House to Lerwick, yet scarcely to be called generally distributed,

and distribution somewhat broken, so far as we could observe. We have quite failed as yet to record the Tree Sparrow from Shetland.

Chaffinch (*Fringilla cœlebs*).—The Chaffinch stands in our autumn lists as the first bird taken note of. When we visited Shetland in October 1891, Chaffinches were by that time in large flocks (9th October) in the corn-fields, and sheltering from the gale under the "kail-blades." They were, however, all migrants. In 1892, the first observed was shot amongst a flock of Twites (5th October); and immense flocks afterwards of hundreds and thousands were seen for the space of a few days. Same day one Brambling seen amongst them; and on 8th at least one sixth were Bramblings. From the association, we think there is no doubt about the Scandinavian origin of these flocks. All disappeared as suddenly as they arrived, and stragglers only were met with after the 10th October 1891.

Brambling (*Fringilla montifringilla*).—First seen in 1892—a single bird amongst a lot of Chaffinches—on the 6th October. Then on the 8th—wind north—close to Loch Spiggie, a large flock of mixed Chaffinches and Bramblings, the latter composing about one-sixth of the whole—several thousands in the flock. Wind had been N. or N.N.E., veering and backing, but always to the N. Suddenly shifted to S.E. and blew hard on night of 5th to 6th, but alas! only for too short a spell.

Linnet (*Linota cannabina*).—Not observed in 1891. But in 1892 one small flock was identified by us, 17th October, near Scatness.

Twite (*Linota flavirostris*).—Very abundant. In small flocks seldom exceeding fifty individuals. Frequent the cabbage-yards, feeding on seeding sorrel, especially in the unoccupied "plantie cruives," and in numerous small flocks on the stubbles. Not so often seen on the "scattald" or "fields" at this season, except where the "plantie cruives" exist. Observations the same in 1891 and 1892.

Corn Bunting (*Emberiza miliaria*).—Not at all abundant, and extremely local; so far as our opportunities gave us of observation. Rarely seen on the farm-lands at this season, but a considerable flock—probably all for many miles round—sheltered during the day, and roosted at night among the reeds of Hillwell Loch in 1891. In 1892—but why, we know not—their numbers appeared to be not more than one-third of those in 1891, and besides they were not so persistent in their chosen roosting-place.

Reed Bunting (*Emberiza schœniclus*).—Not observed in 1891. One single female bird was shot on 8th October 1892.

About same date we received a wing of one killed by Mr. Allan Briggs in North Ronaldshay.

Snow Bunting (*Plectrophanes nivalis*).—In 1891, first a small flock went "tinkling" overhead. Then flocks of hundreds and thousands were seen along Loch Spiggie and upon Backasetter Farm on the 23rd October, and many were heard overhead all day, and they continued exceedingly abundant all the remaining time of my stay—*i.e.* up to 3rd of November. Captain Macfarlane, however, afterwards reported that all, or nearly all, had left by the 19th December of the same year. In 1892, during October, Snow Buntings were much rarer than in 1891, all the time I was there—23rd September to 30th October. The first heard of was a flock of twelve on the 6th October. Then a flock of some hundreds same day, but they did not alight, but flew steadily south. After this some considerable flocks seen, but most passed on. The people on certain farms catch these birds with a sieve-trap—twenty to thirty at a time—in snow-time. In Shetland, the skins are removed by inserting a quill, or the barrel of a steel pen-holder, in a small cut made on the forehead. The pen-holder is then used as a blow-pipe. Of course shot birds cannot be skinned in this way. This method is called "blowing them."

Starling (*Sturnus vulgaris*).—In 1891, observed in small flocks. Nowhere did we observe them in large numbers, as compared with more southern localities. But they are very abundant notwithstanding. We might expect to find amongst migratory Starlings, specimens of the so-called *S. Faröensis*. I did not care to slay numbers of them to make the discovery; but any which I did examine did not appear to me to be worthy of specific separation.

Jackdaw (*Corvus monedula*).—In 1891, two were seen distinctly by us flying in company with Rooks close to Sumburgh Head on 27th October; and in 1892, two again were seen on 18th October consorting with about a dozen Hooded Crows. As will be noticed further on, it is curious how many species observed in 1891 and 1892 appeared in exactly similar numbers at approximate dates, and in adjacent localities. (See Greylag Goose, Wood-pigeon, and several more.)

Since writing the above, we have heard from Mr. Youngclause that "what he takes to be three Jackdaws were seen near Grutness on the 28th October 1892."

Raven (*Corvus corax*).—Perhaps nowhere more abundant in Britain than in the Shetland Isles. Often seen in dozens and half-dozens, and occasionally in much larger companies. Seem to have, in common with many other species, regular beats

over which they pass at certain hours, this varying with the direction of the wind. Thus some days the Garth Banks is a sure find, if one wishes to procure specimens; other days the sandhills of Quendale close to Hillwell, and again Spiggie and other places.

Hooded Crow (*Corvus cornix*).—Abundant, fearless, undisturbed. In flocks of scores or singly. Everywhere assertive and impudent. A possible increase was observable after the 10th October—at least flocks were more commonly seen. Some were much whiter in the mantle than others, and may have been of more eastern origin.

Rook (*Corvus frugilegus*).—In 1891 several were seen: first three on the 19th October, then five reported. By all accounts *rare* in Shetland, but Mr. Bruce of Sumburgh lately (September 1891) had quite a large flock close to his house. Many are seen at odd times. Wind always southerly and westerly when observed. Not observed in 1892.

Skylark (*Alauda arvensis*).—In 1891, Skylarks were literally in thousands up to the middle of October, but after that, perhaps only in hundreds, and later on still fewer; frequenting the stubbles. By 22nd December, Larks had become still scarcer, as we were informed by Captain Macfarlane. In 1892, Larks were only seen rising out of the stubbles in September singly, or in small scattered flights; but soon after, about the 4th October, a great change appeared, and they were beginning to flock and draw nearer to one another—a change observable also amongst the Meadow Pipits. This was a day or two before the general movement of birds on 5th and 6th October 1892.

Wryneck (*Iynx torquilla*).—Mr. Thomas Marshall, The Store, Stanley, Perthshire, informs us (*in lit.* 20th October 1892): "Mr. Youngclause sent me the Wryneck on 21st August 1891." Mr. Youngclause wrote thanking Mr. Marshall for the identification, and said: "It was sent up to me by our local postmaster, Mr. Isbister, and had killed itself on the telegraph wires. I, however,"—continues Mr. Youngclause,—"saw another one alive at Quendale this day week [letter is dated 29th August 1891]. So it seems a few of them have been about."

Short-eared Owl (*Asio accipitrinus*).—In 1891, one was shot by us, as it rose out of the peat "cuts" below Loch Hillwell on the 17th October, and one—probably the same bird—was reported by Mr. Youngclause as seen at Sumburgh Lighthouse two days before. In 1892, one was seen about the same place by Captain Macfarlane before my arrival at Quendale in September.

Snowy Owl (*Surnia nyctea*).—On the 28th October with S. and S.W. wind and heavy rain, and a migration of Glaucous Gulls passing S. to S.E., a magnificent Snowy Owl passed within a hundred yards of our boat on Spiggie. It was almost within range of the big eight bore, but we were all at first too much taken up in watching him, in a very bad light, trying to make him out. At first I thought it was an albino Sea Eagle. I felt dubious, and then flashed across my miserable memory the Snowy Owl's flight in Russia; the wings not so "*board-square*" as the Eagle's. He flew low over Backasetter, and winged his way over the "fields" towards Fitful. When it dipped and its back became visible, it appeared to be a bird about two to three years old, from the mottling of the feathers on the back. The wings showed "frilling" or "fringing" on the edgings against the sky, much as a Rook's or an Eagle's wings do. I believe this bird would probably rest upon the flat plateau which forms the summit of Fitful, and towards which it was slowly winging its way, flying south with a S.W. wind. Perhaps its next resting-place will be Butt of Lewis, possibly Orkney; less likely the mainland of Scotland.

White-tailed Eagle (*Haliaetus albicilla*).—Distinctly saw a White-tailed Eagle wing its high way over Quendale Links and Sand-hills towards Fitful, which, however, was enveloped in dark thick mist. Mr. George Bruce, who was along with us, saw it also, and said, "It is one of the Fitful eagles." He tells me these Fitful birds have often been killed, and he believes that the reason the Fitful Eagles have continued to hold their eyrie so long is to be found in this occasional destruction of one or the other bird before its mate gets too old to wed again. In this I perfectly acquiesce. Mr. George Bruce still believes there are five pairs in Shetland, and Mr. John Bruce corroborates the statement that there has been no break in the continuity of their occupancy of Fitful. Little or no information can be extracted from the natives about this or almost any species of bird. We are not ourselves perfectly satisfied of their occurrence there as a nesting species now, but the above notes may elicit more data and proofs.

Peregrine Falcon (*Falco peregrinus*).—The Fitful falcons were constantly seen both in 1891 and 1892. The female a very large powerful bird, and the male a particularly small bird. I saw them both often at short distances as they suddenly flashed past along the hill-sides, intent on Blue Rock Doves, about the outskirts of the cropped land.

Merlin (*Falco æsalon*).—Very common, and often seen hunting singly, and at times in pairs. Usually appears on the track of the Snow Buntings, Snipe, or flights of small birds. I have

several times nearly whistled them over with the plover call in Shetland, and successfully practised the dodge elsewhere.

Cormorant (*Phalacrocorax carbo*).—A pair regularly frequent Loch Spiggie, and visit Loch Hillwell and fly across thence by the "cuts" and Quendale to Quendale Bay. Common at the Holms in Quendale Bay, but not to compare in numbers with the smaller species or Shag.

Shag (*Phalacrocorax graculus*).—Very abundant, sitting in great colonies upon the rocks all round Garthness, the Quendale Holms, and indeed everywhere prominent in the sea-scape—as many as 300 or 400 together.

Common Heron (*Ardea cinerea*).—Visits the district in autumn. In 1891, five or six were observed early in October along the side of Loch Brow, and in the marshy meadows (marked in the 6″ scale O. S. Map as "subject to flooding"). These shortly disappeared, and only one or two were seen afterwards. In 1892, the first observed was on 1st September, when Captain Macfarlane saw two. Afterwards seen frequently at Loch Brow; and also on Mousa Island, on 20th October, six or seven were seen together.

Greylag Goose (*Anser cinereus*).—In 1891, one solitary bird was seen, and put up at a distance of perhaps a hundred yards, by the side of Loch Spiggie, on 26th October. Mr. Youngclause also reported (*in lit.*) "Greylag Geese" flying S.W. at Sumburgh Lighthouse on the same date. In 1892, curiously enough, again a solitary bird was seen at the same loch side on 10th October. It rose and "gabbled" as it flew, showing the alar patches very distinctly.

Bernicle Goose (*Bernicla leucopsis*).—Saxby says in July 1854 he saw one of this species—making sure of it—and added: "No other authentic record of its occurrence in Shetland has come to my knowledge;" and Howard Saunders, building upon this, says: "To the Shetlands and Faroes, this species is only a rare straggler." On 9th October one which we examined had been shot, out of a flock of seven, among Quendale sandhills, by the Quendale grieve's son, who did not know the bird. On 15th October, I saw three, and these were seen going about the sides of Loch Spiggie for some time. The Bernicle Goose is quite common here—Dunrossness—on migration in both spring and autumn, but does not remain, we are assured, in winter, as it does in the Hebrides. Thirty-eight were frequenting Spiggie Shore on the 21st October 1891 and many more were seen. In 1892, quite a big lot were reported to us close to Backasetter on 6th October, but we saw none till 9th October, when a flock of seven passed south near Quendale House—wind

N.E.—at 2 p.m., and appeared to light on the larger of the Quendale Holms. This was the 9th October, exactly the date of the flock of seven of which the grieve's son killed one last year, and the wind was in the same direction. Afterwards flocks of seven, sixteen, and other numbers, were seen at Sumburgh and on Mousa.

Whooper (*Cygnus musicus*).—One which had been wounded now does duty on Loch Brow as sentinel for wild-fowl, and decoy for other swans. It often gets on wing and flies a few hundred yards, but seems little alarmed by the reports of fire-arms. Another came in November 1891.

Wild Duck (*Anas boscas*).—Common, but not to be called abundant. Seen early in the month, and shot in the marshes. Certainly less common than many other species of Anatidae; much rarer than Wigeon or Teal, Scaup, etc., and never seen in large flocks. A drake shot by W. Moir on 22nd October had not lost the entire female plumage. It possessed the alar patch. The head was only beginning to take back the glossy green. The wing-coverts were partly male and partly female. General plumage, female predominating. No sign of curled feathers of the tail of the male. Axillaries mostly female; very few vermiculated male feathers. Back mostly female, very few male. This appears to us a very late date at which to find this phase of plumage. But on the 28th October 1892, another in precisely similar plumage was also obtained at Loch Spiggie. Now the first of these birds was decidedly an old bird; but the second, to our eye and examination, was a young male of the year. We cannot get any satisfaction on this point from Dresser's "Birds of Europe"; MacGillivray only quotes Waterton; and Howard Saunders ("Manual") says nothing of the differences of the plumage of old males reassuming the drake plumage "by the middle of October," and of the young drake of the year assuming first adult male plumage. MacGillivray only touches the question at vol. v. p. 41, under "Progress towards maturity," *q.v.* We regret that both these birds were not preserved, but our remembrance of them is very distinct.

Teal (*Querquedula crecca*).—About twelve seen upon Spiggie and Brow on 12th October 1891,—which appears to be about their usual time of appearance,—and daily almost afterwards. In 1892, seen at an earlier date, and numbers along with Wigeon on the 8th at Spiggie and Brow.

Wigeon (*Mareca penelope*).—Very common. Many seen. Flocks of twenty or more on Lochs Spiggie and Brow or in Backasetter Marshes or Meadows; all during October 1891. In 1892, during rough weather and south winds, over a hundred were in

Brow, and when put up they broke up into six lots, and all chose a fly-line up the Culsetter Marshes to Hillwell, where, standing still, I shot one; and had the line been observed sooner, I believe six brace could have been got, as they all flew over the same spot, and quite low, against the strong south wind. This was on the 6th October, and many were also in on the 10th.

Pochard (*Fuligula ferina*).—In 1891, five were identified clearly. Many more were suspected, but glass was not powerful enough to make sure whether Pochard or Scaup. In 1892, none made certain of.

Scaup (*Fuligula marila*).—In 1891, numbers of Scaup were frequenting Lochs Spiggie and Brow. Considerable uncertainty about their identity existed until the 29th October, when I secured one out of a lot by the side of Loch Spiggie. There remained then no doubt as to their presence long before this date, and afterwards.

Tufted Duck (*Fuligula cristata*).—I find no record of them in 1891, but four were identified in Quendale Bay, 25th September 1892. They certainly are not at present common here.

Golden-eye (*Clangula glaucion*).—Common on Lochs Spiggie and Brow, and single old males at times on Loch Hillwell. Also in 1892 equally common.

Long-tailed Duck (*Harelda glacialis*).—We do not, curiously enough, find any records of Long-tailed Ducks in 1891. But in 1892 their numbers were very great close in shore. The first seen was a single male sitting on the east point of Loch Spiggie. It is not usual to find this ocean duck on a fresh-water loch. On 17th October, on Wildness Point, between Virkie Vöe and Grutness Vöe, there were some hundreds, coming pretty close in. Wind, which had been N.E., changed round for a short space to E., and blew pretty strong. On 18th there were large lots also in West Vöe, and in Quendale Bay; and a pretty sight it was to watch them with the glass, ranged in close phalanx; those packs on the east side showing a preponderance of females, but the flocks in Quendale Bay a preponderance of males. Wind by 18th back to N.W., and bitterly cold.

Common Eider (*Somateria mollissima*).—Not seen very abundantly, though said to be seen very plentiful at times in the vöes of the west side. Always a few about the Quendale Holms and Bay, and along the Scatness shore.

Red-breasted Merganser (*Mergus serrator*).—Five identified flying overhead towards Quendale Bay from Spiggie, on the 28th October in 1891. In 1892, several times seen; five in

Garth Bay at the fishing-station, 9th October, two at same place on 15th October, and four in West Vöe on 18th.

Ring Dove (*Columba palumbus*).—In 1891, two were seen on the Backasetter Farm, close to Loch Spiggie; and one was shot on 26th October. It was in poor condition. Curiously, in 1892, two again were seen at Loch Spiggie on 10th October, and one shot by Captain Macfarlane.

Rock Dove (*Columba livia*).—Abundant inland during the day, and repairing to the caves at dusk. The old Broch of Mousa is one vast pigeon-house, affording abundance of fine garden manure, which is collected once or twice a year for Sand Lodge garden—perhaps a ton annually.

Spotted Crake (*Porzana maruetta*).—In 1891, my spaniel "bunched" a Spotted Crake in Culsetter Marsh, and fetched it to me alive; otherwise, I would not probably have found it. This was on the 26th October. Saxby says, "Not in Shetland"; but Saunders' ("Manual") says, "Twice in the Shetlands in October." This one is only the second I have seen alive in Scotland, the first having been flushed in a marsh in Stirlingshire close to our own house some years ago. At the Queen's Hotel, Lerwick, we found another specimen stuffed, which had been shot by Mr. Weber, the landlord, who assured me they were not uncommon, and are usually seen between September and November, and even in the latter month. Mr. Weber added: "I could have shot one two days ago," the 21st September 1892. Mr. Weber appeared to know the Water Rail quite perfectly, though he also gave that name to the Spotted Crake in his possession. Mr. G. H. Bruce of Sand Lodge, writing to Captain Macfarlane, says, "We never find these Rails unless we have a dog, and I was unaware of their existence in Mousa until last year (1891), when we had Furlonger's dog and got three, *one of which was different from the other two.*"

Water Rail (*Rallus aquaticus*).—Saw none in 1891, but shot one and saw another on Loch Hillwell, and obtained two in Mousa, 28th September and 20th October 1892. Said to be quite common, and believed to breed in Shetland.

Coot (*Fulica atra*).—Common: five or six pairs on Loch Hillwell, and a few also between Lochs Spiggie and Brow. Young in down, one shot at Loch Hillwell, 28th September.

Water Hen (*Gallinula chloropus*).—Less common than the Coot. None noticed in 1891, when the marshes were drier; but seen and obtained in 1892, when the marshes were much too wet to hold Snipe. Commonest about Spiggie and Brow.

Golden Plover (*Charadrius pluvialis*).—We saw none ourselves, either in 1891 or 1892, but in September, William Moir shot two in the "scattald" between the two stone walls near the churches — a favourite place for newly arrived migrants. Golden Plover appear to be decidedly scarce in autumn in Dunrossness.

Ringed Plover (*Ægialitis hiaticula*).—Abundant earlier in the year, but in 1891 decidedly scarce as resident birds. Only one seen in 1891 in autumn till the 27th October. But plentiful at Sumburgh and Virkie Vöe on the 27th—doubtless migrants. In 1892 they were again scarce up till late in October, and again were very numerous at Virkie Vöe on 17th, and at Sandwick on 20th.

Lapwing (*Vanellus vulgaris*).—Decidedly a scarce bird around Quendale on migration. Four or five seen at Loch Brow the day before the gale culminated on the 14th October 1891, and an odd small flock afterwards. In 1892 a single bird seen near Quendale House, and four at Loch Spiggie, 3rd and 6th October.

Turnstone (*Strepsilas interpres*).—I have received a Turnstone in its flesh, shot at Quendale by Captain Macfarlane. Of course it is a species which, with many others, may be expected to appear there. This, however, is my first positive record from Quendale.

Oyster Catcher (*Hæmatopus ostralegus*).—A few seen in 1892 on the Quendale Holms, most likely resident and old birds in pairs.

Woodcock (*Scolopax rusticula*).—Several were observed on Fitful Head after my departure; and W. Youngclause writes us, 31st October 1892: "Since the rush of these Chaffinches" (viz. 5th and 6th October), "I have seen no new birds, except one Woodcock, which I started on the 20th inst. from the corner of one of the parks close to the houses.

Common Snipe (*Gallinago cœlestis*).—Local sportsmen distinguish the dark-coloured home-bred Snipes from the lighter coloured foreign birds. Abundant. "A flight," writes Captain Macfarlane, "came in at the latter end of September, amongst which a number of very heavy [*i.e.* large?] birds were noticed." This occurred before my arrival, and my host (Captain Macfarlane) being at the time physically unfit for working the marshes, no specimens were obtained. From what I heard subsequently, there seems to be little reasonable doubt that these were Great Snipe, and it would have been possible to have killed two or three couple at that time, or even more. In 1891, Snipe were fairly abundant; but in 1892, Snipe were quite

scarce as compared with the previous season, and all obtained up to end of October—with the exception of Jacks and perhaps two or three Full Snipe—were home-bred birds. We shot one day on Mousa with Mr. George Bruce, but nine Snipe, two Jacks, and two Water Rails composed our joint bag. Further north, on Bressay and in Lerwick district, we heard, however, of bags of ten and a half couple (W. Weber), and fifteen and a half couple (Captain Furlonger); and Captain Furlonger in Fetlar added in all ninety-six to his score in 1892 to date. It was a bad migration season. Snipe which are constantly talked of as weighing seven and a half to eight ounces, and as "foreign birds," can hardly prove to be other than Great Snipe. During our stay in Shetland in 1892, some three or four Snipe we shot were of the *russet* variety; and we brought home skins of both varieties: the dark, boldly-marked birds, usually looked upon as *home-bred*, and the russet, richly vermiculated variety, usually considered to be of foreign origin.

Jack Snipe (*Gallinago gallinula*).—A sprinkling in the marshes in 1891, and quite a number in 1892—for a few days only—the earliest seen on 28th September, and two shot next day. But most seen about 6th October to 10th: a few remained longer.

Sanderling (*Calidris arenaria*).—Mr. A. Forrester shot one,—the only one seen,—27th September 1892, on the shore of Quendale Bay.

Dunlin (*Tringa alpina*).—Four were seen and two shot on the shore of Loch Hillwill on 6th October 1892 by Mr. A. Forrester; and three more were seen on Loch Spiggie a day or two afterwards. None were observed in 1891.

Purple Sandpiper (*Tringa striata*).—Only two observed at Garth Banks in 1891. One only shot by Mr. A. Forrester on 29th September 1892 at same place.

Redshank (*Totanus calidris*).—Not observed very commonly in 1891. But many seen along the rocky shores of Quendale Bay on both sides of the sand in 1892—probably all migrants.

Bar-tailed Godwit (*Limosa lapponica*).—First identified by loose feathers picked up at Loch Hillwell. Saw several afterwards at Virkie Vöe in October 1891, and also at the same place in 1892; but not by any means abundant.

Curlew (*Numenius aquata*).—A flock of about fifteen to twenty persistently frequented the Quendale Links and shore both in 1891 and 1892; always most unapproachable. A large flock on Virkie Vöe, and around Sumburgh.

Whimbrel (*Numenius phæopus*).—Not many seen. None in 1891. A few in 1892, as late as 3rd October.

Black-headed Gull (*Larus ridibundus*).—In 1891, none observed. They are said to have bred on Backasetter Meadows only during the last three years. Twelve birds flew over the Hillwell "cuts," 6th October 1892. I wonder if these are resident birds or migrants. Captain Macfarlane says about twenty pairs bred at Backasetter Meadows this summer, and nine nests were robbed. Saw a few on other occasions about Spiggie and Brow.

Common Gull (*Larus canus*).—None seen in 1891. Several seen previous to 3rd October 1892, and one flock on that date. Several seen 10th October, and often afterwards over land and sea.

Great Black-backed Gull (*Larus marinus*).—Common.

Lesser Black-backed Gull (*Larus fuscus*).—Common.

Herring Gull (*Larus argentatus*).—Commonest of the three species. Thousands congregating in Quendale Bay for about three or four days previous to the 4th October. "Sillock" came into the Bay with the change of wind to the N.

Kittiwake (*Rissa tridactyla*).—Hundreds in Quendale Bay, off Garthness, and around the Holms, previous to and also after the change of wind from southerly to northerly, in the end of September 1892.

Glaucous Gull (*Larus glaucus*).—In 1892, on 9th October, wind N.E., one Glaucous Gull flew past in a N.W. direction, and I saw the same bird several times afterwards. On 26th October, wind N.W. by W., and in afternoon still more westerly, a migration of Glaucous Gulls was distinctly made out: only stray birds had been noted before, very occasionally. They were passing south in single birds and in pairs. I saw seven in all, one a splendid adult bird. They flew S. or S.S.E. Glaucous Gulls are known and spoken of in Shetland as "Iceland Gulls."

Richardson's Skua (*Stercorarius crepidatus*).—An apparently disabled bird, or a gorged bird, on Quendale Links, was added to Mr. A. Forrester's collection. It was in very dark first year's plumage.

Northern Diver (*Colymbus glacialis*).—Captain Macfarlane shot one in spring of 1892, and we saw a few in autumn—one in Grutness Vöe, and another in Quendale Bay, in October 1892.

Black Guillemot (*Uria grylle*).—Very common all around the coasts, and varying in plumage to a great extent.

Sclavonian Grebe (*Podicipes auritus*).—Three were shot by us on 22nd October 1891, out of a flock of seven on Loch Brow.

1/6

From a Photograph

R&R. Clark, imp.

Raia clavata, Linn., Variety

Wind E. by S., fine, very light. They were at first mistaken for Teal flighting over. This appears to be the commonest Grebe in Shetland; but none observed in 1892.

Little Grebe (*Podicipes fluviatilis*).—Only one observed on Loch Spiggie, 26th October 1891. None seen in 1892 to date of 30th October.

AN UNUSUALLY COLOURED EXAMPLE OF THE THORNBACK (*RAIA CLAVATA*, Linn.)

By R. H. Traquair, M.D., F.R.S.

Keeper of the Natural History Collections in the Museum of Science and Art, Edinburgh.

Plate I.

A short time ago Mr. Charles Muirhead, Edinburgh, presented to the Museum a Thornback caught to the east of the Isle of May, the unusual colouration of which renders it worthy of being recorded and figured.

The fish is a female and measures 33$\frac{1}{8}$ inches in length from the tip of the snout to the termination of the tail, and in breadth 21$\frac{1}{8}$ inches across from angle to angle of the pectoral fins. In general form and in its dentition and dermal armature it is a perfectly typical example of *Raia clavata*, Linn., but in its colouration strangely aberrant.

The ground colour of the upper or dorsal surface is white, mottled all over with blotches of dark gray and small spots of black so as to give it a most extraordinary appearance. The colour of the ventral surface is quite normal.

Protective resemblance is generally accepted as the leading motive in the tinting of the coloured surfaces of flat ground dwelling fishes, whether Raiidæ or Pleuronectidæ, thus we have ordinarily various shades of brown or brownish yellow, mottled so as to imitate more or less the appearance of a muddy, sandy, or gravelly sea-bottom. But it is hard to imagine what manner of sea-bottom the colour of this Thornback could imitate, unless it were a surface of white chalk, scattered over with dark pebbles!

The only explanation which occurs to my mind is that this colour-sport may be a case of partial albinism.

NOTES ON *ASTRONYX LOVENI*, MÜLLER.

By W. ANDERSON SMITH,
Member of the Fishery Board for Scotland.

WHEN I first obtained a specimen of this most interesting Starfish, from 90 fathoms in the Sound of Sleat, in the summer of 1886, it was considered a most rare inhabitant of the Scottish waters. Only one previously had apparently been recorded, viz. from Lochinver. But Mr. Thomas Scott had taken one the year previous in 70 fathoms off Peterhead, with a disc 2 inches in diameter and 12 inch arms. This is of much more robust and less characteristic dimensions than that from the Sound of Sleat, in which the disc was only 1 inch diameter, with two arms each 16 inches long, and three of inferior length and robustness. This variation in the size of the limbs is a marked characteristic of the species, and is congenital, and not owing to former severance and a new growth, as so frequently happens amongst other stars. Indeed *Astronyx* is not so brittle as its long slender limbs would lead one to suppose, although, when a mass of them get intertwined, it is difficult to obtain a perfect specimen; as noted by Mr. Sim when they are captured by the trawlers off Aberdeen. There they seem to be very plentiful according to the above authority, but I have no details as to their special habitat on that coast.

During my recent West Coast investigations, however, I had the opportunity of obtaining this species from several localities, and found them indeed, as is commonly the case with all classes of life, to be plentiful enough once the proper habitat was discovered. A marked peculiarity of our West Coast lochs is the prevalence of the great Seapen, *Funiculina quadrangularis*, of noble proportions and great beauty. In every case in which *Astronyx Loveni* were taken during this summer they were in conjunction with these zoophytes, very often twined around them, and apparently living upon the polyps.

In no case did we, however, meet with it south of Skye, either on this or on former expeditions. We first met it in 40 to

55 fathoms in the Sound of Sleat as before, two smaller specimens coming up, along with *Funiculina*. In Loch Duich they proved to be numerous and larger, and in this they were in keeping with the Pennatulæ, which were also plentiful and of fine proportions. On the west of the Minch, in 63 fathoms, off the mouth of Erisort, we again met both the one and other of these low type organisms in juxtaposition, while Lochs Nevis and Hourn were both plentifully supplied with this Starfish, all so closely intertwined with the Seapens that their connection could not well be questioned. Loch Nevis, with its opening opposite the point of Sleat,—but the Loch itself trending southward,—is the most southern habitat I have yet found it in. But the fact that in both Nevis and Hourn they were more especially abundant, would not lead me to look upon them as the southern limit; so that specimens may be naturally looked for still further south in the waters of the west.

The habitat in all cases then seems to be in deep water, from 50 to 100 fathoms; and as this depth is not readily found until a considerable northern latitude is attained on either coast, the possibility is that only stray specimens will be taken south of the Small Isles, and then under exceptional circumstances. We have never yet taken them, although we have trawled and dredged all the ground down to the south of Islay, south of the Sound of Sleat. Again, if they specially haunted the ground on which the *Funiculina quadrangularis* displayed its greatest charms, we should find them in Loch Linnhe and the Mull lochs, where these are especially fine and abundant. But although that ground has been repeatedly worked by us at all times of the year, we have failed to discover *Astronyx Loveni* amidst the Seapens. The enemy of *Funiculina* in these latter waters is the crustacean *Arcturus longicornis*, which evidently browses persistently upon the polyps, and refuses to allow itself to be removed.

Astronyx therefore seems to demand not only the congenial company of suitable provender such as *Funiculina*, but deep water, which in itself may mean more temperature than pressure. On the East Coast therefore it may not require such great depth, as the temperature may be more suitable at lesser depths. The fact that they are occasionally taken

in quantities off Aberdeen in the trawl net would support this contention, as the common trawlers do not work at the depth mentioned.

There is greater delicacy and attenuation evidenced by the measurements on the West Coast than on the East; and further, seems to be still more marked in the confined lochs than in the open waters of the Minch and Sound of Sleat. This would be natural, with no severe currents or rough water to contend against.

The fact that these rare Starfish were taken in plenty in so many localities is proof not only of the inadequate examination hitherto of the lochs of the West of Scotland, but also of their undeveloped possibilities. For these separate lochs, with their differing conditions and isolation, give every facility for differentiation.

ON SOME SCOTTISH WILLOWS GATHERED IN 1892.

By the Rev. E. S. Marshall, M.A., F.L.S.

During last July I spent a fortnight at the Spittal of Glen Shee, mainly with a view to examining the *Salices* of the neighbourhood. Glen Callater has long been known as one of the best localities in Scotland for these plants; but this, and other rich spots accessible from my headquarters, had not, so far as I am aware, been especially worked for the hybrids of the genus. My expectation of fresh discoveries was not disappointed, four new ones being added to the British list; of these, three were found in the course of one afternoon's walk, on the banks of the Lochsie, above its junction with the Thailneiche Burn, in the upper part of Glen Shee.

A few days earlier, Mr. John Knox, of Forfar, had introduced me to the botanical treasures of Restenneth Moss. Here there is a large field for the salicologist; but my visit was rather too late in the year, and the results are consequently not so certain as could be wished. The ground had already been worked to some extent, and several

hybrids discovered, either by my guide or by Dr. Buchanan White. To the latter I am indebted for very valuable notes and criticisms; specimens from nearly all the gatherings have passed under his eye, in some cases fresh as well as dried. I have also had some useful hints from the Rev. E. F. Linton, who has a good knowledge of many hybrids.

The records fall under three vice-counties: East Perth (89); Forfar (90); and South Aberdeen (92). An asterisk denotes a new vicecomital, a dagger a new British discovery.

Salix nigricans—phylicifolia.—Apparently frequent at Restenneth, no less than three plants being so named. I did not recognise the *nigricans* element when they were growing, but it is very evident in the dried material. Dr. White ("Revision of the British Willows," p. 401) remarks that this is "in a few places more abundant than either *phylicifolia* or *nigricans*."

S. Lapponum, L.—A fine bush was found by the Shee Water, some distance below the Spittal, at about 1100 feet; and this species is extraordinarily abundant on the Lochsie, from 1300 to 1800 feet. One very curious plant was found here, with extremely narrow (linear-lanceolate) leaves, which Dr. White suggests may perhaps be the form described as *S. gnaphalioides*, Schl.

S. aurita × *cinerea* (*S. lutescens*, A. Kerner).—Restenneth; I think it is common there.

S. aurita × *Lapponum.*—By the Lochsie, 89; three bushes, between 1400 and 1500 feet. Two of these, though very unlike one another, are good intermediates; the third I suspected might possibly be *Lapponum* × *phylicifolia*, and I still feel some doubt, which it may be hoped that cultivation will clear up. Dr. White has seen a specimen collected by Mr. Baker in Glen Shee, many years since; no doubt from this locality, as the Thailneiche is very poor in willows.

**S. aurita* × *nigricans* (*S. coriacea*, Forbes).—Banks of the Lochsie, about a mile above the Spittal, 89; a good intermediate. Restenneth; on the *nigricans* side.

**S. aurita* × *phylicifolia.* (*S. ludificans*, B. White).—Shee Water, 89; rather towards *phylicifolia.*

S. aurita × *repens* (*S. ambigua*, Ehrh.)—Three forms were seen by the Lochsie, one being very remarkable for its *herbacea*-like habit and thin leaves, which scarcely shew any of the usual silkiness on the under side. Also near the Spittal of Glen Shee, a large state, and on the hills near Beauly, East Inverness

(v.c. 96). A very pretty little specimen was found at Restenneth, with leaves only $\frac{1}{4}$ to $\frac{3}{4}$ inch in length, linear-lanceolate.

†*S. caprea* × *Lapponum* (*S. Laestadiana*, Hartman, *A. canescens*, And.)—By a waterfall on the Lochsie, at 1750 feet. A well-developed female plant, about four feet high. Fruit very like that of *Caprea*, but smaller; style distinct, but shorter than in *Lapponum*. One of the most beautiful willows that I have ever seen, owing to the satiny pubescence, which extends even to the upper surfaee of many of the leaves. These are small-sized (as was the case with the form of *S. Caprea* which grew near), but not more so than in a specimen from Karesuando, Lapland, in herb. Brit. Mus., collected by Laestadius in 1839. In Scandinavia the hybrid is more or less silky, though not nearly so much so as in this Perthshire form; *cinerea* × *Lapponum* is duller, and more like *aurita* × *Lapponum*.

S. Caprea × *phylicifolia* (*S. laurina*, Sm.)—Shee Water; two bushes, both nearer *phylicifolia*.

**S. cinerea* × *nigricans* (*S. strepida*, Forbes).—Restenneth, 90. When dry, it looks very near *nigricans*, but *cinerea* was the more evident parent when living. Barren.

**S. cinerea* × *phylicifolia* (*S. Wardiana*, Leafe).—Restenneth, 90. A female plant, just intermediate.

**S. herbacea* × *lanata* (*S. Stephania*, B. White).—Glen Callater, 92; at about 2700 feet, in the company of both parents. Much like one of Dr. White's Glen Lochay forms. Nearer to *herbacea*, by its small leaves and decumbent, tortuous habit; but the leaves are different in colour and texture, woolly at the tips when young, and very evidently reticulate. I notice that *herbacea* asserts itself in much the same way in Laestadius' specimens of his *S. hastato—herbacea* (herb. Brit. Mus.) Very probably *S. herbacea* × *Lapponum* grows above Loch Kandor, where the two species are abundantly associated. This theory is favoured by the small size, the low and rooting habit, and the structure of some of the leaves; but I found no fructification, and cannot be sure that the plant is more than dwarfed *Lapponum* at present.

**S. herbacea* × *Myrsinites* (*S. Sommerfeltii*, And.)—Head of Glen Callater, 92. Stems prostrate, tortuous, rooting, buried in moss. Leaves small, $\frac{1}{4}$ to $\frac{3}{4}$ inch long, frequently recurved, ovate-lanceolate or ovate-oblong, crenate-serrulate, dotted, shining, more or less hairy on both sides. Bark shining, dark brown; twigs slender, like those of *herbacea*. A good intermediate; probably male, as no catkins were found, though the plant was quite healthy. Close by grew a small bush

which may be *S. Lapponum* × *Myrsinites*, but from the poor material obtainable there can be no certainty.

†*S. Lapponum* × *nigricans*.—At about 2700 feet in Caenlochan Glen, 90; on the "gentian rocks." A small bush, about two feet high, growing with the parents; unfortunately, the material was scanty, and my cuttings do not seem likely to grow. When alive, it rather suggested *aurita* × *Lapponum*; *aurita* does not, however, occur at the spot, and *nigricans* came out clearly as the specimens dried. Dr. White agrees with me in placing them here. I have examined Laestadius's specimens of his *Lappono-nigricans* from Karesuando, at South Kensington; two of them are evidently, as Anderssen has noted, *glauca* × *nigricans*, but the third is clearly correct, and closely resembles the Forfarshire form.

†*S. Lapponum* × *repens*.—By the Lochsie, at about 1500 feet. Very dwarf, creeping and rooting. Both parents have left unmistakable traces of their influence; but no flowers or fruit were to be had. The leaves, however, afford sufficient material for a confident determination. I have healthy-looking plants in cultivation.

S. Myrsinites × *nigricans* (*S. Wahlenbergii*, And.)—I found this in Caenlochan, as well as (in various forms) in Glen Callater and Corrie Kandor—several bushes being male. I also have the male plant in cultivation from Glen Doll or Glen Fiagh.

**S. nigricans* × *repens*.—A barren bush, growing in company with these species, a few hundred yards from the Spittal of Glen Shee, 89; quite intermediate in leaf-characters.

†*S. phylicifolia* × *repens* (*S. Schraderiana*, Willd.)—By the Lochsie, at about 1400 feet, in two forms—one (probably male) low-growing, with shorter, ovate, less silky leaves; the other (female) taller, the leaves lanceolate, strongly resembling *phylicifolia* in their upper surface, and very silky beneath. Like *phylicifolia* in the catkins, which, however, are somewhat smaller, and have the capsules more crowded. Dr. White says ("Revision," p. 395): "It is possible that a hybrid between *S. repens* and *S. phylicifolia* (= *S. Schraderiana*, Willd., which is known only as a cultivated plant) also occurs in Britain; but more specimens must be seen before it can be recorded."

ALCHEMILLA VULGARIS, L.

By G. Claridge Druce, M.A., F.L.S.

The following paper is translated from the "Schedæ ad Floram Exsiccatam Austro-Hungaricam" by A. Kerner, 1884.

Alchemilla Vulgaris, Linn., "Sp. Pl.," ed. i. p. 123 (1753).

Linnæus ("Sp. Pl." ed. i.) distinguishes *Alchemilla vulgaris*, with a var. B, *A. alpina*, with a subspecies *A. hybrida*, and lastly *A. pentaphyllea*. There can be no question as to *A. pentaphyllea* and *A. alpina*; and later botanists have never raised a doubt about them. But very different views have been entertained since Linnæus's time with respect to *A. hybrida*, which he annexed as a subspecies to *A. alpina*, simply because most authors neglected to follow Linnæus' indications and statements. He cites as synonymous with *A. hybrida*, on the one hand *A. alpina pubescens minor* (Tournef. "Inst.," p. 508), and on the other Plukenet's "Hist.," tab. 240, fig. 1. Plukenet gives on the plate cited a figure of a small branch and a single leaf of an *Alchemilla* from the royal garden at Paris. The figure does not give us much information, scarcely more than that the plant depicted must have been clothed with very delicate hairs, and that the leaf was rather more deeply divided than the leaf of the *Alchemilla* which the older botanists named *A. vulgaris*. Tournefort refers in the place cited above to *Alchemilla minor hirsuta cinericia* in Barrelier's "Plantæ per Galliam, Hispaniam, et Italiam observatæ," p. 103, tab. 728; and it is undoubtedly on Barrelier's figure that Linnæus based the remark on *A. hybrida* which Linnæus introduced into the "Hortus Cliffortianus," and which will be noticed again presently. The figure presents a plant with its leaves so deeply divided that the incisions in most leaves reach almost to the middle of the blade. The leaf in the middle of the figure has the lobes toothed at the apex only, and the lateral margins of the lobes are entire. According to Barrelier, this *Alchemilla*, which he says has only ash-gray hairs, is found "in editioribus Apeninorum pratis necnon in monte Ventoso prope Avenionem." Linnæus ("Hort. Cliff.,"

pp. 38, 39) says only of this *Alchemilla*, "*A. alpina pubescens minor*, Tournef. = *A. minor hirsuta cineritia Italica*, Barr., foliis gaudet minoribus et subtus villositate sericea nitida tectis et in sequente specie (*A. alpina*); attamen examinatis omnibus partibus nullam observare potui notam qua distingui posset. An sit species hybrida ab *Alchemillæ* foliis digitatis cum *Alchemillæ* foliis palmatis? Vel an sit solus locus qui luserit? Hæc enim in solis alpibus crescit." These remarks of Linnæus would lead us to think of the hybrid form between *A. vulgaris* and *A. alpina* which Christ has named *A. splendens*, or of the *Alchemilla* which M. Bieberstein calls *A. pubescens*. As the hybrid from *A. vulgaris* and *A. alpina* is extremely rare, and does not answer to Barrelier's figure, whereas *A. pubescens*, M. B., is found over a large area in the mountains of Southern Europe, occurs particularly on Mont Ventoux, and moreover agrees well with Barrelier's figure, it may perhaps be taken for granted that the name *A. hybrida* L. should be assigned to the *Alchemilla* with ash-gray hairs which Marschall Bieberstein has since named *A. pubescens*.

Willdenow, who, in the "Spec. Plantarum," i. p. 698 (1797), unites *A. hybrida*, L., to his own *A. vulgaris*, and says of it, "Differt modo foliis subtus sericeo-pubescentibus; est sola varietas hujus, nec sequentis speciei (*i.e. A. alpina*)," evidently did not mean Linnæus's *A. hybrida*. This appears from the fact that afterwards, in 1809, in the "Enum. Plantarum Hort. Berol.," i. p. 170, he annexes only *A. vulgaris* and *hybrida* of the "Sp. Pl." of the year 1795 to his *A. montana*, and does not give *A. hybrida*, L., as a synonym, and indeed does not mention it at all.

What then is *A. montana*, Willd.? The author ranks it with the species which he considers to be *A. vulgaris*, and distinguishes the two in the following manner:

"1. *A. vulgaris*, foliis reniformibus novemlobis acute dentatis glabris corymbis terminalibus.

"2. *A. montana*, foliis reniformibus novemlobis acute dentatis, subtus pubescentibus, corymbis terminalibus.

The former species is said to grow in "Europæ pratis," the latter in "montosis ducatus Baruthini et Saxoniæ." According to Willdenow, therefore, the leaves of *A. vulgaris* are smooth; but we find the exact contrary stated of

A. vulgaris in Linnæus's own writings. In the "Flora Suecica," ed. i. p. 48 (1745), he distinguishes, under No. 135, the number which is appropriated for the first time to *A. vulgaris* in the "Sp. Pl.," ed. i. (1753), a var. *b*, "*Alchemilla* perennis viridis major, foliis ex luteo virentibus. Morison, "Hist." ii. p. 195,"[1] and adds a note, "Nostra planta communis (*A. vulgaris*, *a*) erectior villosa et viridis est, at varietas *b* foliis magis glabris, caulibus procumbentibus magis viridis subluteis, rarissima, uti in quibusdam campis arenosis exaridis, rarius Upsaliæ obvia"; and in the second edition of the "Flora Suecica," p. 50 (1755), he supplements this note with a fuller description of his *A. vulgaris*, *a*, from which the following passages are extracted: "Caules plures debiles . . . adspersi pilis albis patulis . . . folio reniformi globo obtuso plicato, ante explicationem lateribus involuto, margine circumserrato, subpiloso præsertim apice." The observations of Linnæus show undoubtedly, that by *A. vulgaris*, *a*, is meant the widespread plant with a stem rising from a decumbent base, and clothed with spreading hairs, and with leaves which are hairy on the margin, at least when they unfold: the plant, therefore, which is numbered 816 in the present list. When Willdenow calls *A. vulgaris*, L., *glabrous*, he uses the term with some incorrectness, and must be understood to mean that *A. vulgaris*, L., is glabrous in comparison with the other *Alchemilla* which he formerly, erroneously, took for *A. hybrida*, L., and subsequently named *A. montana*. That is to say, while the leaves of *A. vulgaris*, *a*, L., when fully grown, often lose the hairs on the lower side and on the margin, those of *A. montana*, Willd., are permanently clothed with a dense overlay of silky soft hairs. The flower-stalks also, and the outer side of the calyx-tips, which are glabrous in *A. vulgaris*, L., are densely covered with gray hairs, both when the flowers open and when the fruit is ripe. The physiognomic impression which we receive from *A. montana* owing to the covering of hairs is strikingly different from that given by *A. vulgaris*. Physiognomically *A. montana*, Willd., is not unlike *A. hybrida*, L. (*A. pubescens*, M. B.), and we can understand how Willdenow previously confounded *A. montana* with *A. hybrida*, L.

[1] Unfortunately no specimen of this is contained in the Morisonian herbarium. —G. C. D.

As to *Alchemilla vulgaris*, *b*, which is said by Linnæus to have large yellowish-green glabrous leaves and more decumbent stems, to be rare, and seen by him only in sandy places, I can hardly be wrong in taking it for *A. glabra*, Wimm. et Grab., here numbered 817.

The only thing to be said against this conjecture is that Linnæus in "Flor. Suec." cites Morison, "Hist.," ii. p. 195, for a synonym of *A. vulgaris*, *b*, and that Morison's description does not agree in all respects with our *A. glabra*. It is true that it is a matter of indifference, as far as the nomenclature is concerned, whether *A. vulgaris*, *b*, L., is the same or not as *A. glabra*, Wimm. et Grab., because Linnæus has given this plant no specific name; at the same time it would be important to establish the identity of the two, in order to determine the area of extension.

A. KERNER.

The above paper throws a good deal of light upon the vexed question of what is *A. montana*, Willd.; and it may be of interest to add a few particulars bearing upon *A. vulgaris* and its forms as noticed in Britain.

First let me say that the plant in the Linnæan herbarium answers to the description given above for *A. vulgaris*, L., var. *a*; that is, that the type plant is pubescent, not glabrous. This is a plant which has a general distribution through the British Isles, and ranges from near the sea level to 4000 feet elevation. Whether we have *A. montana*, Willd., as well, perhaps this paper may elucidate; at any rate it may direct the attention of Scotch Botanists to the question.

Now for the plant which Linnæus calls his var. *b*, and which A. von. Kerner identifies with *A. glabra* of Wimm. et Grab. "Fl. Silesiaca," i. p. 135, as a variety of *A. vulgaris* (1827) [= *A vulgaris*, var. *glabrata*, Wimm., "Flora von Schlesien," i. p. 143 (1844)]. Respecting this A. von Kerner (*l. c.*) says: "It is distinguished from *A. vulgaris*, *a*, L., by the glabrous state, colour, and texture of the leaves, by the flowers, which are twice the size, and especially by the presence of large foliage leaves to a considerable height on the stem, and by the circumstance that the ramifications which spring from the axils of these leaves rise only slightly if at all above the sub-

tending leaves, and terminate in rather crowded cymes, are all very nearly of the same length, and thus give a racemose character to the entire inflorescence. The stem in *A. vulgaris, a,* L., bears fewer leaves ; some of the branches which terminate in loose cymes are elongated ; and the entire inflorescence gives the impression of a raceme of umbels rather than of a true raceme."

Last year, when botanising in Glen Spean, I found on a rock at the entrance of one of the upper corries near Aonach Mòr a large-leaved *Alchemilla,* which struck me as possibly the same with this. I collected specimens and sent a sheet to A. von Kerner. He and Dr. von Wettstein assented to my query as to its identity with the var. *glabra* of Wimmer et Grabowski. The specimen of *A. glabra* in the "Schedæ Exsicc." in Herb. Brit. Mus. is in an immature state, so that one cannot well compare its inflorescence with my well-matured plants from Scotland. In these I fail to see any marked variation from specimens of *A. vulgaris* in the inflorescence, or in the presence of large foliage-leaves on the stem. The flowers are somewhat larger, and the texture of the more yellowish-green leaves is somewhat different, while the total absence of hairs from the leaves, flower-stalks, and calyces, is the most marked character. Cultivation must decide whether there is really any claim to varietal distinction.

A somewhat similar, but smaller, plant was gathered in quartz shingle washed down from Ben Eay near Kinlochewe in West Ross, and it will probably be found to have a fairly wide range in the Highlands.

The arrangement of *Alchemilla* in the London Catalogue requires alteration. No. 498 should stand *A. vulgaris,* L.

Var. *b.* should be var. *glabra,* Wimm. et Grab. ; and if *A. montana,* Willd., be really a British plant (which Nyman does not give), it should be placed as var. *c. montana.* I have seen no specimen which I could certainly call by that name ; but I have examined no very extensive series.

Probably *A. conjuncta,* Bab., would be more correctly placed as *A. alpina,* L., var. *argentea* (Don.) ; since Mr. H. Boswell tells me that *A. alpina* which he brought from Ben Lawers has become changed in his garden into *A. conjuncta.*

In Syme's "English Botany" the type is considered to be sub-glabrous; but the characters for var. *montana* do not agree with those quoted by Kerner. In fact, *A. montana*, Willd., seems to recede from the type in one direction, as var. *glabra* does in the other.

I do not find that our British *A. vulgaris* has the stem and calyx-tips glabrous, as Kerner describes. Usually scattered hairs, more or less numerous, are found on them.

I might add that in the first edition of *Flora Anglica* Hudson had a species, *A. minor*, based on Tournefort's plant, and gives Westmoreland as a locality. In the second edition of the same book, p. 71, he reduces it to a variety of *A. vulgaris*, L.; but there is no proof or probability that this is identical with the plant Willdenow called *A. montana*. It was probably the small form, not by any means confined to mountain districts, since I have seen it in pastures in the midland counties.

PEZIZA AMMOPHILA, D. AND M.

By James W. H. Trail, M.A., M.D., F.L.S.

This species of fungus appears to be so local that comparatively few mycologists have had the opportunity of observing it in its native habitats. These are such as to appear very unpromising to the seeker after the fleshy fungi, being the dry sands close to the upper limits of the tide-mark, or the adjacent sandhills; while the late season of the year during which it appears (September to November) renders such localities but little attractive to botanists in quest of the higher plants. It is probably often overlooked, despite its being one of our largest Peziæ; and it may be a good deal less rare than it is commonly supposed to be. Probably a search for it in the suitable localities and at the proper season would disclose its presence in places where it was not previously suspected to occur.

For some years I have had the opportunity of becoming familiar with the plant and of following it through its various changes of form.

It was first detected and described in Algeria. In February 1876 it was recorded as British by Berkeley and Broome (No. 1619), on the evidence of specimens sent by the Rev. M. L. Anderson from St. Andrews in Fife. In Phillips's "British Discomycetes" it is also recorded from Brampton Burrows, Ilfracombe; and in Saccardo's "Sylloge Fungorum," viii. p. 70, it is recorded under the name *Geopyxis arenaria* as "immersa in sabulosis ad radices *Psammæ* in Britannia, Gallia, et Algeria." My personal acquaintance with the fungus commenced on 17th October 1888, when I found two examples growing among loose sand on the Links of Menie, eight or ten miles north of Aberdeen. The discovery was quite accidental, and was due to my kicking one of the two under the impression that it was a nearly mature puffball (*Lycoperdon*), when the brittle texture at once showed the true group of the fungus. A careful search failed to disclose more of the cups at this time.

I next met with one in September 1890, on the beach north of the river Don, close to the high-tide mark. The Lyme-grass (*Elymus arenarius*) has of late years become much more plentiful on the coast of Aberdeenshire, where it forms a belt along the seaward base of the sandhills, and assists materially to protect them from being washed or blown away, and adds to the width of the shore by preventing the sand from blowing. Small quantities of *Psamma arenaria*, of *Agropyrum junceum*, and of the other grasses found in such localities, are often mingled with the *Elymus*; but in many places the latter almost alone forms the belt. *P. ammophila* appeared to be confined to this belt, over a distance of about quarter of a mile in length by about ten yards in breadth, growing most often in the more open sandy spots, though at times also among the tufts of grasses. Far the most of the cups were in the vicinity of the *Elymus*, much less often among the other grasses. There seemed no close relation between the fungus and the *Psamma* or the other grasses, so far as I could trace. Though the roots of all the grasses occasionally adhered to the so-called "stem" of the fungus, I could not satisfy myself of this connection being more than casual. The cups usually appeared in small groups of from two to four, probably from the same mycelium;

but, owing to the fragile nature of all parts, it was most difficult to trace out their relation to each other. It would have been easy to collect two or three hundred cups almost any day during September or October, until storms caused the sand to drift over the belt in which they grew, so that most of them were buried under several inches of sand. However, a few in sheltered nooks remained visible till nearly the middle of November, after which date I could see no more of them. In 1891 they reappeared at the same season, and under the same conditions, in equal abundance; and again in September and October 1892, though in less abundance, owing to early drifting of the sand during storms so as to cover their habitat. Such persistence has not, so far as I am aware, been previously recorded in this species.

The appearance varies so greatly with the age of the specimen that it would be difficult to recognise the species but for the fact that all the intermediate forms can be traced in the various groups.

The descriptions given by the authors above quoted are based upon only one stage of growth, and are thus very imperfect, and indeed misleading if it is assumed that they represent constant characteristics.

From personal observation, I find the course of development to be as follows. The fungus first pushes its way through the sand as a sphere, rather flattened above, and continued below into a thick tapering stalk or "rooting stem." The surface is so covered with sand as to be scarcely visible. On removing as much of the sand as is possible without injuring the tissues the surface is seen to be very pale brown, and appears free from hairs, though under the microscope one finds the surface loosely covered with a downy coating. The apical half of the stalk bears a more evident mycelium. The entire fungus is fleshy and brittle, so as to render it somewhat difficult to procure perfect specimens. The stalk is peculiarly apt to break away unless very carefully handled. On their first appearance the cups do not rise above the surface of the sand, which they much resemble in colour. The smallest that I have seen were about half an inch in diameter, or rather less, and the only indication of the opening of the cup was a small hole in the middle of the upper

surface. The cup continues to enlarge; and the central hole widens, remaining circular and still surrounded by an entire inflexed margin, so that the brown hymenium lining the interior is in full view. When the cup has reached a diameter of about an inch it has assumed the form figured in Cooke's "Mycographia," figures 100, 373. The margin becomes split rather irregularly by the more rapid growth of the adjacent tissues; and the cup becomes turbinate. The proportions of the cup vary a good deal. I have found them in this stage upwards of $1\frac{3}{4}$ inches (42 mm.) in diameter. The tissues lining the cup continue to increase; and at last the hymenium may become only slightly concave, or flattened, or even slightly convex, so as to resemble greatly *Peziza ancilis*, Rehm (a species that I have found in Aberdeenshire in April on ground covered with old sawdust). In this condition I have found examples exceeding $2\frac{1}{2}$ inches (60 mm.) in breadth. *P. ammophila* thus passes through so marked changes of form that, in the later stages especially, it might readily be mistaken for some other species if only one or two examples were found. The long stalk buried beneath the sand is one of its most characteristic features; but, as already stated, this is so easily broken off that it might readily be overlooked.

The depth to which the plant is imbedded in the sand depends very much on circumstances, after the cup has pushed its way out and has opened up. It may remain sunk up to the very edge of the cup; and even the cup may be found partially or wholly filled with drifted sand. But frequently the cup and even a part of the stalk rise above the level of the sand, probably owing to the latter having been blown from around them by the wind. On tracing the stalk downwards one finds that it usually remains unbranched; but in some examples it gives off two or three short, thick, diverging branches. The asci are cylindrical with rounded apex. They are usually about 300 to 350 mm. long by about 15 mm. wide. Each contains eight elliptical, smooth, colourless sporidia, which vary from 15 to 20 mm. long by 8 to 10 mm. broad. They escape from the ascus by a well-defined circular hole at the apex. The paraphyses are not numerous. They are slender and unbranched, and are slightly thickened towards the apex.

ZOOLOGICAL NOTES.

Polecats (*Mustela putorius*) at Lochinver.—A gardener, whose cottage is built on the edge of the plantation and faces on to the high road, had two of this year's Herring Gulls tame; these were both killed one night. Next night he set a rabbit-trap beside his hen-house, and in the morning found a male Polecat caught in it. Thinking the female would come, the trap was set again next night, and another male was captured. Both specimens measured 18½ inches from tip of nose to root of tail, and the tails were 8 inches long, and were evidently full grown. Last year a Polecat was captured in the same place, but not before it had killed seven hens and five ducks. All the birds were killed in the same manner: the front of the necks clawed, and the back of the necks bitten.—ARTHUR BEVERIDGE, M.B., Lochinver.

Notes on Voles as Garden Pests.—I have been much interested in the article of Mr. Adair on the Owl and Kestrel in the vole-infested districts which appeared in the "Annals of Scottish Natural History" for October. There is little doubt that, could the increase of the above, and other predatory birds, be sufficiently secured, it would be the surest and most effective means of coping with the Vole plague. It may not be uninteresting to give my experience of a troublesome visit of Voles to the gardens at Dunrobin Castle on several occasions during the last ten years. I may say that the gardens are surrounded by woods and old pastures, which, in some seasons have a considerable stock of Voles. The first occasion I found them effect a lodgement in the gardens was about 1880, when they cut roads in some tall box edgings, in which they took refuge, and fed at night on the succulent flower-stems of some hundreds of *Lobelia cardinalis*, which had been newly planted out in a prominent position about the end of May. They found refuge too in some large clumps of *Arundo conspicua* (a kind of pampas grass), the fleshy stems of which they fed upon. Thinking the damage was being done by the common long-tailed field-mouse, which, like the poor, is always with us, I had traps set of various kinds, with different baits, without getting any of the mice. As there is usually little difficulty in getting ordinary field-mice trapped, I concluded the damage was the work of Voles. A rat-catcher, who happened to be in the neighbourhood at the time, took the matter in hand, and tried all his stock of poisons and traps unsuccessfully. The difficulty seemed to be, to find a medium which the Voles would eat readily enough to get them to eat the poison with it. I may say I tried dusting the plants with hellebore, rubbing the flower-stems on which they fed with phosphorous paste, a tedious and somewhat dangerous process, but with no success. A chance observation of one of the

creatures feeding, enabled me to cope with the enemy with more success. One evening, I observed a slight movement among the grass. Standing quite still, I found it was one of the Voles feeding on something like the head of a dandelion; after a short time it shifted its position a little way, and cut over a dandelion with ripe seed on it; as soon as the stem fell it commenced to feed on the dandelion seed. I lost no time in acting on the information thus gained; getting some ripe heads of dandelions and cutting off the down, I steeped them in a solution of strychnine, and laid them in the runs of the Voles. Next morning I had the satisfaction of finding several of the creatures stark and stiff near the poisoned seed. In a few days I cleared them out in this way. On several occasions since, Voles have made an attack on Carnations, Lobelias, and Arundos, but dandelion seed and strychnine solution has universally done for them. Whether this remedy might be successful in coping with the Vole pest, I am not prepared to say. If a seed could be found which the Voles would eat freely and which could be had in sufficient quantity, something might be done by placing poisoned seed, well protected from other animals, in spots at some distance apart in vole-infested areas. Dandelion heads with seed are easily enough got in summer in most districts. Plantain seed might be tried, and if the Voles ate it, might be got in quantity. Whin, broom, thistle, or other wild seeds might be experimented with; and if once a suitable medium was found, poisoned seeds might have a tangible effect in coping with the Vole plague.—D. MELVILLE, Dunrobin Castle Gardens.

The Ring Ouzel (*Turdus torquatus*) **in Winter.**—To-day (10th December) I have been handed a specimen of this bird shot in the early morning in an orchard in the outskirts of Maxwelltown. It had been shot in mistake for a blackbird, as the gardener who killed it was engaged in thinning down these sable gentry in view of his future crops. The bird is a male, and apparently a bird of the year, and is in rather poor condition, a result probably of the hardships of the exceptionally severe weather of the past fortnight. The bird had been seen at intervals about the same place since about the time the currants were ripe, but was very shy. The climate of lower Galloway is usually so mild and moist in autumn and early winter that certain species of summer migrants prolong their stay with us for weeks after they have left the rest of Scotland. In the case of birds that can live almost wholly upon berries, there is no reason why in seasons such as this, when various wild fruits are so abundant, they should not remain the winter through. I have notes of a well-authenticated instance where a Ring Ouzel did live at a place in the Stewartry during the whole winter of 1880-81; and that winter was by no means one of our usual mild ones. That bird was seen until so late as the middle of March,

and probably joined its relatives, who had followed out the family instinct, when they arrived from the south later on. In the middle of January 1884 I handled a fresh specimen that had been picked up dead in a garden near here. So the fact seems established that in at least occasional instances the Ring Ouzel may remain in winter in the mild south-west of Scotland, in the same way as they have been occasionally observed to do in England since the time when old Gilbert White of Selborne noticed a small party of them at Christmas.—Robert Service, Maxwelltown.

Jackdaw (*Corvus monedula*) **Nesting in the Rigging of a Ship.**—In April last a pair of Jackdaws built their nest on the chock at the after part of the main-topmast head, between the tressel-trees, of the training-ship "Empress," which is stationed in Gareloch, about a quarter-of-a-mile from the shore, and equidistant from Row Pier and Roseneath. The nest was composed of sticks, dried stems of dock, and coarse grass, and was lined with feathers, wool, and bits of rag, paper, and ribbon. The nest contained six eggs, and at the time I received the information there was another nest building on the fore-topmast head, much in the same position. For the above information I am indebted to Mr. J. Nutt, one of the officers of the "Empress," and to my friend Mr. F. C. Buchanan.—James Lumsden, Arden.

Note on the Sand Martin (*Cotile riparia*) **and Carrion Crow** (*Corvus corone*) **in Tiree.**—Regarding the observations made on these species in the "Fauna of Argyll and the Inner Hebrides," I beg to say that there is no doubt that they nested in Tiree prior to 1887. Though I did not see them nesting previously, I had seen over two dozen of their holes in a sandbank, close together, and I am told that the birds were seen flying in and out of them. As to the crows, I did not know there was any doubt about their occurrence here occasionally. They are, however, rare, and do not occur every year. I saw three about a month ago (*i.e.* about mid October). They appeared very tired; and if I had had a gun I could probably have shot them.—Peter Anderson, Tiree.

Goldfinch (*Carduelis elegans*) **near Edinburgh.**—When passing up the road between Craigend and Kingston Grange, early in July last, I had the pleasure of seeing a goldfinch. I was attracted by the bird's note, and at once detected it on the overhanging branch of one of the Craigend trees, about ten yards from the point where I stood. After sitting a few minutes, it flew over the wall into Kingston Grange grounds, taking a south-easterly direction. As the bird is extremely rare in Mid-Lothian during summer, the occurrence may be worth recording.—P. Adair, Edinburgh.

White Wagtail (*Motacilla alba*) **near Kelso.**—On Sunday, 11th of September, at Nenthorn Manse, I happened to be sitting at a

window that looks on the lawn, when a Wagtail alighted. It came frequently within two yards of the window, and I easily identified it. On going outside I saw three wagtails on the roof, but could not identify them. I raised the White Wagtail that was running familiarly on the lawn, and it joined the three on the roof. I see by the "Scottish Naturalist" of July 1891 that A. H. Evans, in his list of birds of Melrose district, says (p. 107): "White Wagtail not observed nearer than the border between Berwickshire and Haddington." Nenthorn Manse is near the Eden Water, about four miles north from Kelso.—WILLIAM SERLE, Leith.

Swift (*Cypselus apus*) in November.—I was rather astonished to see a Swift flying about here, in Haddington, on the forenoon of the 16th November. I watched the bird for nearly an hour, and wondered where it had been during the late severe frosts.—JOHN MILLER, Haddington.

Occurrence of the Hoopoe, and of a Buff-coloured variety of the Snipe, in the Tay Basin.—A fine male specimen of the Hoopoe *Upupa epops* (a bird of the year) was shot at Birkhill, on the south bank of the Tay, by Harry Wedderburn, Esq., younger of Birkhill, on the 8th of October last (1892). When first noticed, the bird was flying high in the air over a potato field, and finally lit on a wire fence adjoining, but was shortly lost sight of. Mr. Wedderburn on crossing the field and approaching the spot where the bird was last seen, put up a partridge and fired at it; on the report of the shot, the Hoopoe immediately arose from among the potatoes at some considerable distance, and was killed with the second barrel. From the muddy state of the bill and feet of the bird, and the soft nature of the ground, it was evidently on the feed, occupying the ground it would most naturally do, being in the close vicinity of trees and open woods. This was the first time the bird had been seen about, but from its plump appearance and healthy state I should say it had been in the neighbourhood for some few days. Mr. Wedderburn most kindly sent me at once the bird in the flesh, and I have since had the pleasure of placing it in the Perthshire Society's (Natural Science) now valuable collection of the local birds of the Tay Basin. I have further to place on record the capture of a beautifully marked variety of the Common Snipe (*Gallinago cœlestis*), which I take to be a form of albino, shot on the north bank of the Tay, opposite the mouth of the Earn, on the 3rd October (1892). This bird, which seemed not quite to have completed its autumnal moult, was apparently a young female, most beautifully shaded and pencilled with rich buff and creamy yellow, the breast whitish, bill and legs when fresh yellowish cream with a pinky tinge, eyes dark brown. Though I believe Buff-coloured Snipe have now and again been got in Ireland, this is the first occurrence of this variety that has come under my notice, or that I have heard of in this country. This bird

has also been placed in the Perthshire Society's collection of local birds.—H. M. Drummond Hay, Seggieden, Perth.

Snowy Owl (*Nyctea scandiaca*) **in North Ronaldshay.**—Mr. Allan Briggs, in a letter to Mr. R. Cook, dated 15th November 1892, says: "A Snowy Owl has been seen by several people here. It appeared early in this month, and remained for a day or two. This is most likely the same bird I saw at Quendale on the 30th October" (see p. 17).—J. A. Harvie-Brown.

The Goshawk (*Astur palumbarius*) **in Mull.**—On Wednesday, 9th November, while out woodcock-shooting in the Glenforsa estate of Mull, I saw a Goshawk fly over. Its peculiar appearance attracted the attention of my cousin, Mr. C. Akroyd, with whom I was shooting, and also the keeper, both of whom are well acquainted with Buzzards, Peregrines, etc., but neither of whom had ever seen a Goshawk before.—T. E. Buckley, Inverness.

Spotted Crake (*Porzana maruetta*) **near Moffat.**—On the 9th of October last I shot a spotted crake in a marsh near Moffat. I have been informed by Messrs. Small and Son, George Street, Edinburgh, that it is by no means common, though they have another for stuffing from Forfarshire.—Adam Fyfe, Moffat.

Quail (*Coturnix communis*) **in Wigtownshire in 1892.**—In the late spring, Mr. James Cowan, farmer, Sandmill, Stoneybrook, flushed a bird on that farm. And during the second week of October, Mr. Weir, gamekeeper, Lochnaw, shot a fine old bird on the farm of Glengyre, Kirkcolm. It rose from among some cabbages in a field of greencrop. The bird, which I saw, was a very fine specimen; but had been much shattered by the charge.—P. Adair, Edinburgh.

Great Snipe (*Gallinago major*) **near Thurso.**—A solitary Snipe was shot by Mr. Arkwright at Westfield, near here, on the 24th of August last.—Lewis Dunbar, Thurso.

On the occurrence of the Red-breasted Snipe (*Macrorhamphus griseus*) **in Argyllshire.**—In the notice of the Red-breasted Snipe in the "Fauna of Argyll and the Inner Hebrides," it is stated that two specimens of this bird have been killed in Argyllshire in 1891. The bird I exhibited at the meeting of the Zoological Society, 1st December 1891, as having been killed near Crinan, is the same as that which is recorded as being shot at Poltalloch by a son of Colonel Malcolm. The mistake has arisen from confusing the two localities. The actual place where this bird was shot was some distance above the bridge over the river Add, in what is called the old river (a former bed of the Add), near some cottages called Dalnahassoc, on the Poltalloch estate, but nearer Crinan than the mansion of Poltalloch. Mr. Seebohm considers this specimen to be one of the short-billed race (*M. scolopaceus*) from the west of the Rocky Mountains, and breeding in Alaska.—Edward Hamilton, South Kensington.

Note on the Red-necked Phalarope (*Phalaropus hyperboreus*) **in Argyllshire.**—In the Fauna of Argyll, under *Phalaropus hyperboreus*, it is stated that Phalaropes are also seen, but always in winter. On referring to my notes for the year 1880, I find that I shot a Red-necked Phalarope (*Phalaropus hyperboreus*) on the sands opposite Traigh House, Arisaig, on the 13th of September of that year, and on the same afternoon a curlew sandpiper, *Tringa subaquata*.—Edward Hamilton, South Kensington.

Black-tailed Godwit (*Limosa belgica*) **in Forfarshire.**—On 19th September, Mr. Davidson, Montrose, shot a bird unfamiliar to him on the Montrose Basin. He showed it to Dr. Key, who kindly forwarded it to me. It turned out to be a male Black-tailed Godwit. This is only the fourth or fifth occurrence of this bird in Forfarshire; in each case the month was September and the locality Montrose tidal sands.—J. F. Dewar, Arbroath.

Ruff (*Machetes pugnax*) **in the Outer Hebrides.**—As I see in the "Fauna of the Outer Hebrides," only one instance of the Ruff is recorded; I think it will interest you to hear that one was shot by Mr. T. W. Buisson, of Snown Hill, Betchworth, on the 6th of September last, on the Galson shootings, of which I am tenant. It was identified by the late Mr. McLeay of Inverness.—Radclyffe Walters, Ewell, Surrey.

Ruddy Sheld Duck (*Tadorna casarca*) **in the Moray Firth.**—Another fine specimen of this rare duck was shot in the estuary near Findorn on the 19th of October last by Mr. W. A. Brown of Dundee. This is the last of the five that visited the Firth early in July.—James Brown, Forres.

Tufted Duck (*Fuligula cristata*) **breeding in Selkirkshire.**—While staying with W. B. Boyd, Esq., of Faldonside, last July, I almost walked on to a nest of this bird, containing nine eggs, evidently near hatching; they were left undisturbed. Though noted as a visitor in Mr. Evans's List of the Birds of Melrose, it has not, so far as I know, been previously observed to nest in the county. The locality was a very wet "moss," about three miles from Faldonside, in a thick bed of horsetails. I also saw several broods of young Pochards on a loch in Forfarshire, where that species has been a regular resident for some years past.—Edward S. Marshall.

Pomatorhine Skua (*Stercorarius pomatorhinus*) **in Perthshire.**—A Pomatorhine Skua was shot in the third week of September last on the moor of Dalclathie near Comrie, Perthshire.—E. T. Baldwin, London, S.W.

Cannibalism in the Zonuridæ.—I observe that at page 271 of your last number, Mr. J. Macnaught Campbell states that he would be glad to hear of any case similar to that related by him of supposed cannibalism in the Slow-worm (*Anguis fragilis*).

In the early spring of 1858 I was strolling through an oak copse in the province of Epirus, not far from Butrinto, and suddenly observed something moving under the fallen leaves at a few paces distance; there are no rabbits or squirrels in the district to which I am alluding, but many Martens and Polecats, and thinking that the leaves were possibly stirred by one of these animals, I fired at the spot, and on going up to it found an unusually large specimen of the so-called Glass Snake, *Pseudopus pallasi* (Oppell), quite dead, and much cut about by my shot, in the act of swallowing one of its own species. Of the latter animal some three inches were protruding from the jaws of its captor, and life was not quite extinct. I cut open the larger lizard from the vent, and extracted the smaller one, with but slight injury to its scales; the strangest part of my story remains to be told, for on opening the body of the second I found a third of the same species in its interior, with the fore-parts partially digested. This Glass Snake was common in Epirus in dry places, and I believe that its ordinary diet consists of snails and slugs; three feet is rather above the average length of adult specimens, but the animal that I killed by shooting on this occasion cannot have measured less than three and a half feet at least.—LILFORD, Lilford Hall, Oundle.

Occurrence of Sebastes viviparus, Kroyer, off the East Coast of Scotland.—Four examples of this form were brought into Aberdeen market on 24th October 1892. Collet holds that this is merely a variety of *Sebastes norvigicus*; and Day, in his "British Fishes," follows him. Kroyer and Lutken take the opposite view; and from what follows it will be seen that there are strong grounds for believing that the two forms are distinct. It has been said that the young of *S. norvigicus* has a distinct black opercular spot; this the writer has never seen, although many young have passed through his hands. This spot being conspicuous in *S. viviparus*, is the external distinguishing mark between the two forms, and is peculiar to *viviparus* in so far as the writer knows. *Viviparus* has thirty to thirty-one vertebræ, *norvigicus* twenty-five to twenty-six. In *viviparus* the ventral spinous processes always commence on the ninth vertebra, counting from the head, while in *norvigicus* the first process is always on the sixth vertebra. *Viviparus* has a large and well-developed air-bladder; *norvigicus* has none, at least I have never seen one. The palate and gullet in *viviparus* are white, while in *norvigicus* they are blue. In *viviparus* the exit from the stomach runs downwards for half its length, and then upwards at an acute angle, while in *norvigicus* the same organ is straight and directed upwards. The ossicles that lie in the base of the brain cavity in *viviparus* are large and inelegant as compared with that of *norvigicus*. These very marked differences considered, it may be safely concluded that the two forms are distinct, and that now *viviparus* may be added to the list of British fishes.—GEO. SIM, Aberdeen.

The Clouded Yellow Butterfly (*Colias edusa*).—This pretty insect reappeared during this Autumn in Galloway, after a characteristic absence during four seasons. I saw one specimen near Newton Stewart in Wigtownshire, and heard of others during the month of September.—HERBERT MAXWELL.

Notes on Crambus myellus, Hübner.—Mr. William Herd (of Scoonieburn, near Perth) and I having during the last few years taken a good number of this hitherto rare Crambus, a few notes on the habits of the species may not be without interest to some of the readers of the "Annals of Scottish Natural History."

The earliest record of its capture in Britain, so far as I can find out, is one specimen said to have been taken "near Aberdeen," and another "in Scotland," *vide* the "Entomologists' Annual" for 1869, p. 126. Probably this latter one is the specimen referred to by Dr. Buchanan White in the "Entomologist," vol. xvi. p. 213, as having been taken in Glen Tilt. Dr. White seems to have secured the next ones, getting three at light in Braemar as mentioned in the "Entomologists' Monthly Magazine," vol. viii. p. 70; while at p. 113 of the same vol. Mr. Warrington records its capture from Rannoch. Mr. Herd was the next to fall in with it, taking two in Glen Tilt in 1883. My first experience of the species was in 1885, when, through the kindness of my friend, I collected with him on the ground where he took the two just referred to, and on which occasion we each got one specimen. Every year since, we have been successful in taking other specimens; the last few years more numerously when we have been fortunate enough to get favourable days for our visits, so that now I possess a nice series, and have also been able to spare a few specimens to some of my friends. During the last two or three years it has again turned up near Aberdeen, and probably will yet be found more widely distributed in Scotland.

It is a very timid and retiring species. On a very warm day, with strong sunshine, and without wind, it seems to fly pretty freely, with a short, jerky flight, like all the Crambites; on a dull day, however, it is impossible to get it to use its wings at all. Our mode of working for it is to be on the ground as early in the day as possible, and beat the pines and other fir-trees in which it delights to rest, for it seems to fly most freely at night or early morning, and then take shelter in these trees; the least shake of the wind, however, dislodges it, and, falling to the ground, it will not in a dull day rise again. Noticing a specimen fall out of a tree in passing gave us our clue for searching for it; and the majority of our examples have been obtained in this way, very few having been taken during flight. In beating, one has to keep a very sharp look-out, as this beautiful insect usually just drops without a motion of the wings, trusting, doubtless, to escape detection amid the shower of rubbish which the beating-stick brings down out of a fir; reaching the

ground, it scuttles down into the grass head first, making it, when the exact spot is observed, a difficult matter to get it boxed without injury, and, when the place is not clearly noted, an impossible thing to find it at all. On a windy day one may go over the ground and beat every tree without seeing a single specimen, the trees being tenantless and the approach and beating of the collector only making any in the ground dive down more deeply into the roots of the grasses. I have said it is a great advantage to be early on the ground, and one of our happiest recollections goes back to 1887, when we arrived at the scene of operations one morning about four o'clock. We had had a hard day's collecting the previous day on the hills, and late at night had stretched ourselves under a large larch for a few hours' sleep, but found that luxury denied us by the midges; and though we got head and hands inside our nets, and tried other plans to rid ourselves of their attentions, we had at length to give in, and, after an early cup of tea, trudge on our way to the *Myellus* ground. As soon as light permitted, we began beating operations, and were within a short time rewarded with about a dozen specimens, but the wind rising strong with the advance of day, our success was of but short duration, and although we searched diligently until afternoon, we did not see another specimen that day. Open ridings in woods, and isolated trees, will be found most productive. There are two little pines, about three or four feet high, situated all alone on the hillside, from which we seldom fail to beat a specimen in passing; the ground underneath these trees is hard and without any undergrowth, and the specimen, as it falls upon it, makes a desperate attempt to get out of sight, failing which, however, it resorts to stratagem and feigns death, lying motionless and apparently helpless on its side. Of the earlier stages in the life-history of the insect I can say little. The eggs, which we have often had, are, when first laid, of a pale yellow colour, turning, prior to the exit of the larva, to a deep orange. Mr. Herd has put several lots out near Perth, but we have never as yet seen any trace of the species in these localities; possibly the larva did not meet with a suitable pabulum. So far, all the specimens of this species which have been obtained have been from around Aberdeen and from Glen Tilt, with the single exception of Mr. Warrington's specimen from Rannoch; and it is to be hoped collectors in Rannoch and other parts will look specially for this species, so that its distribution in Scotland may be more clearly defined. It has always appeared to me as very strange that in the locality where we have been so successful in taking this species we have never seen its close ally, *Pinetellus*, although this latter is very generally distributed over other parts of Perthshire.—S. T. Ellison, Perth.

Reappearance of Euthemisto compressa in the Firth of Forth.—In the "Tenth Annual Report of the Fishery Board for Scotland,"

I recorded for the first time in the Firth of Forth the occurrence of the Amphipod *Euthemisto compressa* (Goes). The specimens were obtained at Trawling Station V. (west of May Island) in February of this year (1892). These were probably stragglers from the immense shoal that was observed off Redcar during the 10th, 11th, and 12th of the same month by Mr. Thomas H. Nelson when, according to his description ("Naturalist" for May 1892, p. 144), "the sea was literally alive" with them, and that "heaps of these were afterwards washed ashore by sea winds, and afforded a feast for starlings and other frequenters of the tidal line." Quite recently (25th November), this species was obtained for the second time in the Firth of Forth in material collected by surface tow-net between Fidra and the Bass Rock; when a few specimens only were taken, and they have been forwarded to the Museum of Science and Art, Edinburgh. *Euthemisto compressa* is readily distinguished from *Parathemisto oblivia* (Kröyer), which also occurs in the Forth, by its larger size, its keeled dorsum, and by the two last segments of the mesosome and two first of the metasome being produced posteriorly in the median dorsal line into distinct tooth-like processes. The same species was obtained off the Aberdeenshire coast by Mr. Sim, and recorded by Mr. Spence Bate in the "Annals and Magazine of Natural History" for May 1878, under the name of *Lestrigonus spinidorsalis*. Like most of the Hyperiidæ, *Euthemisto compressa* is a northern form, and attains its maximum dimensions in the Arctic seas, where, according to Dr. Bovallius, it reaches a length of 30 mm. ($1\frac{1}{5}$ inches). Another species, *Euthemisto libellula* (Mandt), which is not yet recorded for our seas, attains to a much larger size, and seems to be a veritable giant among the Hyperiidæ. Specimens 60 mm. ($2\frac{2}{5}$ inches) in length, have been recorded from the Arctic seas by Dr. Bovallius. A specimen from Greenland in my collection measures $1\frac{1}{2}$ inches. —Thomas Scott, Leith.

Eledone cirrosa in the Firth of Forth.—In "Annals of Scottish Natural History," Part 3, p. 202 (1892), there is an interesting note on the occurrence of *Eledone cirrosa* (Lamarck) in the Solway Firth; on reading which it occurred to me that some records of the recent captures of this Cephalopod in the Firth of Forth might not be out of place. But before giving these, it may be as well to state, for the sake of the uninitiated, that *Eledone*, which closely resembles, and may be mistaken for, *Octopus vulgaris*, is readily distinguished by observing that each tentacle has only one row of suckers instead of two rows as in *Octopus*; but though this be a ready and sure means of distinguishing between the one Cephalopod and the other when the animal is at rest, careful examination is nevertheless necessary should it be moving its tentacles about. The suckers composing the two rows on the

tentacles of *Octopus* are arranged more or less alternately, and when the tentacles are stretched, though to a comparatively small extent, it is at times difficult to determine whether there are one or two rows, and the alternate suckers then approach so near to the middle line as to appear to constitute but one row; this is especially the case with those suckers that are more distant from the base and nearer to the extremity of the tentacle. The following are some recent records of the capture of *Eledone* within the area of the Firth of Forth:

Trawling Station	I. (East of Inchkeith),	September	21st.
,, ,,	III. ,,	,,	22nd.
,, ,,	II. ,,	October	22nd.
,, ,,	VIII. (N.E. of the Bass),	,,	25th.
,, ,,	VII. (between Fidra and Bass),	,,	26th.
,, ,,	V. (West of May Island),	November	11th.

One, or at most two, specimens only were taken at one time. In the "Invertebrate Fauna of the Firth of Forth," by Leslie and Herdman, p. 104, the only record of the occurrence of *Eledone* in the Firth is that by Dr. M'Bain, who obtained the species in Kirkcaldy Bay in 1855.—THOMAS SCOTT, Leith.

BOTANICAL NOTES AND NEWS.

Ranunculus Flammula, *L.*; var. *petiolaris*, Lange ined. Marshall in "Journ. Bot.," 1888, 230.

R. petiolaris, Marshall, "Journ. Bot." 1892, t. 328, p. 289.

Mr. S. M. Macvicar of Invermoidart has kindly sent specimens of the above plant from Loch Bealachna Gavishe, alt. 607 ft., Moidart, Inverness-shire, 21st November 1892. He also has gathered it in another station. The specimens he sends show that the plant produces roots, and root-leaves at the upper nodes, which, falling to the ground by the decay of the flowering stem, become new plants. The atumnal root-leaves are 3 to 5 inches long, terete for two-thirds of their length, the apex produced into a slightly flattened, spathulate, concave end, with whitish membraneous basal sheaths. For a short distance above the sheaths the leaf-petioles are slightly doubly channelled, shading almost imperceptibly into the terete portion. The new plant is produced by the side of the old flowering-stem (most of the roots of which are decayed, or decaying), with the habit of growth of *Triglochin*, and also reminding one of some of our native orchids.

I have no specimens at hand of the type to compare; but from recollection I believe the growth to be different in that.

Mr. Macvicar found *Subularia aquatica* growing with it, as at Mr. Marshall's original station.

Judging by descriptions, the varieties of *R. flammula* that come nearest to Mr. Marshall's plant are: var. ε. *alismoides*, Van den Bosch., "Fl. Bataviæ," p. 9 (1850), and δ. *tenuifolius*, Wallroth, "Sched. Criticæ," p. 289 (1822); but they do not agree; and the habit of the plant is so curious and characteristic that Mr. Marshall seems at present to be justified in giving it a specific name.—ARTHUR BENNETT.

Caltha palustris, *L.*, and its forms.—In the "Scottish Naturalist," 1887, pp. 52-56, Dr. Buchanan White called attention to a paper by Dr. Gunther Beck of Vienna on the above plant, giving a translation of its more important parts, and calling attention to such Scottish forms as he had seen.

Since then I am not aware of any results having arisen from the above notes; but the receipt of some well-dried specimens obtained at various heights in Aberdeenshire and Inverness-shire by Mr. A. Somerville, induces me to recur to the subject, as it is much to be desired that we should *know* what forms really do grow here, whether considered as species, subspecies, or varieties.

Since Dr. Beck's paper, Dr. E. Huth has published a "Monographie der Gattung Caltha," with a plate of leaves and fruits. He here somewhat modifies Dr. Beck's results; but his paper is by no means exhaustive, as he has, *in it*, to add an appendix for materials taken from the Russian collections at St. Petersburg. But even with this he has not taken up all the names, as one misses *C. glabra*, Gilib., "Fl. Lith." (1782), *C. radicans*, DC. (1818), etc.

Dr. Huth keeps the Scottish *radicans* distinct by itself, adding *C. zetlandica*, Beeby, as a synonym. The Finland plant placed under it, he refers to a variety *procumbens*, Beck, *n. s. C. minor*, Miller, he localises from the mountains of Westmoreland ("Herb. Mertens"). Var. *membranacea*, Turcz., to which Dr. White was inclined to refer Syme's var. *minor*, he gives from Siberia and Japan, but has not seen a specimen. Schur's *ranunculoides* he separates from this, but puts Schur's *ranunculiflora* under Miller's *minor*.

Mr. Somerville seems to have gathered the var. *procumbens*, Beck, the var. *minor*, Syme, a large form resembling *radicans* in habit, but certainly not with the leaves of that plant, and a plant from 3900 feet, in Aberdeenshire,[1] that I cannot make agree with any of Huth's forms.

Some of these specimens I hope this winter to submit to Dr. Huth, by the kindness of Dr. G. Beck.—ARTHUR BENNETT.

Lepigonum neglectum., *Kindb.*, and Polygonum minus, *Huds.*, in North-east Scotland.—As I am not aware that either of the

[1] 500 ft. higher than on record for Scotland.

above plants has been recorded from Aberdeen, it may be worth a note to state that I have met with both in this neighbourhood: the former near estuaries, the latter plentifully around the small Loch of Loirston in Kincardineshire, the only locality in Scotland for *Juncus filiformis*.

L. neglectum occurs beside the South Esk and the North Esk in Forfarshire, extending also into South Kincardineshire. It is not uncommon, though stunted, and readily overlooked, on a low part of the links south of the River Don, often flooded by the river at high tides. It also occurs on a back water from the river Ythan near Newburgh, and along both shores of the estuary. It is usually, if not almost always, situated where the water is only slightly brackish; and its structure, size, and relation in habitat to *L. marginatum*, which I almost always find near at hand, but within the reach of the spray, if not of the salt water itself, suggests that it is a weaker representative, the relative weakness being due to less favourable conditions of growth. The *Pol. minus* grows on rather a barren beach, associated with *P. Persicaria*. Both frequently show very dwarfish examples, though some examples that have the good fortune to grow in rather better soil by the out-let stream reach quite a fair size. Both species show a great tendency in this exposed situation to assume a red-brown tint on all parts; but this is much less evident in the plants of *Pol. minus* that spring up in the water. These are often of a distinctly, though dull, green tint. Dr. Roy informs me that *Lep. neglectum* was brought to him from near Bervie, and that he has "some recollection of having gathered it on the Old Town Links, and at Newburgh. At both places, *L. marginatum* occurred." Of *Pol. minus* he tells me that "some years ago it grew around the margin of an old disused mill-dam at Stoneywood (a few miles north of Aberdeen). I believe the dam has been filled up and the station destroyed. It also occurred, and probably does so still, very sparingly, along with *P. Hydropiper*, on the margin of Loch Kinnord."—James W. H. Trail.

Lupinus perennis, *L.*, in Scotland.—It is curious how long a time it takes to introduce certain facts into books. Of this a good example is afforded by the way in which British Floras appear resolved to ignore the presence of this Lupine as a denizen thoroughly established in many parts of Scotland. It is extremely plentiful along several of the larger rivers, along which it has spread rapidly downwards. Year by year the seeds, washed down from the higher grounds, extend the range of the plant towards the mouth of each river. Its effect on the banks and bed of the river is very marked in many places; and during the period of flowering, in early summer, the beds of Lupines are not seldom a continuous sheet of blue and purple. A beautiful example is seen at Cults, a few miles up the Dee from Aberdeen. Here there is an island of some acres in

size in the river. About twenty years ago this was in truth an island, separated from the mainland on the north by a rather wide shallow stream which it was not easy to cross dry shod, except after continued dry weather when the Dee was low. The bed of this portion of the river consisted of sand and shingle. The Lupine, though rather frequent even at that time some miles farther up the Dee, did not then occur near Cults. But a few years afterwards it began to colonise the banks and higher portions of the sandy beds of shingle; and soon it became abundant, seedlings springing up in multitudes. In a very few seasons the consequences of the immigration as affecting the course of the river began to be evident. The plants during the dry weather proved able to establish themselves so firmly on all parts exposed when the water was low that they ran little risk of being uprooted during the floods of winter. They flowered and seeded freely; and the dead stems caught and retained the sand and smaller pebbles brought down the stream, and that had formerly been swept onward towards its mouth. In the summers the plants grow only more vigorously because of the materials deposited by the river each winter; and the result has been that the bed of the old channel is now raised so high by such accumulations that only the higher floods of winter cover any part of it. The Lupines have spread over the area so gained, and form an almost continuous covering from two to nearly four feet in height, and of great beauty during the flowering season. There is little reason to suppose that the species will not form a permanent part of the flora of Scotland in future; and it assuredly deserves to be noticed as an immigrant in all works dealing with the British flora as a whole. Its effect upon our native flora may be worth a brief notice, as it proves itself one of the most powerful competitors in the struggle for existence along our river banks, and tends to crush out some of the most interesting species met with beside such rivers as the Dee. The tributaries of this stream, rising at high altitudes, carry down with them the seeds of Alpine species. These, lodging among the shingle and sand along the river in its lower course, often spring up; and, being free in such bare places from severe competition with our native plants of the Lowlands, they reach very low levels at times. But the Lupine has taken possession of many of the localities suited to such alpine species along the lower course of the Dee, and has greatly diminished their frequency, a heavy price to pay for its beauty in the landscape.—James W. H. Trail.

First Records of Scottish Flowering Plants.—The following are noted in the instalments of the F. R. of British Flowering Plants in "Journ. Bot.," October to December 1892:

Astragalus alpinus, *L.*—Found, 30th July 1831, by Mr. Brand, Dr. Greville, and Dr. Graham, in Glen of the Dole, Clova.

Oxytropis uralensis, DC.—Upon Carn-Dearg, one of the lower heads of Ben Sguilert, a high mountain in Glen Creran in Upper Lorn . . . found there by Mr. Stewart. It has also been discovered at the Bay of Farr, on the eastern coast, and in a rocky soil at Cromarty, by Mr. Robertson. See "Scotch Magazine" for July 1768, with a figure of it.

O. campestris, DC., 1813.—Discovered by Mr. J. Don, in the summer of 1812, on a high rock, at the head of Clova.

Rubus nessensis.—W. Hall, in "Trans. Roy. Soc. Edin.," iii. 21 (1794). *R. suberectus*, Anders. (1813). "I found (it) in the Highlands in 1787, on the banks of Loch Ness."—W. Hall, *l. c.* 20.

Potentilla Sibbaldi, *Haller*, f. 1684.—Transmissa fuit ad Hortum Medicum a regione *Jernensi*, ubi in sylvis sponte provenit." Sibbald, in "Scotia Illustr.," ii. 25.

Alchemilla argentea, *Don.*, ex W. C. Trevelyan, "Veg. Faroe Islands," 10 (1837). *A. conjuncta*, Bab. (1842).—"I am informed by Mr. D. Don that the same plant was gathered by his father in the Island of Skye, and that he considered it a good species, naming it *A. argentea*," W. C. T., *l. c.*

Rosa involuta, *Sm.*, 1804.—"In insulis occidentalibus Scotiæ," D. Walker and D. J. Mackay Smith, "Fl. Brit.," iii. 1398. *R. mollis*, Sm. "In the way from Edinburgh to Ravelston Wood," Smith, *l. c.* ii. 539.

British Rubi.—The difficulties of all who desire to become thoroughly acquainted with the flora of their own districts will be greatly lightened, as regards the genus *Rubus*, by the labours of a band of clergymen, who, though English, have done much to extend our knowledge of the distribution of plants in Scotland. Messrs. E. F. Linton, W. R. Linton, R. P. Murray, and W. Moyle Rogers are now issuing a "Set of British Rubi," of which the first fascicle (twenty-five forms) has been issued. It is anticipated that there will be three more fascicles, the whole number of forms amounting to about a hundred. Mr. Roger's Synopsis, at present in course of publication in the "Journal of Botany," is the result of the labours of himself and his colleagues, after careful comparison of the British forms with those of the Continent of Europe, aided by the advice of such specialists as Professor Babington and Dr. Focke. Much progress has been made in clearing away doubts and errors in nomenclature, and in gaining a better insight into the true relations of the different forms; and this is embodied in the Synopsis, and will be fully illustrated in the "Set," if one may judge by the excellence of the examples in the first fascicle. The genus possesses great attractions, increased by the very difficulty of the subject; and it may be recommended as a profitable study to all who wish to become practically acquainted with the problem of the relations of *species* to

varieties. Access to the "Set of British Rubi" will much facilitate the preparation of local floras. Local Natural History Societies could scarcely do better than acquire one for the use of their members, which may be done on communicating with the Rev. E. F. Linton, Crymlyn, Bournemouth.—Ed. A. S. N. H.

The Champion Potato.—The last issue of the "Annals of Scottish Natural History" contained some very interesting notes on Pistillody of the Stamens in the Champion Potato, by Professor Trail; and I am glad to be able to give some additional facts regarding this variety. For many years I have experimented by hybridising various kinds of potatoes with the object of rearing new and improved varieties from them. The Champion possessing good properties, I was anxious to see its offspring and to prove their value; but in vain I looked for plums on it every season from the time when it was distributed up to 1887, in which year I found a few solitary fruits. In the following summer I crossed a few of the most completely developed blossoms with pollen from other good sorts; and I was rewarded with a few more plums, thus proving that naturally fertilised seed may be found, although rarely to be met with, and that well-formed ovaries may be made fruitful by artificial pollination, under favourable circumstances. I always find the stems of the Champion robust and hardy, and the stamens occasionally deformed and without pollen even when the corolla is well expanded and complete. The blossoms are very conspicuous even from a distance in a good season; but they are of short duration, and the whole flower soon falls away. I may add that the progeny of the Champion from both pure seed and when crossed showed a number of distinct kinds, none of which resembled the female parent; and when reared up to maturity they all proved inferior to that variety.—W. Sim, Fyvie.

New British Fungus.—At the recent visit of the Cryptogamic Society of Scotland to Aberfoyle there were found, near the Mansion House of Gartmore, growing in a spot where garden rubbish had apparently been burned, numerous specimens of a small orange *Peziza*, about an eighth of an inch in diameter. It was sent to William Phillips, F.L.S., Shrewsbury, and he replied, "It is *Peziza majalis*, Fr., of which I am not aware of any record in Britain. It is therefore most interesting. It is very close to *P. carbonaria*, A. and S., but is smoother outside, is of a more decided orange-yellow inside, and less crenate on the edge; the stem is also shorter." On the same spot were also found *P. leucoloma*, Hedw., and *P. violacea*, Pers.—Thomas King.

CURRENT LITERATURE.

The Titles and Purport of Papers and Notes relating to Scottish Natural History which have appeared during the Quarter—October-December 1892.

The Editors desire assistance to enable them to make this Section as complete as possible. Contributions on the lines indicated will be most acceptable and will bear the initials of the Contributor. The Editors will have access to the sources of information undermentioned.]

ZOOLOGY.

Red Deer born in September. E. F. J. *The Field*, 22nd October 1892, p. 613.—A newly born calf found on 26th September 1892, in the Island of Rum.

Risso's Grampus in the Solway. R. Service. *Zoologist* (3), xvi. pp. 404-405 (November 1892).—One taken in the Solway near Annan, on the 24th of September 1892.

Pheasants devouring Mice and Voles. "Kirkcudbright." *The Field*, 12th November 1892, p. 759.—Pheasants are very fond of voles, and when a vole's nest was discovered, the young pheasants would fight greedily for its contents.

Late Nesting of the Tawny Owl in Scotland. R. Service. *Zoologist* (3), xvi. p. 424 (December 1892).—A nest with new-laid eggs, at Crichope Linn, on the 19th of September 1892.

Lapwings Carrying their Young. R. Service. *Zoologist* (3), xvi. pp. 360-361 (October 1892).—An interesting fact observed in Southwick in May 1892.

On the Recent Occurrence in the British Islands of the Ruddy Sheldrake. F. Menteith Ogilvie, M.A., F.Z.S. *Zoologist* (3), xvi. pp. 394-395 (November 1892).—A flock of five, one shot, at Durness, Sutherland, on 20th June 1892. The other Scottish records quoted have already appeared in *The Annals*.

On the Food of Fishes. By W. Ramsay Smith, M.B., C.M., B.Sc. *Tenth Ann. Rep. of the Fishery Board for Scotland.* Being for the year 1891. Part iii. (Scientific Investigations), Section B. (Biological Investigations), pp. 211-231.

Observations on the Reproduction, Maturity, and Sexual Relations of the Food Fishes. By Dr. T. Wemyss Fulton, F.R.S.E. *Op. cit.* pp. 233-243, Plate VI.

Contributions to the Life-Histories and Development of Food and other Fishes. By Professor M'Intosh, M.D., LL.D., F.R.S. *Op. cit.* pp. 273-322, Plates XIV.-XVII.

Additions to the Fauna of the Forth. Part IV. By Thomas Scott, F.L.S. *Op. cit.* pp. 244-272, Plates VII.-XIII.—Records not only species of Copepoda and Amphipoda new to the

Forth, but describes genera (four) and species (fourteen) new to science.

[The Fishery Board is to be heartily congratulated on the results of its Biological Investigations. This section of the Report is a perfect mine of information relating to Scottish Marine Biology.—Edd.]

Note on Cetonia floricola, Herbst. R. W. Lloyd. *Ent. Mo. Mag.* (2), iii. p. 310 (December 1892).—Eight or nine pupæ in nest of Formica rufa, at Rannoch, in 1891.

Colias edusa in Scotland, 1892. *Entomologist*, xxv. p. 313 (December 1892).—One, a male, Whistlefield, Loch Long, Dumbartonshire, 24th August (Geoffrey Hughes). A male taken at Forgandenny, near Perth, 25th August (R. Lawson). One near Row, near Glasgow, about 20th August (F. C. Woodforde). Two at New Abbey, Kirkcudbrightshire, on the 23rd September (L. S. Brady).

Notes on the Season—Moray and Aberdeen. A. Horne. *Ent. Rec.*, iii. pp. 233-234 (October 1892).—Records of Lepidoptera captured. Aberdeen. J. P. Mutch. *Ent. Rec.*, iii. pp. 257-260 (November 1892).—Notes on Lepidoptera observed and captured at Monymusk and elsewhere in the County. Aberdeen. A. Horne, *t.c.* p. 287. J. Sinclair, *t.c.* p. 287 (December 1892).—Notes of Lepidoptera captured.

Carsia imbutata and Cidaria populata in Lanarkshire [Lancashire, in error]. Rev. J. C. Mackonochie. *Entomologist*, vol. xxv. p. 245 (October 1892), and correction, p. 293 (November 1892).—Common in August near Douglas Castle, Lanark.

Hercyna phrygialis, Hb., probably a British Insect. Philip B. Mason. *Ent. Mo. Mag.* (2) vol. iii. p. 264.—A new Pyralid said to have been captured in Scotland by Turner. Mr Mason considers there is nothing unlikely in the capture of this species among the Scotch mountains.

On New and Obscure British Spiders. Rev. F. O. Pickard, Cambridge. *Ann. and Mag. Nat. Hist.* (6) x. pp. 390-392 and 394 (November 1892).—Leptyphantes pinicola and Porhomma adipatum mentioned as Scottish species.

Studies of British Tree- and Earth-worms. Rev. Hilderic Friend, M.A., F.L.S. *Journ. Linn. Soc.*, Zoology, xxiv. pp. 292-315, Plate XXI. (October 1892).—Allolobophora celtica, Rosa, specimens were obtained at Langholm in 1890. A. boeckii, Eisen, obtained at Paisley in 1892. Lumbricus rubescens, *sp. nov.*, Paisley.

New British Earth-worms. Rev. Hilderic Friend. *Nature*, 27th October 1892, pp. 621-622.—Contains the same information as the last. Dr. Hurst (*Nature*, 10th November 1892, p. 31) and Dr. Benham (*op. cit.* 1st December 1892, p. 102) concur in con-

sidering the Rev. Mr. Friend's supposed new species to be identical with Enterion festivum (Savigny), described under the name Lumbricus festivus by Rosa.

BOTANY.

Species, Varieties, etc., described or observed in Great Britain and Ireland since the publication of Babington's "Manual," Ed. 8 (1881), and Hooker's "Student's Flora," Ed. 3 (1884). By Arthur Bennett, F.L.S. Concluded, *Science Gossip*, October.—This most useful list is here carried to the end of the Vascular Plants.

First Records of British Flowering Plants, compiled by William A. Clarke, F.L.S. Continued, *Journ. Bot.*, October-November.—The two instalments cover from *Trifolium* to *Rosa* inclusive. Several Scottish records are noted (see p. 54 of *Annals*).

Flora of the Left Bank of the Tay, between Perth and Glencarse. By W. Barclay. *Trans. and Proc. of the Perthshire Soc. of Nat. Sc.*, vol. i., pt. 6, 1891-92.—This enumerates all the species of Vascular Plants found in the above area; and indicates especially the more rare, local, and interesting species.

Presidential Address (on 12th November 1891) to the Perthshire Society of Natural Science. By F. Buchanan White, M.D.—In his address Dr. White described the several excursions of the Society during 1891, with especial reference to the flora of the localities visited.

On an apparently endemic British Ranunculus. By Rev. E. S. Marshall, M.A., F.L.S. *Journ. Bot.*, October, pp. 289-290, plate 328.—This form is named *R. petiolaris*, n. sp., with the synonym appended thus: "*R. Flammula*, L., var. *petiolaris*, Lange, ined., Marshall in *Journ. Bot.*, 1888, 230." It is now fully described and figured. It has been found on "gravelly margins of small Highland lakes in W. Scotland; Kingshouse, Argyle; Sligachan, Skye; Assynt, W. Sutherland," growing by preference in water two or three inches deep, and not more than a yard or two from the margin. The characteristic habit and leaves have been constant in cultivation during four years.

An Essay at a Key to British Rubi. By Rev. W. Moyle Rogers, F.L.S. Continued, *Journ. Bot.*, October-November.—The sections *Radulæ* and *Koehlerianæ* are discussed fully in the above numbers. The only plants noted from localities in Scotland are *R. obscurus*, Kalt., from "Banchory, N. B.," and *R. Koehleri*, W. and N., var. *plinthostylus*, Genev., from "Kirkcudbright."

Further Notes on Hieracia new to Britain (*Continued*). By Frederick J. Hanbury, F.L.S. *Journ. Bot.*, December.—The following are recorded, with full descriptions, from localities in Scotland:—*Hieracium britannicum*, n. sp., "a well-defined and

characteristic plant of the extensive limestones of Central Britain," and two examples in the Boswell herb., from Burntisland in Fife, appear to belong to it. *H. Sommerfeltii*, Lindeb., var. *tactum*, n. var., "from mountains around Kingshouse in Argyle." *H. caniceps*, n. sp., "among the rocky burns of Sutherlandshire and Perthshire, often at no great elevation above the sea." *H. cæsium*, Fr., var. *insulare*, n. var., "Hitherto observed only in the vicinity of Crianlarich, at 2100 to 3200 feet above the sea." *H. Friesii*, Htn., var. *hirsutum*, n. var., found in August, 1887, in the stony bed of the Cluny in Braemar, and in 1891, by Dr. F. B. White, in Strath Braan and at the Linn of Campsie.

Some Scottish Willows. By Edward F. Linton, M.A., F.L.S., and William R. Linton, M.A. *Journ. Bot.*, December.—Enumerates and describes many hybrids observed by the authors, chiefly in Clova, one or two from Perthshire, one from Little Craigindal in Braemar, and one from Dunbeath in Caithness-shire. Almost all have been cultivated for some time in deep heavy soil at Shirley, and in sandy peaty soil at Bournemouth, and the results are embodied here. One new form is described, *S. eugenes*, n. sp., or n. hyb. (probably *S. Myrsinites* × *reticulata*).

Hypnum Procerrimum Molendo: a new British Moss. By R. H. Meldrum. *Trans. and Proc. of the Perthshire Soc. of Nat. Sc.* 1892, i. pt. vi.—From Ben Lawers.

New or Critical British Algæ. By E. A. L. Batters, B.A., LL.B., F.L.S. *Grevillea*, December 1892.—Enumerates and describes numerous species, among which are the following from Scottish localities:—*Halicystis ovalis*, Aresch., Loch Goil and Kyles of Bute, G. Murray; *Ectocarpus brevis*, Sauvag., Berwick-on-Tweed; on *Ascophyllum nodosum*, E. A. L. Batters.

REVIEWS.

A Vertebrate Fauna of Lakeland. By the Rev. H. A. Macpherson, M.A. (David Douglas, Edinburgh, 1892.)

This is a large, handsome, and well got up octavo volume of 552 pages, and the latest contribution to the series of district faunas from the press of Mr. David Douglas.

The faunal area of the district comprises Cumberland and Westmoreland, and Lancashire north of the Sands—a land of special interest to the naturalist, as one of the last remaining strongholds in England of some of our most interesting beasts and birds. The author is able to include a total number of 421 species of vertebrate animals as having, at one time or other, occurred within its limits.

In turning over the pages of this volume, what will most strike

the reader is the extraordinary amount of antiquarian research that has been bestowed by the author on his subject. In this manner facts of the greatest possible interest have been accumulated and for the first time brought together.

Mr. Macpherson records 262 species of birds as visiting the English Lake district, past and present. This seems a small number when compared with the avi-fauna of some of the Eastern counties, but it must be remembered that the geographical position of the district is such as to place it, to a great extent, beyond the direct influence of those chief lines of bird flight, which in the autumn bring so many migrants to the East Coast, including many rare and occasional visitors.

Cumberland and North Lancashire can, however, boast of three rare and far-travelled wanderers, in the Isabelline Wheatear, the Spotted Eagle, and the Frigate Petrel, the first and last being new to the British list. The Wheatear was shot on 11th November 1887, near Allonby; the two latter by a most strange and singular coincidence washed up on the shore of Walney Island in 1875, and both passing through the same hands.

Eyries of the Sea-Eagle undoubtedly formerly existed at Wallow Crag, Hawes Water, and Buck Crag in Martindale, and probably in other places. Notwithstanding, however, the accumulated facts brought forward by Mr. Macpherson in his endeavour to prove the former nesting of the Golden Eagle in central and western Lakeland, we think there is not sufficient evidence that this has been the case within the period of historic ornithology—all the facts when critically examined are equally suggestive that the occurrences are referable to *H. albicilla*. The positive testimony of Richardson as to the nesting of Golden Eagles in 1788 and 1789 in the Buck Crag, Martindale, is finally disposed of in the negative, by the author himself, in a footnote at the end of the volume.

The evidence also supplied as to the former nesting of the Osprey is exceedingly nebulous and cannot be considered conclusive. Sea-Eagle and Osprey are often synonymous terms with the old ornithologists. The record or tradition says nothing of the position of the eyrie of reputed Ospreys in Whinfield Park in the last century, and both Eagle and Osprey we know do occasionally select trees for their nesting places. In the second instance adduced, the precipices on the Westmoreland side of Ullswater are a most unlikely position for an Osprey's nest but very likely for the Sea-Eagle. Dr. Heysham, who wrote towards the close of the eighteenth century, in his "Catalogue of Cumberland Animals," published in Hutchinson's *Cumberland*, 1794, makes separate species of the Sea-Eagle and the Cinereous or White-tailed Sea-Eagle. Of the former he says: "A few years ago there used to be an annual nest in the rocks which surround the lake of Ullswater, and the great trout of that lake had been taken out of its nest." The concluding sentence of the

paragraph is: "This bird has often been mistaken for the Golden Eagle." So it is obvious that the Ullswater birds could not have been Ospreys. Mr. Macpherson's notices of the past and present status of the Harriers, Kite, Buzzards, Peregrine, Merlin, Heron, Bittern, Shoveller, Tufted Duck and Woodcock, are very pleasant reading, and contain an immense amount of information. The Dotterel never seems to have been a common nester, even in the wildest parts of Lakeland, although "trips" on passage have from time immemorial visited the highest ranges of fells, and these were, before the passing of the Wild Birds' Act, annually shot down and destroyed for the sake of their feathers, used in tying "flies."

Mr. Macpherson, we think, completely fails to prove the former existence of the Ptarmigan in the mountains about Keswick, his argument being chiefly based on the former existence of a single example in a local museum, but without any label or document to state the locality it was obtained from. The illustrations in the volume include excellent coloured plates of the Isabelline Wheatear and Frigate Petrel, and several others from photographs very fairly executed, interesting also from the local scenery they depict.

Space will not allow us any further, much as we should have liked to do so, to follow Mr. Macpherson in his many pleasant pages descriptive of the haunts and habits of beast, bird, and fish. Some of his chapters are charmingly written, and if the merits of this work were left to depend on his antiquarian researches it would in this respect alone be a valuable addition to zoological literature, both local and general.

British Fungus Flora. By George Massee, Vol. I. (George Bell and Sons.)

In our last issue we briefly referred to the announcement, in *Grevillea*, of the early appearance of this work. The first volume has now been published, and an estimate can thus be formed of the place which the new Flora will occupy in British Mycology.

Those familiar with the classifications in use in previous works on the whole subject of British Fungi will probably enough find themselves a little embarrassed by the arrangement of the groups in Mr. Massee's scheme. This commences with the *Gastromycetes*, and passes on to the *Hymenomycetes*, in which the usual order of treatment is reversed, the succession being from the *Tremellineæ* to the *Agaricineæ*. Of the latter the present volume includes only the *Melanosporæ* and the *Porphyrosporæ*, leaving a very large part to follow in the second volume. The diagnoses, alike of the species, of the genera, and of the higher groups, are careful and clear; and the additional remarks that follow the diagnoses and give the "eye-marks" and points of special interest show familiarity with the works of previous writers as well as, where opportunity permitted, with the fungi themselves in the living state. These remarks are often of great interest and value, not only to the beginner, but also to the

adept in the study, by calling attention to characters which, though of much importance, might otherwise be overlooked.

Numerous woodcuts illustrate the structure of the genera, and will render the use of the book more easy and also more reliable. A good index of genera and species is a detail worthy of commendation, certain to be appreciated by all who make use of the Flora. Habitats are noted under each species, but not localities. The work will be found useful by all who interest themselves in the British Fungi, and we have great pleasure in recommending it to the favourable notice of Scottish botanists. It will add to the reputation of the author; though we cannot but think that he will find himself unable to include all known British Fungi in three volumes of the size of that before us, despite the announcement on the title-page. Meanwhile we can cordially wish him success in the accomplishment of the serious task to which he has set himself.

In the Gun Room: Sketches in Prose and Verse. By H. Knight Horsfield. (London: Eden Remington and Co., 1892.)

This neat little volume is, as its title implies, chiefly given up to sketches relating to sport. One of them, however, is devoted to "A Visit to the Island of Foula," and is, moreover, written from the standpoint of a Naturalist. But while this does not profess to be a contribution to science, it is most attractively written and its perusal impresses us with the fact that Mr. Horsfield is not only gifted with a graceful and philosophic pen, but that he is also a keen and accurate observer and excellent field-naturalist. We are inclined to express the hope that the author may be induced to give the public a series of his delightful nature-sketches in the near future.

Vegetable Wasps and Plant Worms. By Dr. M. C. Cooke. (S.P.C.K., London, 1892.)

Under the above somewhat fanciful title is issued, at the low price of 5s., a book dealing with all the Fungi parasitic upon insects that are known to the veteran author. Each fungus is described, and its habitat and the locality of its discovery are mentioned. Woodcuts of a considerable number are given. The book is a very valuable collection of information in a curious department of mycology, and is of peculiar practical interest also. There is no doubt but that it "will be welcome alike to the Entomologist and to the Mycologist," and that it will "assist them in their respective studies," as the author expresses the hope that it will.

Recent Additions to the Natural History Department of the Museum of Science and Art, Edinburgh.

The most important donations to the Natural History Department of the Museum of Science and Art since the beginning of last July comprise:—

Four hundred and twenty Bird-skins from the duplicates of the Tweeddale Collection, presented by Major Wardlaw Ramsay of Whitehill. Sixty-three Bird-skins and a number of Mammals, Reptiles, and Insects from the Gold Coast, presented by Dr. Ferrier. A collection of Zoological Specimens in spirit from Swatow, China, presented by Dr. Philip Cousland. Seventeen skins of Reptiles and Fishes from the duplicates of the British Museum, presented by the Trustees. Twenty Land Shells from New Caledonia and New Hebrides, presented by Mr. E. L. Layard. Pelvic limb of the Right Whale (*Balæna mysticetus*, Linn.), comprising the pelvic bone, femur and tibia (the latter modelled in wood), also the original cartilaginous tibia in spirit, presented by Professor Struthers, M.D. Fifteen exotic Mammals, from Mr. W. Eagle Clarke. Three Mammals from San Diego, Texas, presented by Mr. W. Taylor. *Euthemisto compressa*, Goes, and a Cucumaria from the Firth of Forth, presented by Mr. Thomas Scott. Several specimens of *Astronyx Loveni*, from the West Coast of Scotland, presented by Mr. W. Anderson Smith. Two exotic Bird-skins, presented by Brigade-Surgeon Aitchison. Several exotic Rays, presented by Professor Cossar Ewart, M.D.

Of British Birds, specimens have been given to the Museum by Mrs. Traill, by Major Wardlaw Ramsay, and by Messrs. J. A. Harvie-Brown, W. Smith, W. Eagle Clarke, W. Berry, F. P. Johnson, D. Smellie, and T. G. Laidlaw.

Of British Mammals, by the Rev. George Birnie, and Messrs G. H. Caton Haigh, J. C. Moodie Heddle, and Charles Campbell.

Of British Fishes, by Messrs. C. Muirhead, E. W. Holt, and W. Loudon. The last named gentleman's donation consists of a number of the malformed trout of Gonar Burn, to which reference was made in a previous paper in this journal.

From the Caithness Flagstone Company the Museum has received six Fossil Fishes from the Old Red Sandstone of that county, while Professor Heddle has also presented a Slab of Sandstone from the Upper "Old Red" of Dura Den, containing specimens of *Holoptychius Flemingii*, Agassiz. Several Fossils from Glencartholm, Eskdale, have also been given by Dr. Haddon, Canonbie.

Among the purchases are :—The bones of a specimen of Risso's Grampus (*Grampus griseus*) caught in the Solway Firth, and which are now being prepared to form a skeleton of this hitherto rare Cetacean. A Barred Warbler (*Sylvia nisoria*) captured on the Yorkshire Coast, a pair of Lapland Buntings (*Calcarius Lapponicus*) from Norfolk, and a pair of Bearded Reedlings (*Panurus biarmicus*) and their nestling, also from Norfolk, are among the rarer British Birds acquired. A number of Fossil Fishes and Fish-remains from the Old Red Sandstone of Caithness, including the type specimen of *Homacanthus borealis*, Traq. Eighty-three exotic Bird-skins ; also thirteen Minerals, including the recently discovered Geikielite.

R. H. Traquair, Keeper of Natural History Department.

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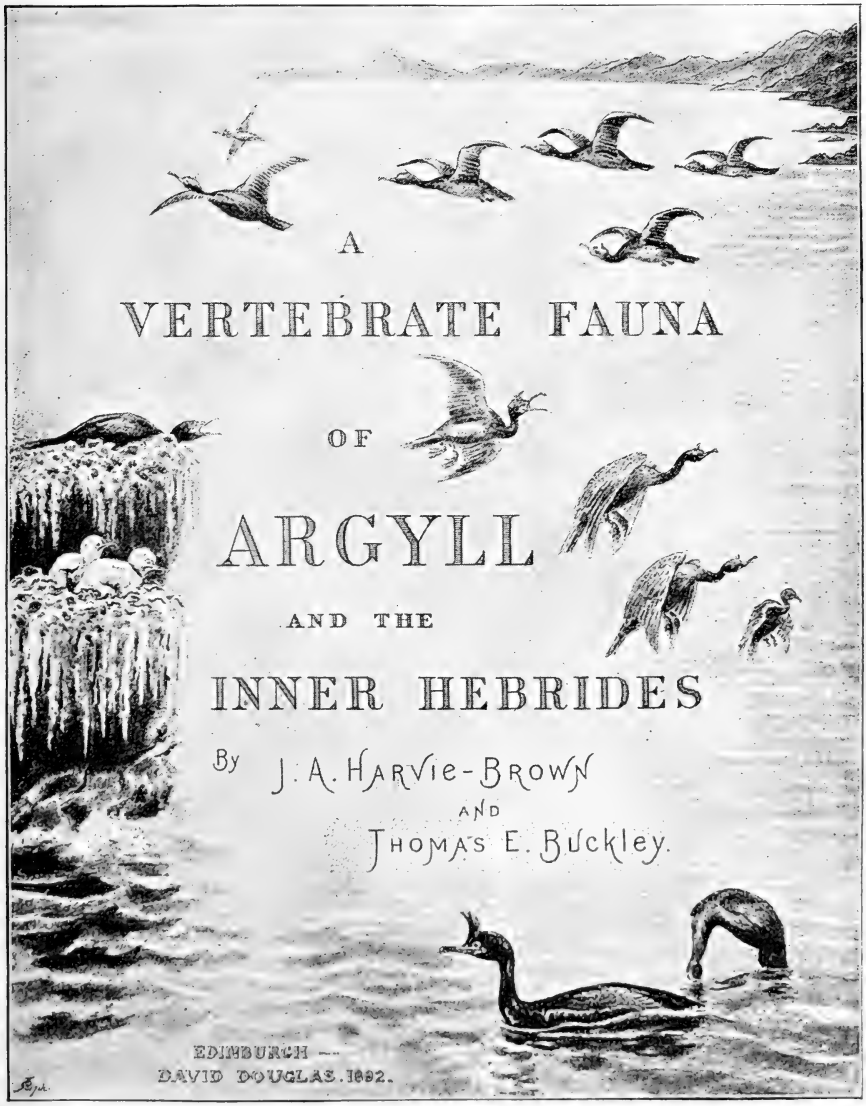

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EDINBURGH: DAVID DOUGLAS

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of
Scottish Natural History

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REPORT ON THE GREAT SKUA (*STERCORARIUS CATARRHACTES*) IN SHETLAND DURING THE NESTING SEASON OF 1892.

By Wm. Eagle Clarke, F.L.S.

Foula.—Mr. Frank Traill, who spent a considerable portion of the past summer in this island, kindly informs us that careful preparations were made by the proprietor to protect the eggs of this bird from the raids of any stranger who might visit Foula during the nesting season; and that these were carried out with complete success. Many of, or all, the eggs of the first laying, and part of the second, were, however, again taken by the natives, which is much to be regretted; and some of these, about a dozen, Mr. Traill saw on sale in Kirkwall, for which the sum of ten shillings each was demanded. It is satisfactory to know, however, that from sixty to seventy young Great Skuas were reared in Foula this year. We are much obliged to Mr. Traill for the above information.

Unst.—Regarding this species in its most northern British breeding haunts, and how it fared there during the past season, we quote the letter which Mr. Thomas Edmondston addressed to "The Times" of 11th October 1892 on the subject, as follows:

"Will you permit me again to make my annual report regarding the preservation of the Great Skua on Hermanness? I am glad to say that eight pairs, the whole number that returned to their accustomed nesting-place, succeeded in hatching their broods, all the young birds getting away in safety. One pair again made trial of the neighbouring heights of Saxavord, but the nest was, as usual, remorselessly harried. Another pair of colonists were more fortunate; for, selecting the hill of Sneuga, some distance south of the enclosure of Hermanness, they were there hospitably entreated and carefully protected by the occupier of the land, Mr. Alexander Sandison of Lund, with the happy result that the young birds were safely hatched, and another settlement, I hope, founded upon the island of Unst. The result is a net gain of two pairs over last year, when only seven couples, and all of them in Hermanness, succeeded in maintaining their homes inviolate. I ought to add that, in spite of the most careful watching, two nests on Hermanness were plundered of their eggs, but it was early in the season, and the birds laid again with better results.

"It is not possible to state with any kind of confidence at what period of life the young of the Great Skua become mature and begin to pair. The birds are so rare, and their lives so wandering, that opportunities of observation, except during the short period of their stay in their breeding stations, are wholly wanting. Again, the thought of killing a Great Skua, even in the dearest interests of science, has been abhorrent to the minds of three generations of bird-lovers in my native island, and hence there has been no chance of determining the point referred to by comparison of specimens at various stages of life or by anatomy. It was, however, the opinion of my late father, Dr. Edmondston, supported by the still higher authority of his son-in-law, Dr. Saxby, that the Great Skua does not attain its full plumage, or begin to breed, until the fourth year. These opinions, and I know of none entitled to greater weight, were based upon various experiments in keeping young birds for some time in captivity, and, although by no means conclusive, are probably approximately correct. If this be so, we may reasonably expect that some of the birds successfully hatched in 1891 will return to breed in 1895, and those of the present year in 1896, and so on. I adhere to my formerly expressed opinion that Hermanness is already stocked to its utmost capacity, or nearly so; and, if the Skuas in Unst are to be largely increased, the protected area must be extended. It is surely not too much to hope that the neighbouring proprietors will do as Mr. Sandison has done in the case I have referred to, and will afford true northern hospitality to such grand and interesting guests.

"It may not be out of place, as illustrating the difficulties of protecting Hermanness, to mention an occurrence of last season. Two visitors, presumably gentlemen, since they came provided with intro-

ductions, and calling themselves ornithologists, presented themselves to my nephew, Mr. Lawrence Edmondston of Halligarth, and sought permission to visit the Skua's home. Such permission is never refused to any one, the only conditions being that all visitors shall be accompanied by the keeper, and the birds disturbed as little as possible. The Skuas were then in act of laying, and, as the visitors had time at command, Mr. Edmondston suggested that their expedition should be postponed for two or three days, when all the birds would be sitting, and when they would have an opportunity of seeing the Skuas to greater advantage, and with less risk of damage. This proposal was acquiesced in, but two days afterwards these gentlemen betook themselves to Hermanness, entirely on their own account, and without the necessary letter of permission. Warned off by the keeper, they laughed at his remonstrances, and proceeded to hunt for the Skuas' nests. It is highly satisfactory to add that they did not find them, for the keeper, who had been joined by my nephew's shepherd, "shadowed" them at a few paces distance, taking good heed of all their proceedings. But the example of two "stranger gentlemen" in thus setting at defiance the prohibition against trespass very naturally encouraged native raiders, better acquainted with the locality. Only a few days afterwards the two nests to which I have already referred were plundered of their eggs, and there was no possibility of tracing the depredators. You can give powerful aid to our dearly prized dependents if you will give world-wide publicity to my protest against such unworthy conduct."

BIRD NOTES FROM NORTH RONALDSHAY.

By Allan Briggs.

This island is so well described in "A Fauna of the Orkney Islands" by Messrs. Harvie-Brown and Buckley, that little remains for me to add. There are seven named lochs on the island, the largest being known as the Mill Loch, with an area of something over twenty-eight acres during winter. The island is for the most part cultivated, and divided into a great number of small farms, which are intersected by stone dykes, in many cases so low that they are of little use for stalking purposes. Many strange birds undoubtedly occur, but with such a large population (the inhabitants numbering about 500) they are so often disturbed that they seldom remain with us for more than a day at a time.

This is my first experience of North Ronaldshay during

the winter, but in the years 1884, 1885, 1887, and 1888, I was here during the months of August and September, or part of them.

Song Thrush (*Turdus musicus*).—One, or at most two pairs breed in the island. A pair had several nests in the garden here (Holland) this spring, but they always came to grief through cats. It is only within the last two years or so that the Thrush has been known to breed here. I find under date 13th October, "Have seen for some days numbers of Song Thrushes about."

Redwing (*Turdus iliacus*).—First noticed for 1892 on 14th October, when six were seen about the garden, one of which I shot. After this I saw them in small lots up to 26th November, never more than seven in a flock.

Fieldfare (*Turdus pilaris*).—In 1892 they occurred here on 3rd November, when I found a flock of close on 500 in one of the grass parks near the house, out of which I shot nine. Since this date I have seen them in small lots, up to a score, and a few single birds.

Blackbird (*Turdus merula*).—Two or three pairs resident: they have only been so for a very few years. Last June one pair had their nest in an *Escallonia* close to our dining-room window. Unfortunately, the cats took the young when nearly ready to fly. On 3rd November there were large numbers of Blackbirds all along the stone dykes: the wind on the 2nd had been strong from the S.E.

Wheatear (*Saxicola œnanthe*).—Common, and breeding all over the island, both in rabbit-holes and old stone walls. The last one I saw was on 15th October 1892.

Stonechat (*Pratincola rubicola*).—One, a female, shot on 15th October 1892: the only one I have ever noticed here.

Redstart (*Ruticilla phœnicurus*).—Saw three on 1st September 1892. Shot one, a male. One seen on 2nd September, and one 25th October. These birds often occur in company with Pied Flycatchers.

Redbreast (*Erithacus rubecula*).—On 4th October 1892, noticed numbers scattered in small parties along the wall sides on the west of the island. A few have remained about the garden up to this date (January 1893).

Whitethroat (*Sylvia rufa*).—I shot one in the garden here on 19th September 1888, and on the 10th July 1892 saw a single bird in the garden, which remained a few days.

Golden-crested Wren (*Regulus cristatus*).—One in garden 5th November 1892. The Gold-crest occurs nearly every winter, sometimes in large numbers.

Willow Wren (*Phylloscopus trochilus*).—One killed 29th August 1884. On 31st August 1892, and for the first few days of September, there were large numbers about the garden and among beds of nettles along the west side of island : as many as fifteen or twenty together. Wind easterly.

Hedge Sparrow (*Accentor modularis*).—A pair seen in the Holland Garden, 13th October 1892.

Common Wren (*Troglodytes parvulus*).—Saw one in the garden on 2nd October 1892. Since then there have been one or two constantly about.

Pied Wagtail (*Motacilla lugubris*).—On the 22nd August 1892, saw a single bird close to the Lighthouse on the north beach. On 29th August I saw several family parties feeding on insects among the rotting seaweed along the south beach, and for some days after this there were a few small lots about.

Meadow Pipit (*Anthus pratensis*).—I saw a few on 20th September 1892. I had seen them in small numbers in former years. I cannot make out that they breed here, though I particularly looked for them during the breeding season I saw nothing of the birds during spring and early summer.

Rock Pipit (*Anthus obscurus*).—Very common, breeding in the stone wall which runs all round the island, and among the loose stones on the beach.

Pied Flycatcher (*Muscicapa atricapilla*).—One in Holland Garden 2nd September, one on 13th, and two on 14th October 1892. This bird seems to occur pretty regularly nearly every autumn.

Sand Martin (*Cotile riparia*).—A single bird circling round the house here on the evening of 25th September 1892, after a dreadful day of wind and rain from the S.W.

House Sparrow (*Passer domesticus*).—Common all over the island. I shot an albino in August 1892.

Chaffinch (*Fringilla cœlebs*).—Large numbers occurred on 5th October 1892, and small lots were to be seen for the next few days. Flocks largely mixed with Bramblings. It struck me that the Chaffinches largely consisted of females.

Brambling (*Fringilla montifringilla*).—Seen along with the above from the 5th to 10th October. At no time would I say there were large numbers. Shot a Brambling on the 14th October 1892 : a single bird, which was the last one I saw.

Linnet (*Linota cannabina*).—On the 19th October 1892, several small flights of Linnets near the Mill Loch. This is the only time I have identified the Linnet in North Ronaldshay.

Lesser Redpole (*Linota rufescens*).—Four in Holland Garden, 15th September, a few near the Mill Loch, 18th October 1892; and a single bird in the garden, 13th January 1893.

Twite (*Linota flavirostris*).—Common, and breeding all over the island; nesting almost invariably in young corn or grass fields. Have observed no difference in numbers at any time, only during the winter months they collect in small flocks of a dozen or so about the stack-yards.

Common Crossbill (*Loxia curvirostra*).—One, a female, caught close to the Lighthouse, on 7th July 1892, by the daughters of Mr. Ross, the chief light-keeper.

Common Bunting (*Emberiza miliaria*).—Fairly common, fifteen or sixteen pairs breeding here. Seem all to collect about the corn-stacks at Holland Farm during the winter. No perceptible increase or decrease in numbers.

Snow Bunting (*Plectrophanes nivalis*).—The first I saw here for 1892 were on 19th September, when I noticed three or four small flights, numbering from five to a dozen birds. A flock of forty at the north end of the island on 21st September, and a flock of several hundreds on 27th September. On the 19th October, and for some time after this date, they were simply in *thousands*—required to be seen to be believed.

Skylark (*Alauda arvensis*).—Very common, and breeding everywhere throughout the island. From my observations, much scarcer during the winter months.

Common Starling (*Sturnus vulgaris*).—Very abundant, breeding in all the old stone walls, and under large stones and boulders on the beach. Large flights roost during the early autumn in the reed beds of the Mill Loch. Only small numbers seem to remain here for the winter.

Gray Crow (*Corvus cornix*).—I have only seen two this winter (1892): one on 26th November, and another some time in October. The natives assure me they sometimes occur in great numbers in October and November. This is not to be wondered at, when the large quantity of "braxy mutton" which is always more or less plentiful around the shore is taken into consideration. Their scarcity this year is all the more strange, as I understand the percentage of deaths among the shore sheep has been large.

Raven (*Corvus corax*).—This bird is generally to be seen here during the autumn months. I have noticed a few birds every

August and September I have spent here, but never more than two or three together. This season, 1892, I have seen about ten birds. One family party of five I chased half way round the island before I managed to get on terms with them; however, I eventually succeeded in securing a pair. This was on 14th September. Since then, I have only seen two birds.

Swift (*Cypselus apus*).—Killed one 26th August 1892: two others were along with it. These birds were flying in a westerly direction over the island, the wind being S.W. and the weather very stormy. This is the first occasion on which I have noticed this bird in North Ronaldshay.

Long-eared Owl (*Asio otus*).—I shot one, a male, in Holland Garden, 24th November 1892.

Short-eared Owl (*Asio accipitrinus*).—Saw one, a male, on 2nd December 1892, which rose out of some reeds by the edge of a small loch, where I was after Snipe. I killed it and a Snipe, right and left. I came across another on the night of 3rd December when I was waiting for duck. It circled round me several times, but I refrained from shooting it. I hear from the natives at times that they have seen a Cat-face (their name for an owl) among their turnips, and I fancy in most cases they mean this bird.

Scops-eared Owl (*Scops aldrovandi*).—A bird of this species was caught alive on 2nd June 1892, in an outhouse at the Lighthouse, by Mrs. Ross, wife of the head light-keeper. It lived for some days, but eventually choked over a piece of meat; when Mr. Ross had it stuffed, and it is now in his possession. This is, I believe, the first instance of this bird being recorded in Orkney.

Snowy Owl (*Nyctea scandiaca*).—On the 2nd November 1892 Mr. Angus (the farmer at Holland) sent a message to the house to inform me that there was a very large owl sitting in one of his fields. Unfortunately I had set out for the north end of the island. Next morning I had a good look all round, but did not search the rocks on the west shore, close to where it had been seen. I understand it was seen on these rocks the day after my ineffectual search. From Mr. Angus's description, there is little doubt but that this was the Snowy Owl. He told me, when first his attention was called to it the bird was sitting in a stubble-field. What first drew his attention was the row the gulls were making, mobbing it. It was seen subsequently by two other men and a daughter of the farmer. This is likely to have been the same bird seen by Mr. Harvie-Brown at Quendale, Shetland, and recorded in the January number of this magazine.

Hen Harrier (*Circus cyaneus*).—I saw one sweeping over the fields, close to the house, on 16th July 1892. From its light colour and small size, I made it out to be a male. This is the only one I have noticed this season, but in former years I have seen them generally in September.

Peregrine Falcon (*Falco peregrinus*).—Always several about during the autumn and winter. The first I noticed for 1892 was on 31st August. Since then there have always been one or two with us. On 7th October I shot a young female.

Merlin (*Falco æsalon*).—Common every year during August and September. One or two remain through the winter. The first I noticed for 1892 was a single bird on 21st July. About 16th August they were very plentiful. On that date I saw four on the sheep dyke within a yard or two of one another. Nearly all the birds seen here are immature.

Kestrel (*Falco tinnunculus*).—Not so common here as the last named, but fairly abundant immediately after harvest. I think mostly young birds. I never saw a male in mature plumage.

Cormorant (*Phalacrocorax carbo*).—Common, and breeding on the Seal Skerry. On 4th July 1892 I visited the Skerry with my wife and a lady friend. We counted fifty nests, most of which contained three eggs. Only in five were there four eggs, which was the largest number observed. In some nests the eggs were quite fresh, in others hard sat. The Shag (*Phalacrocorax graculus*) does not breed here, but during the winter months large numbers of these birds roost, along with the Cormorant, on the Seal Skerry.

Gannet (*Sula bassana*).—Common, from summer onwards, fishing round the island. What strikes me most is the preponderance of those in the pure adult plumage.

Heron (*Ardea cinerea*).—Occur here in small numbers every year. The first generally appear early in August. They make the Seal Skerry their headquarters. On a visit there (9th January 1893) I counted fifteen rise at our approach: the largest number I have ever seen here at one time.

Graylag Goose (*Anser cinereus*).—On the 7th October 1892, during a fearful gale, with rain from the N.W., three of these birds occurred here. They appeared very restless, shifting their ground often, and eventually disappearing on the 9th October. I think this bird must seldom visit the island, as the natives who saw them informed me they had never seen the bird before. The Brent (*Bernicla brenta*), seems to be the commonest variety seen here. From all accounts, they were fairly plentiful last winter (1891-92), many being shot.

Canada Goose (*Bernicla canadensis*).—On the 9th June 1892 I saw this goose on the Mill Loch. Coming round the corner of a wall, I found myself within twenty yards of the bird. It rose heavily and flew across the loch, where it dropped again on the water. By next morning it had disappeared.

Hooper (*Cygnus musicus*).—Thirty seen crossing the island, flying due west, on 15th October 1892. Of this flock only five were in pure white mature plumage. They flew low, almost within gunshot.

Sheldrake (*Tadorna cornuta*).—Fairly common during the breeding season: perhaps a dozen pairs breed on the rabbit links. Seldom seen after August. I only once saw them after the breeding season, that was on the 26th September 1888, when I shot two out of a flock of six close to the Lighthouse.

Wild Duck (*Anas boscas*).—Always a few about, without being plentiful. A goodly number sit about the Seal Skerry all day, coming on land after dusk to feed. Many pairs breed here, both in the reed beds in the lochs and in grass fields; but their eggs are most systematically taken by the natives for eating purposes, or to sell as those of the Domestic Duck.

Shoveller (*Spatula clypeata*).—On coming here in June 1892, I found two pairs of these birds breeding in the Mill Loch. Their eggs of course shared the same fate as those of the Wild Ducks, but one pair eventually brought off a brood of, I think, nine youngsters. They seem to remain here the year round, as I have seen them all through the autumn and winter months. On 3rd January I shot a drake which had nearly completed the moult back into his nuptial dress. These birds can only have bred here within the last two or three years, as on my former visits I never saw or shot them. On my drawing the attention of some of the natives to the peculiar Ducks, the more intelligent of them seemed to agree that the birds were first noticed in 1891.

Teal (*Querquedula crecca*).—Fairly common in the month of September and later. At times very plentiful. This season (1892), about the beginning of October, I shot four, from a flock of sixty or so, on one of the small lochs. The same day I saw a flock of about a score on another loch. On a recent visit to the Skerry, on 9th January 1893, I must have seen a hundred and fifty Teal, besides Duck and Widgeon.

Widgeon (*Mareca penelope*).—Occurring regularly, but in small numbers. The largest flock I have ever seen would number not more than fifteen. One, a drake, remained here the greater part of June 1892.

Pochard (*Fuligula ferina*).—I killed a pair at flight, from a flock of about a score, at a small loch close to the house here, on 14th November 1892. Since that I have seen two flocks of five and six, and a few single birds.

Scaup (*Fuligula marila*).—On the 15th October 1892 I shot two, both ducks, on the loch of Garso, at the north end, just getting into mature plumage, the face beginning to show the white well. Since then I have seen and shot a few others, but they are by no means plentiful.

Tufted Duck (*Fuligula cristata*).—I have only shot three Tufteds here this season: the first on 10th October 1892, on Garso Loch—there was another with it at the time. The last I killed was on 13th January 1893, a young male; he, along with a fine Golden-eye drake, was in company with six Pochards.

Golden-eye (*Clangula glaucion*).—A few occur. These would appear to keep principally to the Mill Loch, which is a fairly large sheet of water during the winter. These are nearly all females or birds of the year. I have shot four in all, one of them a drake in the third year's plumage. I have only seen one other old drake.

Long-tailed Duck (*Harelda glacialis*).—Large numbers. Seem to prefer the sandy bays on the east side of island. Often occur on the lochs in stormy weather. The first I shot, 2nd November 1892, rose off a small loch near the old lighthouse at the extreme north-east corner of the island. I had seen them several weeks before this date.

Eider Duck (*Somateria mollissima*).—Very abundant, occurring in large flocks. Numbers roost on the Seal Skerry.

Red-breasted Merganser (*Mergus serrator*).—Occurs regularly. The first I recognised for 1892 was on the 14th October, when I saw four swimming in a sandy bay on the south side. Since then I have seen several pairs at different dates.

Smew (*Mergus albellus*).—I saw what I believe to be a bird of this species on 1st September 1892, on a loch about the centre of the island. I had a good binocular with me, and watched it for some time. The prevailing black and white plumage and the peculiar head and bill were most distinctive, and I have little doubt in my own mind that the bird was identified unmistakably. There was no cover of any kind, and when I tried to get within shot it took alarm, and after circling once round, went off in a westerly direction.

Rock Dove (*Columba livia*).—I have only seen a pair of the Wild Blue Rock here: this was in September 1888, when I shot one, and a friend, Mr. Cook, the other. It is curious their not

occurring oftener, as in the island of Sanday they are numerous; and the distance is so short.

Water Rail (*Rallus aquaticus*).—There seems to have been a regular influx of these birds into North Ronaldshay this winter (1892). The first I saw were on 9th November, while snipe-shooting. I shot five, and could, I believe, have killed a dozen more. The marshes were much flooded, and consequently there was little cover. The poor birds took refuge in the loose stone walls, where my old retriever at once spotted them, and stood scratching at the place till I called him away, or the bird bolted through the dyke. After this I saw them in greater or smaller numbers all through November and up to 9th December, when most of them disappeared. Saw one on 16th January 1893. Never saw this bird during my former visits.

Spotted Crake (*Porzana maruetta*).—On the 8th September 1884 I shot one in the Mill Loch, and in the same loch, and within a few yards of the same spot, I shot another (a male) on the 27th September 1892. There was a second bird along with this last, but it got into a thick patch of rushes, and the united efforts of my dog and myself were unavailing to turn it out.

Land Rail (*Crex pratensis*).—A very common breeding species; in fact, I never knew them so common anywhere. Many fall victims to prowling cats. Last seen for 1892 on 10th October.

Moor Hen (*Gallinula chloropus*).—Common, but seems to entirely disappear during the winter. I have seen six nests at a time in the reed beds of the Mill Loch.

Coot (*Fulica atra*).—Breeds in most of the small lochs, perhaps from fifteen to twenty pairs, all told. None seen for the last two months (December and January).

Golden Plover (*Charadrius pluvialis*).—Large numbers here at times. The first I saw in 1892 were five on 4th July, after which they came in rapidly, and for the first half of August were here in great numbers. After September they were scarce for a time, but about the end of November again became plentiful, though very wild. One bird with pure white wings remained here part of August and September.

Gray Plover (*Squatarola helvetica*).—I shot the only one I have ever seen here, on 3rd September 1892.

Ringed Plover (*Ægialitis hiaticula*).—Very common, and breeding wherever there is suitable ground.

Lapwing (*Vanellus vulgaris*).—A common breeding species, but most of them leave early in September.

Turnstone (*Strepsilas interpres*).—A few seem to remain here all the year round. I saw five on the Seal Skerry on 4th July

1892, a score at the east rocks on 27th July, and numbers came in as the season advanced.

Oyster Catcher (*Hæmatopus ostralegus*).—Two or three pairs breed. Small numbers come in autumn, when flocks of from ten to thirty may often be seen at the west rocks.

Red-necked Phalarope (*Phalaropus hyperboreus*).—A few pairs nest. The last I saw of them was on 4th August, when I noted three birds, after which they seem to have taken their departure. On 3rd August 1887 I saw six, evidently a family party.

Woodcock (*Scolopax rusticula*).—I have only seen three here this winter, all of which I got: the first on 3rd, and second on 9th November, the last being shot on 2nd January 1893. I understand a number were seen among large boulders on the north beach, near the Lighthouse, in December 1891.

Common Snipe (*Gallinago cœlestis*).—Fairly numerous, sometimes even as early as August. Fluctuating in numbers, as one might expect, according to weather. Season 1892, they were most plentiful during the latter half of November and most of December. Since the beginning of January 1893, they have been few in numbers, and dreadfully wild. Up to 16th January 1893, I have shot somewhat over 200 couples, the heaviest weights for individual birds being, one $6\frac{1}{8}$ozs., another $5\frac{7}{8}$ ozs., while many ranged from $4\frac{1}{2}$ to $5\frac{1}{2}$ ozs.

Jack Snipe (*Gallinago gallinula*).—First I shot for 1892 was one on 6th September, during which month I only killed four; in October, twenty; November, twenty; in December, only thirteen, making in all fifty-seven. Out of a number weighed, one was $3\frac{3}{8}$ ozs.

Dunlin (*Tringa alpina*).—Common during the breeding season; nesting much in corn-fields. When the young are able to fly, they all take their departure, and are not seen again for months. A few reappear in early winter.

Little Stint (*Tringa minuta*).—I had never seen the Little Stint here until 26th August 1892. On that date I had gone out along the west side to see if any strangers were about, as it had been blowing a gale during the night, and the wind was still pretty strong from the west or south-west. At the extreme north-west corner of the island there is a considerable tract of barren ground, given up to the sheep, with a few pools of water in the hollows; and here it was I found the Stints. There was one flock of fully fifty birds, and two smaller lots, containing, I should say, from ten to fifteen birds each. It was difficult to count them accurately, as they were restless, and constantly on the move. After this I saw them in small lots or singly in

different parts of the island up to 2nd September, but after this there was not one to be seen. They seemed to mix little with other waders; in any case in which I observed them do so, it was only a single bird, or at most two.

Purple Sandpiper (*Tringa striata*).—Occurs every autumn. The first I noticed for 1892 was a flock of five on 23rd August. In November they swarmed all along the rocks; on the 11th of that month I counted fifty-three birds in one flock, and there were many other much larger flocks.

Curlew Sandpiper (*Tringa subarquata*).—I shot two on 24th August 1892, and on 30th August killed ten at a shot, out of a good-sized flock, which appeared to be all of this species. After this I saw them fairly common all over the island. The last mention I find of them in my diary was 1st October, when I shot a single bird. I never saw the Curlew Sandpiper in North Ronaldshay before this year.

Knot (*Tringa canutus*).—Noticed almost every August I have been here. I shot a single bird on 12th August 1892; on 17th I saw a flock of about a score, and 23rd August found them plentiful along the west rocks. During this winter I have not remarked their presence.

Ruff (*Machetes pugnax*).—In my experience of North Ronaldshay, I have found that the Ruff occurs pretty regularly during the months of August and September. In 1887 they were more plentiful than usual, being often seen during August. On the 20th August of that year I shot five (two Ruffs, three Reeves), from a flock of nine, this being the only occasion on which I have seen a flock. They usually appear only singly, or perhaps as many as three together. This season I have noticed less than a dozen, of which I shot three at different times, viz. 9th August, 26th August, 1st September 1892.

Sanderling (*Calidris arenaria*).—Wonderfully numerous in 1892. First seen on 25th August, when fourteen were counted in flights of Ringed Plover. Since then they have been conspicuous among the shore birds.

Redshank (*Totanus calidris*).—Scarce during the breeding season, only a few pairs nesting here. Common all along the shore in autumn and winter.

Greenshank (*Totanus canescens*).—A scarce autumn visitor. I shot one on 27th August 1887, and had only recognised them on two previous occasions. In 1892 I identified one, by its peculiar call, flying overhead on 25th October. On 10th November, picked up the remains of another, and subsequently heard that a man had shot two, out of a lot of six, some time in October, at the loch where I found the dead bird.

Bar-tailed Godwit (*Limosa lapponica*).—On 24th August 1887 I shot one, a single bird. 8th June 1892, I found a Godwit, in full breeding plumage, frequenting the margin of one of our small lochs. I saw him for a week or ten days, and then he disappeared. I heard he had been shot by one of the islanders.

Whimbrel (*Numenius phœopus*).—A common bird here during the month of August: I have seen as many as thirty or forty together. In a flock of Whimbrels, Curlews are often seen, but much in the minority, as the latter is by no means common here till after the Whimbrel leaves, which it does early in September.

Curlew (*Numenius arquata*).—Pretty common in late autumn and winter. During winter most of the Curlews on the island appear to keep in one flock, their favourite resting-place a point of rock on the north shore running out for some distance into the sea, called the Green Skerry. They sometimes number a hundred or more, and are very wary and difficult to approach.

Arctic Tern (*Sterna macrura*).—A common breeding species—last year scattered in small groups or single pairs in different parts of the island, whereas formerly, I am given to understand, they nested almost entirely in one colony: in a large grass field at the south-west of the island. This past season they nested largely in corn-fields, perhaps owing to the late season and the corn being backward in growth.

Common Tern (*Sterna fluviatilus*).—Scarce, compared with the Arctic Tern, but still certainly identified. Nesting sometimes singly, and in other instances with the above-named bird. In very few cases did I find more than two eggs in the nests of either species.

Black-headed Gull (*Larus ridibundus*).—A very large colony occupy the reeds in the centre of the Mill Loch. I believe this colony to be much smaller than it was some years ago, owing to the manner in which the nests are systematically robbed by the boys. The late Dr. Traill did all in his power to protect the birds during the breeding season, but the present proprietor, Mr. John Traill, having been so much abroad, the boys have had it all their own way.

Herring Gull (*Larus argentatus*).—The commonest of the Larinæ during winter here; the Common Gull (*Larus canus*) being noticed in much smaller numbers

Lesser Black-backed Gull (*Larus fuscus*).—By no means commonly seen at any time. During July 1892 a flock of some sixty or seventy remained about Ancum Loch for two or three weeks. These were chiefly old birds, but few in the first year's plumage being seen among them.

Great Black-backed Gull (*Larus marinus*).—A few of these birds are always to be seen here, although less common in spring. No appreciable difference in numbers is noticed during winter.

Glaucous Gull (*Larus glaucus*).—On the 10th November 1892 I saw a single bird in mature plumage at the north end of island, and later in the same month I came on another sitting on the shore of the Mill Loch. On the 22nd December I again saw a single bird at the north end, close to Lighthouse. When waiting for duck on the Seal Skerry on 9th January of the present year, I counted fifteen on the wing at the same time. All that I have mentioned were in mature plumage. I cannot say that I identified a single bird in the first or second year's plumage, and I think I should have recognised them, even at a distance, as I saw numbers of them, and shot several some years ago, near St. Andrews, Fife.

Iceland Gull (*Larus leucopterus*).—I shot one, a female, on 3rd January of this year. This bird, which is the only one I have seen, was shot flying along the east rocks in company with some Herring and Common Gulls.

Common Skua (*Stercorarius catarrhactes*).—A specimen of this bird was shot here in 1891—if I am correctly informed, some time during September. It is now in the collection of Mr. Dennison of West Brough, Sanday.

Pomatorhine Skua (*Stercorarius pomatorhinus*).—On 5th November 1892, while on a point of rocks (Sromness Point) at the south corner of the island, waiting for Curlews flighting over, I saw a large black-and-white Skua. He was engaged chasing the Gulls, which were fishing a few hundred yards off in the firth. Again, on 29th December, I saw a similar bird not far from the same point. From the shorter tail feathers and greater apparent bulk, thus differing from Richardson's Skua, I have little doubt these were of the above-named species. I may mention that I have shot the Pomatorhine Skua at St. Andrews.

Richardson's Skua (*Stercorarius crepidatus*).—Commonly seen here during August and September. In 1892 they were oftener noticed than usual. Saw three on 3rd August beating up against a strong wind from the west, flying over the island, just in front of the house. On 10th August I shot a single bird in black-and-white plumage at a small loch. After this many were seen, for the most part of the dark variety.

Little Grebe (*Podiceps fluviatilis*).—I shot one (a bird of the year) on Garso Loch on 5th December 1892. This is the only one I have ever seen here.

THE *CRAMBI* OF SCOTLAND.

By William Reid, F.E.S.

The Scotch *Crambi* are very diversified in their habits, and may be found in every variety of rough grassy places, from the coast sandhills to the summits of the highest mountains. Many fly about merrily in the bright sunshine on quiet days, others prefer the cool of the evening, while several are more or less nocturnal in their habits. The commonest species in Scotland are *Crambus pratellus*, *culmellus*, and *tristrellus*, which are widely distributed, and common everywhere. *Dumetellus*, *pascuellus*, *hortuellus*, *margaritellus*, and *perlellus* are also fairly common, but local. *Geniculeus* is recorded on insufficient authority. *Inquinatellus* is very local, though possibly not rare. *Pinetellus* is only found in or near fir woods, and is almost nocturnal in its habits. *Ericellus* and *furcatellus* are mountain species, and are rather scarce in collections. *Myellus*, though widely distributed, is always considered a prize.

The genus may be characterised as follows: Imago—*Antennæ*, simple, or slightly ciliated. *Palpi*, prominent, always much longer than head. *Fore-wings*, oblong, twice as long as broad, tip blunt or produced to a point: most of the species have a longitudinal white streak or dash along centre of wing from base, and an angulated transverse line near hind margin. Others are nearly unicolorous, without markings. *Hind-wings*, ample, folded longitudinally in repose. They rest on grass stems with the head downwards, and the wings wrapped tightly round the body. The larvæ are quite unknown to me, and I am obliged to Mr. Leech's little work on the British Pyralides for any notices appended to the various species.

To facilitate identification, I have divided the genus into seven sections, characterising each section separately, and, where essential, each species comprised in the section. By this means I do not think it will be necessary to enter into minute details, and will only notice the more prominent features in my descriptions.

The nomenclature adopted is that in ordinary use in Britain. I do not consider it necessary to give any synonyms.

Section I.—Fore-wings streaked and speckled with white and brown, two transverse angulated lines. *C. falsellus.*

Crambus falsellus, *Schiff.*

Antennæ, whitish brown. *Palpi*, whitish ochreous, darker at the sides. *Head*, dirty ochreous white. *Thorax*, whitish, with a dirty ochreous tinge. *Fore-wings*, pale ochreous white, with a number of rusty and dark brown streaks; two transverse angulated streaks—one before and the other beyond the middle; fringes slightly glossy. *Hind-wings*, pale gray. *Abdomen*, whitish gray. *Legs*, whitish ochreous. Expands about 20 mm.

Occurs in July and August. I never saw it alive, and know nothing about its habits. It has been found in all the eastern counties from Aberdeen to Edinburgh, and, though local, is probably not rare.

Section II.—Fore-wings with a white longitudinal streak, followed by a white spot or blotch, and an angulated transverse line near hind margin.

a. Fore-wings *dull* brownish, streak narrow, acutely pointed, silver spots near tip, indistinct. *C. pratellus.*

b. Fore-wings *glossy* ochreous brown, streak and silver spots at tip distinct; a narrow white streak on costa at base. *C. dumetellus.*

c. Fore-wings dark ochreous brown, streak broad, followed by a large white blotch, and a whitish streak along inner margin. *C. ericellus.*

d. Fore-wings shining ochreous brown, the broad white streak commences *on the costa* at base. *C. pascuellus.*

Crambus pratellus, *Linn.*

Antennæ, dark brown. *Palpi*, brownish. *Head*, brownish, tinged with ochreous. *Thorax*, dark brown, tinged with ochreous. *Fore-wings*, dull dark brown, with an ochreous tinge, a narrow dirty white streak on the costa; and a

narrow white streak from near the base to beyond the middle is followed by a small whitish blotch and an angulated, transverse, glossy whitish line near hind margin ; there are also several indistinct whitish spots on costa near tip, fringes glossy. *Hind-wings*, dark gray, fringes pale. *Abdomen*, dark brown, with an ochreous tinge. *Legs*, ochreous brown. Expands about 18 mm.

Occurs in July. Frequents meadows, commons, and bogs, and is an abundant and generally distributed species. It flies naturally before and after sunset. The ♀ is much paler than the ♂, and not so easily found. "The larva feeds amongst roots of grass, and hybernates, pupating in spring in a slight cocoon."

Crambus dumetellus, *Hb.*

Antennæ, brownish ochreous. *Palpi*, brownish ochreous. *Head*, pale ochreous brown. *Thorax*, shining dark ochreous brown. *Fore-wings*, glossy ochreous brown. A narrow white streak on costa at base, and a longitudinal white streak from base along centre of wing, broadest beyond the middle, is followed by several distinct white spots and a transverse elbowed line near hind margin ; fringes, and blotch at anal angle, shining whitish gray. *Hind-wings*, grayish, fringes dirty white. *Abdomen*, gray, with an ochreous tinge. *Legs*, ochreous brown. Expands about 22 mm.

Occurs in July. Frequents sand-hills, riverside meadows, and grassy places on the mountains ; does not seem to occur much above a thousand feet. Though very local, it is widely distributed in Scotland, and common in many places. It flies naturally in the sunshine, and at dusk. It seems to prefer dry, sunny hillsides and coast sand-hills, and is less common in wet places.

Crambus ericellus, *Hb.*

Antennæ, brownish. *Palpi*, brownish, tinged with ochreous. *Head*, brown, with a slight ochreous tinge. *Thorax*, ochreous brown. *Fore-wings*, dark ochreous brown, slightly paler towards the inner margin ; a broad white streak from *centre of base* to beyond the middle is

followed by a white blotch and an angulated transverse line near hind margin; there is also a triangular white spot on costa, and another at the tip, and a pale dirty white streak along the inner margin. *Hind-wings*, dark gray, fringes paler. *Abdomen*, dark grayish brown. *Legs*, ochreous brown. Expands about 23 mm.

Occurs in July. Frequents grass, and heath-covered knolls and hill slopes, at an elevation of from 1000 to 2500 feet. It flies naturally at dusk, and is distributed over the whole of the north-western counties, and in some places is not rare.

Crambus pascuellus, *Linn.*

Antennæ, brownish. *Palpi*, ochreous brown, darkest at the sides. *Head*, pale ochreous. *Thorax*, pale ochreous; shoulders ochreous brown. *Fore-wings*, glossy ochreous brown, slightly tinged with rust colour before the transverse line; a broad white streak from *costa* at base to beyond the middle is followed by a white blotch, an angulated transverse white line before the hind margin, and two white spots at tip; veins and inner margin generally streaked with white; blotch at anal angle dark gray; fringes glossy. *Hind-wings*, pale gray, fringes and inner margin very pale. *Abdomen*, pale gray. *Legs*, ochreous brown. Expands about 23 mm.

Occurs in June and July. Frequents wet meadows, edges of woods, and damp heaths and bogs. Flies naturally at dusk, and is local and rather rare in Scotland. It has been found in the counties of Aberdeen, Forfar, and Perth.

Section III.—Fore-wings unicolorous, or nearly so, with a pure white longitudinal streak.

a. Palpi, head, and thorax dark brown. *C. furcatellus.*
b. Palpi, head, and thorax white. *C. margaritellus.*

Crambus furcatellus, *Zett.*

Antennæ, dark brown. *Palpi*, brown, paler towards base. *Head*, dark brown. *Thorax*, dark brown, or dark chocolate brown. *Fore-wings*, dark brown, chocolate brown, or dark brown with an ochreous tinge; a pure white streak

from centre of base to near the centre of outer margin, outer half broadest, and lower edge serrated; fringes pale, almost white. *Hind-wings*, dark brownish gray, fringes paler. *Abdomen*, dark brownish gray, anal tuft slightly ochreous. *Legs*, ochreous brown. Expands about 22 mm.

Occurs in July. Frequents grassy mountain slopes at from 2500 to 4000 feet. Flits about over the grass on quiet, warm, sunny days. It is local, but not rare where it occurs. I have taken it on several of the mountains near Braemar. also on the Glen Shee and Perthshire hills at a high elevation, It is recorded from the counties of Argyll, Perth, Inverness, Forfar, Aberdeen, Elgin, Ross, and Sutherland. The larva is said to feed under the club-moss. Probably it also feeds on other species of moss, as club-moss is not always present where *furcatellus* occurs.

Crambus margaritellus, *Hb.*

Antennæ, ochreous white. *Palpi*, white, or dirty white. *Head*, white. *Thorax*, white, shoulders pale brownish ochreous. *Fore-wings*, brownish ochreous, or dark brownish ochreous; a broad white streak from near the costa at base almost reaches the hind margin; streak broadest beyond the middle. *Hind-wings*, pale gray, with a slight glacious tinge. *Abdomen*, pale gray, anal tuft slightly ferruginous. *Legs*, whitish ochreous. Expands about 24 mm.

Occurs in July and August. Frequents wet moss and damp woods. Flies naturally about sundown and dusk. Although local, it is widely distributed in Scotland, and is common where it occurs.

Section IV.—Fore-wings with a pure white interrupted longitudinal streak.

a. The streak with one interruption. *C. pinetellus.*
b. The streak with two interruptions. *C. myellus.*

Crambus pinetellus, *Linn.*

Antennæ, yellow ochreous. *Palpi*, white above and below, brownish ochreous at the sides. *Head*, white. *Thorax* white, shoulders yellow ochreous. *Fore-wings*,

yellow ochreous or brownish ochreous, clouded towards the costa and hind margin with dark brown; a broad pure white streak from base to near the hind margin is interrupted in the middle by an oblique transverse bar of dark brown; fringes darker than ground colour. *Hind-wings*, very pale grayish. *Abdomen*, almost white, with a slight ochreous tint. *Legs*, white, or white with a tinge of ochreous. Expands about 24 mm.

Occurs in July and August in or near fir woods. Flies naturally at dusk; easily found at rest with a light. It is widely distributed, but rather local, and is not common in Scotland. "The larva lives in a silken web amongst the tufts of grass on which it feeds; it hybernates and pupates in a cocoon amongst its food."

CRAMBUS MYELLUS, *Hb.*

Antennæ, dark brown. *Palpi*, pure white on the upper surface, dirty white below, and dark brown at the sides. *Head*, pure white. *Thorax*, pure white, shoulders ochreous brown. *Fore-wings*, rich ochreous brown, darkest towards the tip and hind margin; a broad white streak from base to near the hind margin is interrupted in the middle, and near the outer edge, by oblique chocolate brown bars. *Hind-wings*, very pale gray, darker towards the hind margin, fringes pale. *Abdomen*, same colour as hind wings. *Legs*, white, with a tinge of ochreous. Expands about 26 mm.

Occurs in July and August on moors and near the edges of woods. Flies naturally for a few minutes on quiet, warm evenings at dusk. Mr. Webb of Dover, writing under date 28th November 1890, in answer to an inquiry of mine, says: "The first British specimen of *Crambus myellus* was captured sitting on a grass culm in a pouring rain (and another seen) by Mr. N. Brown, then curator to Mr. Wilson Saunders, on a hillside about three hours' walk from Aberdeen, and brought to me to identify the following week as a doubtful *C. pinetellus*. From the British Museum collection, I quickly ascertained its name, and it was exhibited at the Linnæan and London Entomological Societies by Mr. Saunders's son as new to Britain." Since then it has been found in a number of different localities comprised

within the counties of Aberdeen, Perth, Elgin, and Kincardine. It has been found in fair numbers in Perthshire for several years. Aberdeenshire can also show a long array of records. I had sixty specimens on my setting boards last year (1892); and it has been taken regularly in the place where I found mine for the last five years. "The larva feeds in silken galleries under moss on stones, in which galleries it hybernates, pupating the following May." From what I have seen of the localities where *Myellus* is found, I do not think that it is necessary there should be stones below the moss. I think it may probably feed *among* the moss.

Section V.—Fore-wings with, or without, a more or less distinct longitudinal streak, and generally two transverse lines.

a. First transverse line very indistinct. *C. tristrellus.*
b. Both transverse lines distinct. *C. inquinatellus.*
c. Lines sharply angulated at costa. *C. geniculeus.*

Crambus tristrellus, *Fb.*

Antennæ, yellow ochreous. *Palpi*, yellow ochreous. *Head*, yellowish, yellow ochreous, or ochreous brown. *Thorax*, different shades of ochreous, or ochreous brown. *Fore-wings*, pale yellowish, yellow ochreous, ochreous brown, or dark brown with an ochreous tinge; very variable in shade and depth of ground colour, costal portion darkest; a more or less distinct white streak from base to outer margin; an angulated transverse line before the centre of wing,—this line is often only to be distinguished by a dark spot on fold,—and an angulated transverse line near outer margin; veins generally paler. *Hind-wings*, glaucous gray or pale gray, fringes paler. *Abdomen*, pale whitish ochreous. *Legs*, pale ochreous. Expands about 27 mm.

Occurs in July and August among rough herbage. Flies naturally at dusk and by night, and is an abundant species almost everywhere. It is the largest *Crambus* found in Scotland. "The larva feeds on grasses in a vertical silken tube, and pupates amongst the roots after hybernating."

Crambus inquinatellus, *Schiff.*

Antennæ, grayish brown. *Palpi*, pale ochreous brown or dark brown. *Head*, ochreous brown, very pale. *Thorax*, pale ochreous. *Fore-wings*, grayish brown; veins and outer half of costa pale ochreous or pale yellowish; streak very indistinct, hardly to be distinguished from veins; two transverse angulated lines, one before and the other beyond the middle; fringes grayish brown. *Hind-wings*, gray, with pale fringes. *Abdomen*, pale ochreous. *Legs*, pale ochreous brown. Expands about 24 mm.

Occurs in July and August in fields, waste places, and heaths. It has been taken as far north as Perthshire, but is most abundant in the south. I never saw it alive. "The larva feeds on the surface of the ground in silken galleries, upon various species of grass."

Crambus geniculeus, *Haw.*

This species *is said* to have been taken in Scotland. I cannot find an authentic record, and am unable to describe it, as I have never seen a Scotch specimen.

Section VI.—Fore-wings pearly white or ochreous brown.

a. Fore-wings pearly white. *C. perlellus.*
b. Fore-wings pearly white; veins dark brown, sometimes almost black. Var. *Warringtonellus.*
c. Fore-wings pale ochreous. *C. culmellus.*

Crambus perlellus, *Scop.*

Antennæ, white or ochreous white. *Palpi*, white or pale ochreous. *Head*, white, or dirty ochreous white. *Thorax*, white, or ochreous white. *Fore-wings*, pearly white, sometimes with a dirty ochreous tinge. A brownish longitudinal dash from the base near costa to near the hind margin *Hind-wings*, pale grayish, darkest towards tip; fringes pale. *Abdomen*, pale grayish. *Legs*, dirty ochreous white. Expands about 26 mm.

Occurs in July on dry pastures and coast sand-hills. Flies naturally by day in the bright sunshine, and at dusk.

It is widely distributed, but local in Scotland. The variety *Warringtonellus* has the veins dark brown. It is more abundant in Scotland than the type. I have seen it flying in dozens on the Culbin Sands, near Forres, on bright, warm, sunny days. "The larva feeds in perpendicular tubular galleries on *Aira flexuosa* and other hard grasses. It hybernates and pupates the following spring in a cocoon half sunk in the earth."

Crambus culmellus, *Linn.*

Antennæ, ochreous brown. *Palpi*, ochreous brown. *Head*, ochreous. *Thorax*, pale ochreous. *Fore-wings*, pale ochreous, the costal half and fringes darker, veins generally paler than ground colour. *Hind-wings*, gray, or dark gray; fringes slightly paler. *Abdomen*, same colour as hind-wings. *Legs*, ochreous brown. Expands about 18 mm.

Occurs in June, July, and August. It is an abundant species almost everywhere. Flies naturally on dull, quiet days, and at dusk. "The larva lives in upright silken tubes among the tufts of grass on which it feeds, and forms a cocoon in its tube for pupation."

Section VII.—Fore-wings ochreous brown, veins lighter, with a transverse angulated line near hind margin. *C. hortuellus.*

Crambus hortuellus, *Hb.*

Antennæ, dark brown. *Palpi*, dark brown, with an ochreous tinge. *Head*, dark brown. *Thorax*, dark brown. *Fore-wings*, whitish ochreous brown, ochreous brown, or dull dark brown. Very variable in depths of colour. Veins generally distinctly paler than ground colour; a bluish white angulated transverse line near hind margin; fringes glossy. Expands about 20 mm.

Occurs in July. Frequents grassy places, and is common in many parts of Scotland. I know very little about its habits; all I have seen were flying about on quiet, warm days. "The larva occurs amongst the roots of grass in fields, inhabiting a silken tubular gallery."

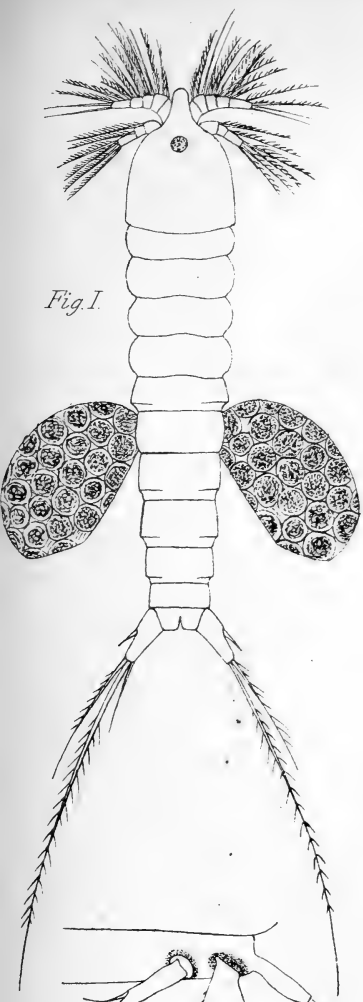


Fig. I.

Fig. V.

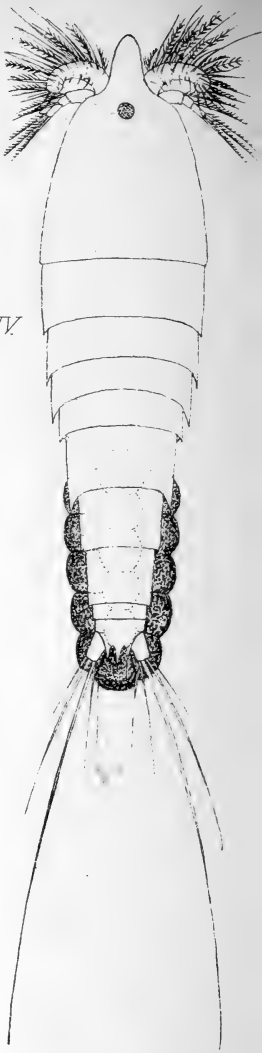


Fig. IV.

Fig. II.

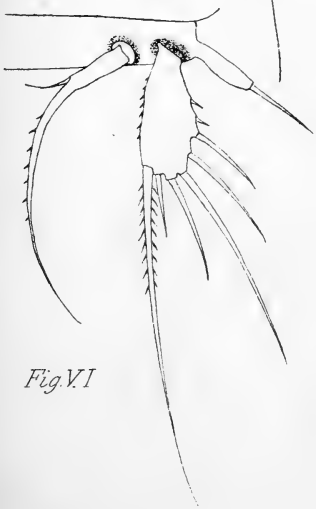


Fig. VI

Fig. III.

Figs. I.-III. CANUELLA PERPLEXA *Sp. n.* Figs. IV.-VI. LONGIPEDIA CORONATA. *Claus*

NOTES ON COPEPODA FROM THE FIRTH OF FORTH: *LONGIPEDIA CORONATA*, CLAUS; AND A PRELIMINARY DESCRIPTION OF AN APPARENTLY NEW GENUS AND SPECIES.

By Thomas Scott, F.L.S.,
Naturalist to the Fishery Board for Scotland,

and Andrew Scott.

Plate II.[1]

Longipedia coronata, Claus, is one of the most beautiful as well as one of the most common of the Copepoda in the British Seas, and has long been familiar to us.

It belongs to the *Harpacticidæ*, a family not only very extensive, but which also includes many interesting and curious species. As regards distribution, *Longipedia coronata* is to be obtained in a great variety of places, and at very various depths; it usually lives on or near the bottom, and is thus much more frequently obtained in materials collected by means of the dredge than in tow-net gatherings. Its favourite habitat seems to be among the zoophytes and weeds of the littoral and coralline zones.

Though many hundreds of specimens have passed through our hands, especially during the last few years, so that its appearance has become familiar to us, we have nevertheless had our suspicions occasionally aroused as to whether there were not really two species mixed up together under the name *Longipedia coronata* as understood by British Carcinologists. On several occasions during the past few years a partial investigation has been made by us for the purpose of ascertaining whether there were really two species or not; but from want of time, or from some other cause, no satisfactory solution was arrived at. On referring to some of the literature dealing with the Copepoda, it was ascertained that a certain amount of dissatisfaction had been expressed by various authors with the diagnosis of *Longipedia coronata* as given in "Die freilebenden Copepoden" and in the "British

[1] This plate will be issued with the July number.

Copepoda." Geisbrecht[1] in 1882 pointed out some of the doubtful characters in the description of this species in both the works named, but he apparently failed to realise the important significance of the characters he had called in question. In a capital work by Dr. Eugene Canu lately published, entitled "Les Copepodes du Boulonnais," that author again calls in question the accuracy of the description of *Longipedia coronata* in these same two monographs, but ascribes the error, in the one case to a young male having been described for an adult, and in the other case to a misunderstanding as to the sexes. The following are Dr. Canu's remarks: "Formes jeunes très fréquentes et peut-être plus nombreuses dans une même pêche que les adultes; ce que pourrait expliquer les méprises faites par Claus (jeune ♂ décrit pour l'adulte) et Brady (confusion entre les deux sexes ♀ immatures) et relevées par Geisbrecht."[2] Dr. Canu has thus evidently missed the true explanation of the difference between the so called "male" and "female" forms; at least so far as regards the description of *Longipedia* in "British Copepoda."

A short time ago one of the writers of the present remarks (Andrew Scott), while examining a quantity of material dredged in Largo Bay, Firth of Forth, in 1891, observed as usual both forms of *Longipedia coronata*—*i.e.* "males" and "females"; he also observed that some of the "males" carried one ovisac! and one or two of the "females" two ovisacs! This discovery naturally led to further inquiry being made, with the result that two distinct species of Copepoda were found to have been mixed up under the one name, the so-called "male" being the true "female" of the *Longipedia*, while the so-called "female" was found to be the female of a new and distinct species, for which we have had to provisionally institute a new genus. Both males and females of this new species have now been obtained. A preliminary description of the true *Longipedia coronata* and of the new species is given below. Full descriptions (with drawings) are being prepared for the Annual Report of the Fishery Board for Scotland, to be published during the summer.

[1] "Die freilebenden Copepoden der Kieler Föhrde."
[2] "Les Copepodes du Boulonnais" (1892), p. 146.

LONGIPEDIA, *Claus.*

Longipedia coronata, Claus, Plate II., Figs. 4-6.

1863. *Longipedia coronata*, Claus, "Die freilebenden Copepoden," p. 110, t. xiv.

1880. *Longipedia coronata*, Brady (in part), "Mon. Brit. Copep.," vol ii. p. 6, Plates XXXIV and XXXV.

Female.—Secondary branch of posterior antennæ nearly as long as the primary branch, six-jointed, all the joints rather longer than broad. Inner branches of second pair of swimming-feet in both sexes conspicuously elongate, being much longer than the outer branches, or fully two and a half times longer. Fifth pair of feet foliaceous: those of the female consist of a moderately long inner segment, obovate in outline, bearing three setæ of moderate length and two very small ones on the outer distal margin, and one long and two short terminal setæ; a long stout and curved seta with a minute hair, arising from its inner aspect and near the proximal end, springs from the inner part of the basal joint; this spine-like seta is distinctly articulated to the basal joint. The rounded posterior dorsal margin of the last abdominal segment bears three spiniform processes, the central one large and easily observed, the lateral ones smaller. The postero-lateral angles of the cephalo-thoracic and abdominal segments acutely angular. Caudal stylets short, slightly divaricate. Length, 1·5 mm. ($\frac{1}{17}$th of an inch). One ovisac.

One of the most prominent characters of this species, and one by which it is readily distinguished, is the very long inner branches of the second pair of swimming-feet.

Longipedia coronata is common all over the Forth, and especially so off Musselburgh.

CANUELLA,[1] gen. nov., provisional name.
LONGIPEDIA, Brady (in part).

Anterior antennæ less robust and less plumose than those of *Longipedia coronata*, five-jointed, first and second

[1] So named by us in compliment to Dr. Eugène Canu, author of "Les Copepodes du Boulonnais."

joints large. Posterior antennæ somewhat similar to those of *Longipedia*, but the secondary branch is shorter, the width of the joints being greater than the length. Mouth organs similar to those of *Longipedia*. Both branches of each of the first four pairs of swimming-feet of about equal length, and, with the exception of the second pair, somewhat like those of *Longipedia*; the first joint of the inner branches of the second pair very short, and armed with a stout conical spine about equal in length to the second joint (Fig. 2). Fifth, in both sexes rudimentary, consisting of a small basal joint, bearing in the female four setæ, one of which is rather longer than the others, and densely plumose (Fig. 3). The first and fourth segments of the abdomen without spinous armature. Caudal stylets about equal in length to the two last abdominal segments, and considerably divergent. The animal is more slender than *Longipedia coronata*, and the postero-lateral angles of the cephalo-thoracic and abdominal segments are rounded (Fig. 1). Ovisacs two, large.

One of the most conspicuous differences between *Canuella* and *Longipedia* is in the structure of the second pair of swimming feet. In *Longipedia* the inner branches of the second pair are greatly elongated in both sexes, and form one of the distinctive characters of the genus, the name of which has also reference to this character. In *Canuella*, on the other hand, both branches are of about equal length in both male and female, and the fifth feet are rudimentary. Therefore, notwithstanding the number of important points in which the two forms agree, the differences described clearly separate the one from the other; and, moreover, while *Longipedia* has only one, *Canuella* has two ovisacs.

Canuella perplexa, sp. n. (provisional name) Plate II. Figs. 1-3.

1880. *Longipedia coronata*, Brady (fem.), "Brit. Copep." vol. ii. p. 6, Plate XXXIV. Figs. 3, 9; Plate XXXV. Figs. 1, 3, 9.

The characters of the genus are applicable to the species, and therefore need not be repeated, this species being the only one known. Length, 1·4 mm. ($\frac{1}{18}$th of an inch).

Additional Notes.—(*a*) Males and females of a small (?)

variety of *Longipedia* were observed after the above Notes had been prepared. This variety agrees in size and with the detailed figures and description of *Longipedia coronata* in Dr. Geisbrecht's work on the free-living Copepoda of Kiel Föhrde, but differs from the description and figures of the "male" in "British Copepoda," and from *Longipedia coronata*, partially described and figured in the present Notes, in the following particulars, viz :

(1st) In the armature of the first pair of swimming-feet being more slender ; (2nd) in the outer branches of the second pair being proportionally longer. The two first joints of the outer branch are about equal in length to the two first joints of the inner one, and the large spiniform seta on the outer edge of the long third joint of the inner branch has a position nearly intermediate between the two smaller setæ on the inner edge; and (3rd) the middle lamellæ of the fifth pair of feet in the female are much narrower and more elongate. These differences, so far as we can make out, appear to be constant. For the purpose of provisionally distinguishing this variety, we propose to call it variety *minor*. Length of variety, ·85 mm. ($\frac{1}{29}$th of an inch). On the other hand, the form partially described here as *Longipedia coronata* (type) agrees practically in size and in structure with the so-called "male" of *Longipedia* described in "British Copepoda" and in "Die freilebenden Copepoden," while that described here as *Canuella perplexa* agrees in structure with the so-called "female" of *Longipedia* in "British Copepoda." We have not seen Boeck's description, and are unable to say which of the forms now referred to agrees with that described by him.

(*b*) In 1867 M. Hesse recorded[1] a new Copepod (*Sunaristes paguri*) living as a commensal in the same shell with *Pagurus* (a kind of hermit-crab), and which in some respects agrees with the form described by us here as *Canuella perplexa*, but differs from it in the following important points. The first abdominal segment in the female is "aussi long que les quatre autres ; il est séparé du thorax par un espace assez écarté et arrondi qui facilite les mouvements du corps," and each of the two ovisacs "forment un ovale très-allongé et

[1] "Ann. Sc. Nat. (Zool.)," 5th series, vol. vii. p. 205, Plate IV. Figs. 11-25 ; also *op. cit.* p. 211.

sont presque pointus des deux bouts. Ils sont attachés, par leur extrémité supérieure et par un pédicule, au bord inférieur du dernier anneau thoracique, et leur longueur égale celle de l'abdomen." There also appear to be important differences in the structure of the mouth appendages and swimming-feet in both sexes. *Sunaristes* is also much longer than our species, being "5 millimètres de long" (? including tail setæ). The habitat is quite different, for the *Sunaristes* "sont les compagnons intimes des *Pagures*, et c'est avec la plus grande peine qu'on peut les en séparer, non qu'ils soient fixés sur eux comme le sont leurs parasites, mais par leur adresse à se cacher dans l'intérieur, ou en dessous des coquilles que ceux-ci habitent."

In 1884 Dr. Wilh. Müller described[1] a large Copepod (*Longipedina paguri*) that he had discovered living with *Pagurus bernhardus*. This is considered by Dr. Canu to be the same as the *Sunaristes* of M. Hesse; it also resembles, even more closely than *Sunaristes*, the form now described by us.

After a careful study of the descriptions and figures of *Sunaristes* and *Longipedina* we find that, if both authors are correct, the difference in their descriptions and figures are scarcely reconcilable, and appear to refer to different species; and further, the difference both in respect of structure and habitat between both of these and the species described by us is apparently so considerable that we prefer for the present to consider the Forth species as distinct from both. *Canuella perplexa* is, so far as we know, a free-living Copepod, and is not associated in any way whatever, as commensal or parasite, with any other animal.

Explanation of Plate.

Canuella perplexa, gen. et sp. n.

Fig. 1.	Adult female	× 46·6
„ 2.	Foot of second pair	× 126·5
„ 3.	Foot of fifth pair	× 760

Longipedia coronata, Claus.

Fig. 4.	Adult female	× 46·6
„ 5.	Foot of second pair	× 84·0
„ 6.	Foot of fifth pair, female . . .	× 190

[1] "Archiv für Naturgesch." Jahrgang 50, Erste Band, p. 19, Plate III.

RECORDS OF SCOTTISH PLANTS FOR 1892, ADDITIONAL TO "TOPOGRAPHICAL BOTANY," Ed. 2, 1883.

By Arthur Bennett, F.L.S.

When these records were first undertaken in 1886, it was thought that when those for 1883 to 1886 were taken up and embodied (1849 records), the others that would have to be placed on record might occasionally tell up to 200 or a little more; but, contrary to this, the numbers have been 323, 688, 583, 225, 371, 306, and in this present one, about 180. At first it was intended that notes should accompany such species as seemed of interest; but the space occupied has quite forbidden such a wish being carried out, notwithstanding a very patient editor. Perhaps hereafter this may be done.

Personally, I should like to see these records carried on until we get a new edition of "Top. Botany." The number of counties to be filled up with Watson's "British types" is now very much reduced, and in the next year or so it may be allowable to make some observations on the census of these, and of some other of the more diffused types.

We do not progress much in the records of ascertained higher or lower limits of species in Scotland. This is a subject that should always be kept in mind, if we are to keep ahead of some of our Continental neighbours. The French botanists have been doing good work in this among the Jura Mountains lately; and the Irish botanists are also doing good work.

I have to record one plant on this occasion new to Scotland, *viz. Orobanche cruenta*, Bert. (*O. gracilis*, Sm.) For some years I have had a specimen of an *Orobanche*, named *O. elatior*, gathered in 1846, near Oban in Argyllshire; it has been a puzzle to me, until, last autumn, my friend Mr. Miller sent me some very interesting specimens of the genus from the Channel Isles, but too far gone to be able to dissect them. This made me resolve to try and clear up the Argyll specimen, which was certainly not *elatior*. I carefully

dissected it, and, by comparing it with Reichenbach's "Icones" and the Kew herbarium, made it out to be *O. cruenta*; and very troublesome they are, when dried, to make out. Other particulars will be found elsewhere in this Journal.

The sequence of the counties and the abbreviations are the same as before, *viz.* "Ann. Scot. Nat. Hist." = "Annals of Scottish Natural History," "J. B." = "Journal of Botany." Introduced species are marked with †. It may be that this sign is placed less frequently than it ought to be; but, when general rules fail to guide, local observers must be relied on.

72. Dumfries.

(Report for 1891. Transfer *Hordeum pratense* from 72 to 73, Kirkcudbright.)

The following additions to the county list are included in the "Dumfries Flora," in the "Transactions of the Dumfries and Galloway Natural History Society," on the authority of Messrs. Scott-Elliott and J. T. Johnstone, as indicated by the initials after each species.

Hypericum dubium, *J. T. J.*
†Geranium pyrenaicum, *J. Shaw*, in "Dumfries Flora."
Euonymus europæus, *J. H. Dixon*, in "Dumfries Flora."
Vicia Orobus (confirmed), *J. T. J.*
Veronica humifusa, *J. T. J.*
Scutellaria minor, *Mr. Thomson.*
Salix stipularis, *J. T. J.*
Salix lapponum, *J. T. J.*
Cladium Mariscus, *S. E.*

The two following are inserted as extending records of vertical range:—

Cerastium glomeratum, at 2000 feet, *J. T. J.* (1050 feet is Watson's record).
Spergula arvensis, at 700 feet, *S. E.* (600 feet is Watson's record).

74. Wigtown.

All, except where specified, recorded by Mr. J. M'Andrew.

Hypericum hirsutum, *J. M'A.*, in Scott-Elliott's "Flora."
Lavatera arborea.
Malva rotundifolia.
Geranium dissectum, *ex. Newbould.*
Anthriscus vulgaris.

Carex remota.
Carex sylvatica.
Carex pendula.
Melica uniflora.

[Ceterach officinarum. There is an earlier record for this, "Near Wigtown, *Rev. Baillie*," in "Trans. Bot. Soc. Edin." 1863, p. 201.]

77. Lanark.

Hieracium gothicum, *J. T. Johnstone*, *l.c.*

79. Selkirk.

(*Fide Mr. Boyd, ex. Rev. E. S. Marshall*).

Berberis vulgaris.
Prunus Padus.
Rosa involuta.
Rosa mollis.
Rosa sepium, var.
Circæa intermedia.
Chrysosplenium alternifolium.
Cicuta virosa.
Symphytum tuberosum.
Utricularia "neglecta?"
Ulmus montana.
Orchis latifolia, *seg.*
Habenaria Conopsea.
Potamogeton pusillus.
Potamogeton Friesii? *sp.*
Potamogeton prælongus, *sp.*
Potamogeton natans.
Potamogeton polygonifolius.
Potamogeton plantagineus, *sp.*
Sparganium minimum.
Sparganium simplex.
Carex (chrysites) Œderi Auct. angl.,
Fide Rev. E. S. Marshall.
Ranunculus Drouettii.
Cardamine flexuosa.
Geum intermedium.
Rubus Radula.
Callitriche stagnalis.
Zannichellia palustris, *agg.*
Luzula multiflora.
Carex filiformis.

80. Roxburgh.

(*Rev. E. S. Marshall.*)

Utricularia neglecta, *sp.*

86. Stirling.

(*Col. Stirling* and *R. Kidston.*)

Ranunculus Lenormandi, *sp.*
Ononis spinosa.
Hieracium "pallidum, var. Smithii, Tausch."
Hieracium duriceps, Hanb., *sp.*
Veronica polita, *sp.*
Neottia Nidus-avis.
Convallaria majalis, *sp.*
Juncus Gerardi, *sp.*
†Sagittaria sagittifolia.
Potamogeton pusillus (Berchtoldii, Fieber), *sp.*
Triticum caninum, *sp.*
†Euonymus europæus.
†Melilotus officinalis.
†Dipsacus sylvestris.
†Centaurea scabiosa.
†Acorus Calamus.
†Apera Spica-venti.

(From record for 1891 delete *Glyceria maritima*, as on record previously.)

87. Perth, W.

Hieracium Sommerfeltii, Lindeb., *Rev. E. S. Marshall* in "Ann. Scot. Nat. Hist." 1892, p. 189.

88. Perth, M.

Hieracium prælongum, Lindeb., *Dr. F. B. White.*
Hieracium angustatum, Lindeb., *Dr F. B. White., ex.* Hanbury, "J. B." 1892.
Hieracium Sommerfeltii, *Rev. E. S. Marshall* in "Ann. Scot. Nat. Hist."

89. Perth, E.

(All reported by *Rev. E. S. Marshall.*)

Aquilegia vulgaris.
Polygala oxyptera.
Rubus villicaulis.
Hieracium flocculosum.
Salix "Smithiana."
Glyceria plicata, "extinct"? "J. B." 1884, p. 275.
Lastrea æmula.

90. Forfar.

(All reported by *Rev. E. S. Marshall*, except Lep. neglectum.)

Ranunculus Drouettii, *sp.*
Polygala oxyptera.
Lepigonum neglectum, *Trail* in "Ann. Scot. Nat. Hist." 1893.
Hieracium angustatum, Lindeb., *Hanbury*, "J. B." 1892.
Utricularia neglecta, *sp.*
Orchis mascula, at 2900 feet. (Watson's highest level is 1500 feet.)
Lastrea spinulosa.

91. Kincardine.

Lepigonum neglectum, Polygonum minus } *Trail* in "Ann. Scot. Nat. Hist." 1893, p. 53.

92. Aberdeen, S.

Stellaria nemorum, at 3000 feet, *Rev. E. S. Marshall.* (Watson's highest record was 1200 feet.)
Lepigonum neglectum, *Trail* in "Ann. Scot. Nat. Hist." 1893, p. 53.
Hieracium onosmoides, Fries, *Hanbury* in "J. B." 1892, p. 131.
Polygonum minus, *Trail* in "Ann. Scot. Nat. Hist." 1893, p. 53.
[Potamogeton perfoliatus, at 2300 feet, in Loch Brotachan, *Rev. E. S. Marshall.* This is not new to vice-county, but extends the vertical range, Watson's highest record being 1200 feet.]

93. Aberdeen, N.

Lepigonum neglectum, *Trail* in "Ann. Scot. Nat. Hist." 1893, p. 53.

96. Easterness (E. Inverness).

[Drosera intermedia should be deleted from 1891 report, as Mr. S. Grieve writes that the station "is just within V.C. 97," for which it was already on record.]

(The two at the head of subjoined list are recorded by *A. Somerville*, the remainder all by *Rev. E. S. Marshall.*

Viola canina.
Carex paniculata.
Cochlearia anglica.
Lepigonum salinum.
Rubus plicatus.
Rubus mucronatus.
Rubus villicaulis.
Rubus corylifolius.
Myriophyllum alterniflorum.
Œnanthe crocata.
Lactuca muralis.
Arctium nemorosum.
Carduus crispus.
†Veronica Buxbaumii.
Myosotis palustris, strigulosa.
Myosotis repens.
Atriplex littoralis.
Rumex Hydrolapathum.
Humulus Lupulus.
Betula pubescens.
Orchis latifolia, *seg.*
Ruppia rostellata.
Zostera nana.
Glyceria plicata.

[Vicia sepium at 1700 feet, *A. Somerville.* No maximum Scottish height is given in "Compendium of Cyb. Britannica."]

97. Westerness (W. Inverness).

Thalictrum maritimum, *S. M. Macvicar, sp.*
Ranunculus petiolaris, *E. S. Marshall.*
Ranunculus Steveni. *S. M. Macvicar, sp.*
Callitriche polymorpha, Lönn. ?
†Plantago media, *S. M. Macvicar, sp.*
Hieracium holosericeum.
Thymus Serpyllum.
†Populus alba.
†Populus canescens.
} *G. C. Druce* in "Ann. Scot. Nat. Hist." 1892, p. 178.

98. Argyll.

Hieracium Sommerfeltii, Lindeb.
Hieracium angustatum, Lindeb.
Hieracium submurorum, Lindeb.
} *Rev. E. S. Marshall.*
Vicia hirsuta, *P. Ewing, sp.*
Orobanche cruenta, Bert. (*Miss Harvey*, 1846).

99. Dumbarton.

Trientalis europæa, *Rev. Mr. Somerville*, 14th July 1889.

100. Clyde Isles.

Rubus villicaulis (*f.* M. Rogers), *T. King.*

104. Ebudes.

Hieracium onosmoides, Fr., *W. R. Linton*, ex *Hanbury*, "J. B." 1892, p.

105. Ross, W.

[Vicia hirsuta, delete "*Ewing*" and substitute *Druce* in "Record Club," 1880, p. 169.]
Hieracium prælongum, Lindeb., *Druce*.

106. Ross, E.

[1891 Report. Delete *Hieracium anglicum* and substitute *H. Langwellense*, Hanb., *fide* Marshall in litt.
Under Rosa rubiginosa delete *Marshall* and substitute *Druce*, "J. B." p. 356.
Delete *Cerastium tetrandrum*, *Spergularia marginata*, and *Veronica Buxbaumii*, as already on record.]

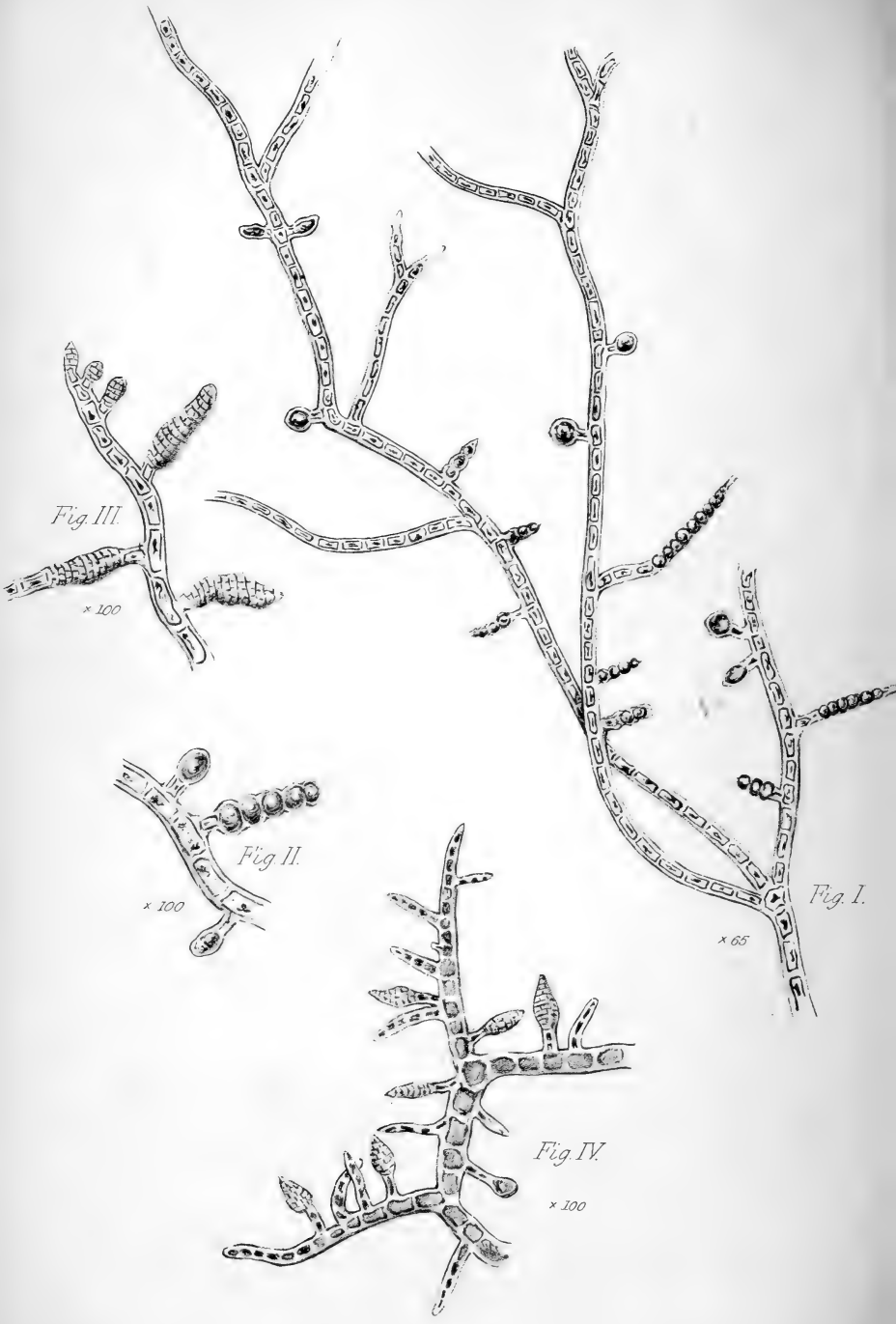
(*Fide Rev. E. S. Marshall*, except where specified.)

Cochlearia grœnlandica, *sp.*
Cochlearia anglica, *sp.*
†Senebiera didyma.
Lepidium Smithii.
Polygala eu-vulgaris.
Cerastium semidecandrum.
Rubus Radula.
Rubus diversifolius.
Agrimonia Eupatorium.
†Pyrus torminalis, *sp.*
Hieracium flocculosum, *Baily*, herb., *fide* Hanbury.
Hieracium strictum.
Hieracium boreale.
Hieracium auratum, Fr.
Hieracium onosmoides, Fr.
Petasites vulgaris.
Arctium intermedium, *f.*
Symphytum tuberosum.
Rumex viridis.
Potamogeton pusillus, *sp.*
Potamogeton rufescens, *sp.*
Potamogeton nitens, *sp.*
Potamogeton crispus, *sp.*
Typha angustifolia.
Zostera nana, *sp.*
Carex filiformis.
Aira uliginosa, *sp.*
Glyceria plicata, *f. sp.*
Bromus giganteus.
Bromus asper, *sp.*

107. Sutherland, E.

(Last 8 records *fide Mr. Henderson.*)

Cherleria sedoides, *Marshall* in "J. B." 1888.
Scirpus lacustris, Murray's "Northern Flora."
Carex pauciflora, *Graham*, as spec. to H. C. Watson.
Carex rigida, *Marshall*, in "J. B." 1888.
Arabis petræa.
Silene acaulis.
Cerastium alpinum.
Stellaria cerastoides.
Potentilla alpestris.
Saussurea alpina.
Azalea procumbens.
Polystichum Lonchitis.



E. Batters del

R. & R. Clark imp

Figs. I.-III. PYLAIELLA VARIA *Kjellm.* *Fig. IV.* ECTOCARPUS LANDSBURGII *Harv.*

108. Sutherland, W.

Cochlearia grœnlandica, L., *E. S. Marshall* in "Ann. Scot. Nat. Hist." 1892, p. 187.
(In our old manuals *C. grœnlandica* usually meant the *C. alpina* of the present day.)

109. Caithness.

Hieracium reticulatum, Lindeb., *Hanbury, sp.*

110. Outer Hebrides.

[1891 Report. Delete the following as on record, viz.: *Arabis, Orobus, Lysimachia, Polygonum, Listera cordata, Habenaria* (2), *Potamogeton pusillus, Carex pauciflora*, and *Pilularia.*]

(Recorded by *W. S. Duncan, sp.*)

Raphanus maritimus.
Alchemilla arvensis.
Centunculus minimus.
Juniperus communis.
Ruppia rostellata.
Carex distans, *f.*

THE OCCURRENCE OF *PYLAIELLA VARIA*, KJELLMAN, IN SCOTLAND.

By E. M. Holmes, F.L.S.

Plate III.

Under this name Kjellman described in 1883, in his "Algæ of the Arctic Sea" (p. 282), a plant which, although very variable in its characters, he considered to be distinct from *P. litoralis*, Kjellm. His description of the plant is as follows:

"*P. thallo* racemoso-ramoso, ramis sub angulo fere recto egredientibus duplicis generis, longioribus et brevissimis; his e singulis bis denis cellulis constructis, omnibus, vel saltem nonnullis, vulgo divisione vario modo peracta in zoosporangia vario modo disposita mutatis. Tab. 27, Figs. 1-12.

"The alga forms loosely complicated mats of a dark olive-brown, lying free on the bottom or hanging on larger algæ. I have not found attached specimens. The frond is repeatedly racemosely

branched, with distinct main axis, with branches of at least four orders. The branches are of two kinds: long branches with many cells, and short ones with from one to ten cells. The former are few in number, and issue partly alone, partly in pairs opposite to each other. The short branches are numerous; by these the present species is easily recognised from *P. litoralis*. In long parts of the frond such a branch issues from every cell. They are always isolated, and issue at a right or nearly right angle. The long branches are somewhat attenuated towards the tip, and generally end in some long hair-cells. The short branches are cylindrical or slightly claviform, with an apical cell rich in endochrome, which cell is finally transformed into a zoosporangium.

"The cells of the frond are usually short, cylindrical, or slightly tun-shaped, equally or even twice as long as thick. The cells which give rise to a long branch are commonly short. If a short branch issues from a cell which is longer than thick, as is often the case, the branch is almost always placed at the middle of the longer wall. The thickness of the principal axis is about 80μ. With the exception of the hair-cells, all the cells are rich in granular, equally distributed endochrome. The development of the zoosporangia, and their arrangement thereupon, are subject to very great variations. The zoosporangia are sometimes arranged as in *P. litoralis*. In a modification of this type all the cells, not only the ultimate ones, are transformed into zoosporangia. Sometimes only the apical cell becomes a zoosporangium, and the branch is composed of one or more cells. It also often happens that a greater or less number of cells are divided by longitudinal or oblique walls, and that it is the secondary cells produced by this division that are developed into zoosporangia. In this case the division of the cells and the development of the zoosporangia sometimes take place in such a manner that the zoosporangia become arranged in whorls."

The above description applies exactly to a seaweed which I detected in a parcel of specimens collected in Cromarty Firth, and forwarded to me last year by Mrs. M. Farquharson of Meigle. It formed dark brown, dense, entangled rope-like tufts, and by reason of the short horizontally patent ramuli, it was distinguishable at once from the ordinary forms of *Pylaiella litoralis*, Kjellm., which were present in the same parcel. The latter could easily be spread out naturally in sea water, but with *P. varia* it was impossible to do so, owing to the felting of the ramuli. The plants were abundantly fruited, having unilocular zoosporangia: sometimes in a short moniliform series of four or five, formed at the expense of one of the short lateral ramuli, and

sometimes only the terminal cell was developed into a zoosporangium. By this fruit it is at once distinguished from *Ectocarpus distortus*, Harvey, which it so exactly resembles in habit that by the naked eye it would be almost impossible to say to which species a plant might belong.

The occurrence of *P. varia* on the coast of Scotland is interesting for three reasons :

1. It is one more addition to a numerous series of the algæ of Scandinavia that have been detected on the coast of Scotland, in consequence of a definite search for Norwegian species which I started some years since, and which has resulted in the discovery in Scotland of a large number of species new to the British Flora by several algologists, more especially Mr. G. W. Traill of Edinburgh and Mr. E. A. L. Batters.

2. It is one of the forms characteristic of species growing amongst *Zostera* roots, in water comparatively still and less saline than ordinary sea water. Under such conditions there appears to be a tendency to the horizontal development of shorter branches, as in *Ectocarpus distortus*, *E. Landsburgii*. *Sphacelaria cirrhosa*, var. *patentissima*, *Halopteris filicina*, f, *patens* (*S. Sertularia*, "Phyc. Brit."), and *Laurencia obtusa*, Lamx., f. *crucifera*, Hauck.

3. It is variously described by different algologists : by some as a species, and by others as a variety.

Dr. Kjellman, who first published it as a distinct species, still maintains its specific rank in the "Handbok i Scandinaviens Hafsalgflora" (1890), p. 83.

Dr. Kuckuck, in an inaugural dissertation entitled "Beitrage zur Kenntniss einiger Ectocarpus Arten der Kieler Forde," degrades it to a sub-species ; considering that *Pylaiella litoralis* consists of a series of forms (*formenkreis*), modified according to the circumstances under which it grows. This species he divides as follows :

Pylaiella litoralis, Kjellm.

Sub-species *a*, oppositus.

f. *typica*, Kuck. (*E. firmus* f. *vernalis*), "Aresch. Alg. Scand. Exs." Fasc. 4, No. 173.

f. *subverticillata*, "Kütz. Tab. Phyc." 5, t. 77, fig. 11.
f. *rupincola*, "Kütz. Tab. Phyc." 5, t. 76, fig. 1.
f. *rectangularis*.

Sub-species β, firmus, Kuck.
f. *typica*, "Wyatt, Alg. Danm." No. 129.
f. *subglomerata*.
f. *livida*.
f. *pachycarpa*.

Sub-species γ, divaricatus, Kuck.
f. *ramellosa* "Kutz. Tab. Phyc." 5, t. 78.

Sub-species δ, varius, Kuck.
f. *typica*, "Kjellm. Alg. Arct. Sea," t. 27. figs 1-12.
f. *contorta*.
f. *pumila*.

Kjellman, on the other hand, divides *P. litoralis* into three varieties and several forms, as follows:

Var *a*, opposita, Kjellm.
f. *rupincola*, "Aresch Alg. Scand. Exs.," No. 113.
f. *elongata*.
f. *crassiuscula*.
f. *nebulosa*.

Var. β, firma, J. Ag.
f. *olivacea*, Kjellm.
f. *macrocarpa*, Fosl. "Nye Hafsalg." 5, t. 2, figs. 13-15.
f. *parvula*, Kjellm.

Var. γ, divaricata, Kjellm.
f. *prætorta*, Kjellm.
f. *ægagropila*, Kjellm.
f. *subsalsa*, Kjellm.

None of these, except f. *rupincola*, are identified by Kuckuck with the forms described by him.

The limit of a species doubtless forms a very vexed

question ; but it seems desirable, for the sake of convenience, that when two plants differ in habit and mode of growth and development so much as do *P. litoralis* and *P. varia*, and retain their characteristics in different countries, they should be kept distinct, as, for example, is done in the *Rubi*, *Salices*, and *Hieracia*, amongst Phanerogams. If Dr. Kuckuck's plan were followed, there would be little reason for holding *Ectocarpus distortus* and *E. Landsburgii* distinct from *E. tomentosus*, Lyngb. The plurilocular fruits borne on specimens of *E. Landsburgii* sent me by Mr. D. Robertson of Cumbrae, and those of *E. distortus* collected by myself at Fairlie in Ayrshire, show so great a resemblance to those of *Ectocarpus tomentosus* that I see no reason why they should not both be considered as sub-species of that plant, more especially as the differences in ramification and in the size of the zoosporangia are not greater than exist between *P. litoralis* and *P. varia*. A careful search on the west coast of Scotland would doubtless reveal an intermediate series of forms connecting the three plants *E. tomentosus*, *E. distortus*, and *E. Landsburgii*.

It may be noted in this relation that Dr. Kjellman identifies the *E. Landsburgii* of Dickie, "Alg. Suth," i. p. 142, with *Pylaiella varia*. But it has not been shown that Dickie correctly referred this plant to *E. Landsburgii*. Dr. Kjellman says of the gametes of *P. varia* that they are unknown ; but Dr Kuckuck describes both the unilocular and plurilocular zoosporangia (gametes) of his *P. litoralis*, f. *varia*.

Description of Plate III.

Fig. 1. *Pylaiella varia*, Kjellm., from Cromarty Firth, with unilocular sporangia.

„ 2. The same more highly magnified.

„ 3. With plurilocular sporangia.

„ 4. *Ectocarpus Landsburgii* from Cumbrae, with plurilocular sporangia.

ON SCOTTISH DESMIDIEÆ.

By John Roy, LL.D.

In the following pages an attempt is made to bring the knowledge of "Scottish Desmidieæ" up to date, and to indicate their distribution throughout the country. From their very nature, both subjects must necessarily be imperfect. The northern and midland counties have been fairly well examined, some of them very well, but we have almost no information from south of the Firths of Forth and Clyde, except from Renfrew, Bute and Arran, and Kirkcudbright.

No attempt has been made to give the distribution of species in altitude. This cause does not appear to exercise any great influence on their distribution, most species seeming to be found both at high and low altitudes. A very few species seem to cling to marshes formed by melting snow, where it lies late into the summer and autumn, from 3500 feet upwards. *Cosmarium nasutum*, Nord., and *Staurastrum Kjellmanii*, Wille, may be cited as typical examples of these.

Perhaps the most marked influence in determining the number of species in a district is its geological formation. Granite appears to be the most favourable, limestone less so, and sandstone very poor. Hence the basin of the Dee, in Aberdeen and Kincardine, which is almost wholly granite, has turned out well, one marsh alone yielding about 300 species; while in Strathmore, on sandstone, it is seldom possible to get more than forty or fifty species in a gathering, and usually not nearly so many. Sometimes, however, in these scanty gatherings, a little patience reveals a rarity: *e.g. Cosmarium biretum*, Breb., var. *supernumeraria*, Nord., at Keithick, near Cupar Angus; and *Cosmarium subortogonum*, Raciborski, at Ballendoch, near Alyth. The direction of the watershed of a country has also something to do with distribution, though probably not so much as was at one time supposed, and certainly not nearly so much as it has in the case of flowering plants. In Scotland the chief watershed runs from north to south, giving rise to an Atlantic and Germanic slope. Almost the only species known at present

to be confined to the Atlantic slope are *Euastrum divaricatum*, Lund., *Staurastrum bidentatum*, Wittr., *St. setigerum*, Cleve, and *St. bifidum*, Ehr.; but a little further investigation may find these over the watershed, as it has found others. It must not be forgotten, however, that the western slope has not been searched with anything like the care bestowed on the eastern. Indeed, it has only been tapped at a few widely separated points: by myself in Sutherland, at Loch Inver; in Ross, at Poolewe, by Rev. D. Campbell; in Inverness, at Balmacarra, by Mr. Wills; and by myself in different localities in Skye; in Argyll, in Glen Coe, and about Oban, by Mr. Wm. Archer; in Mull, by Dr. Buchanan White and Mr. G. Ross; between Lochs Lomond and Long, by Dr. Watson; near the Kyles of Bute, by Mr. Wm. Anderson; in Bute and Arran, by Messrs. J. and J. P. Bisset; near Greenock, by Mr. T. Fisher; and near New Galloway, in Kirkcudbright, by Mr. M'Andrew. I have seen and examined gatherings from all these localities, except those made by Mr. Wills and Mr. M'Andrew. Mr. Wills examined his gatherings himself, and gave the results to Mr. W. Barwell Turner, Leeds, who kindly sent them to me. Mr. M'Andrew's gatherings were sent to Mr. Wm. West, Bradford, who very courteously placed the results, as well as those of numerous gatherings of his own, from various parts of the country, at my disposal. In "Eng. Fl." vol. v. pt. i., Captain Carmichael records five species from Appin, in the north of Argyll, and in Ralf's "Brit. Desmid." Rev. D. Landsborough records four species from Ayrshire; but in both cases the species recorded are quite common all over the country.

These few collections, though good in themselves, and exceedingly useful, are quite insufficient as a basis on which to found any reliable generalisations as to the frequency of the occurrence of species on the Atlantic side of the watershed as compared with the Germanic, or *vice versa*. A few rather notable species, which hitherto have proved western in other portions of our islands, have not as yet been detected in Scotland. These are *Micrasterias apiculata*, Ehr., and *M. brachyptera*, Lund., from Westmoreland; *M. furcata*, Ag., *Docidium nodosum*, Bailey, *Staurastrum Ophiura*,

Lund., *St. brasiliense*, Nord., *forma*, Lund., from North Wales, and from Connemara in Ireland; and *St. verticillatum*, Arch., from Connemara. The entire absence of these species is somewhat remarkable; but no doubt there is a fine field for the future investigator along our whole western slope. In passing, though it does not come directly in my way, I would remark on *St. brasiliense*. Lundell's form does not accord well with Nordstedt's Brazilian species bearing that name; but it does agree exactly with *St. multiconne*, Grunow, issued by Hilse in No. 2165 of Rabenhorst's "Algen Europas," in March 1870. It seems to me that Grunow's name should be adopted.

Perhaps it may be thought that some explanation of the terms expressing the distribution should be given. When the words "general" or "common" are used, it is to be understood that the species has been found in suitable localities in all the counties examined, though not occurring in every gathering, or in every district of a county. "Not common" implies that in many districts the species is awanting, or occurs sparingly. In this case a list of the counties from which it has been seen is given; and if it occurs very sparingly the localities are also added. When "rare," "very rare," etc., occur, it is to be understood that though the species may occur in more than one county, it may be in only one or two localities, and there very sparingly. Single examples of a species have been occasionally found, which no amount of searching has been able to detect again. *Onychonema læve*, Nord., is a remarkable instance of this. An unmistakable filament was once found in a gathering from a spot near Aboyne; but though that spot has been searched many times since, the *Onychonema* has not been seen again. Agricultural improvements, such as drainage, etc., account for the loss of some species. Several of our most productive localities on Deeside have been lost from this cause.

Exception may perhaps be taken to the alphabetical arrangement of species adopted in the following pages. I admit at once that it has nothing to recommend it except convenience. On this ground it was adopted when this work was begun a good many years ago; and now I shrink

from the labour involved in rewriting and rearranging the whole.

"Suitable localities" have been spoken of. It may be asked, What are suitable localities? They are of various kinds. Amongst the best are comparatively small permanent pools of clear water, a few square feet or yards in extent, with floating *Sphagnum* round their margins. The Desmids nestle among the *Sphagnum* leaves, and have to be squeezed out. Such localities often yield large numbers of species. In similar pools *Myriophyllum*, *Utricularia*, *Chara*, and *Nitella* will always be worth treating in the same way as *Sphagnum*. Occasionally the Desmids form small, pale, yellowish-green films on the mud at the bottom of pools, and can be taken up with a little care. It requires a little more care to strip the submerged stems of grasses, etc., between one's fingers, and to secure the stripped materials; but this process often yields very interesting results. Another *very* suitable locality is in tufts of moss growing on rocks and stones which are kept constantly moist. Many of our rarest and most beautiful species are found on such spots, from cliffs by the sea to high up on our mountains.

And here I must be permitted to enter a protest against a practice among writers on Desmids, more particularly in recent years. I refer to the multiplication of so-called varieties. Some species seem to have been specially fixed on for the application of this process. Take the case of *Cosmarium Meneghinii*, Breb., for instance. This tiny species has been so covered over with these *vars.* that it runs a risk of being crushed out of existence altogether. And yet the original form of Brebisson, as figured by Ralfs, and its zygospore figured by Mrs. Thomas in the "Quarterly Microscopical Journal," vol. iii., is surely a distinct enough species. But so, it seems to me, is De Bary's form, and so are several others. Now, if these forms maintain their individuality, and that they do so is undoubted, I fail to see the utility of crowding them together as *varieties*. Why not make species of them at once? The time will no doubt come when species will be largely reduced, but it has not come yet; neither will it be accelerated by the indiscriminate manufacture of varieties, and still less by what is worse, varieties

of varieties! Varieties are founded on slight differences of shape, or size, or of the degree of roughness or smoothness of the particular forms. But it is well known that many species vary greatly in size and roughness. Take the case of *Gonatozygon Brebissonii*, De Bary. This varies in surface from perfectly smooth without puncta to rough with granules, depending not a little, I believe, on the water in which it is found, and in size from the tiniest thing to 300μ long or more; but it is distinctly *G. Brebissonii* in all these variations. If there are no intermediate forms, I certainly prefer to call the extremes separate species.

There is another subject on which a remark may be permitted. It is in connection with the attempts—more or less successful, generally less—to divide some of the old genera into new. I confess to having a certain amount of sympathy with this movement, for the genera *Staurastrum* and *Cosmarium* are becoming very unwieldy. But however desirable a rearrangement would be, it seems to me that the present state of our knowledge does not admit of an arrangement on a strictly scientific basis being made. Any other would simply add to the confusion already existing. Before a scientific arrangement is possible, the Desmidieæ of the whole world must be much better known. Thanks to the few hard workers in this field, this knowledge is rapidly being gained.

In this paper I adhere mainly to Ralf's divisions. I decline to break up *Docidium* into *Docidium* and *Pleurotænium*. In dealing with species when the cells are empty, as they usually are in material sent from other parts of the world, how is the chlorophyll to help one? *Triploceras* is a very natural division; and I do not agree with Wolle in retaining it under *Docidium*.

Collections of material for examination are gratefully acknowledged from the following: *Shetland*, Mr. John Sim, who also sent many valuable gatherings from *Aberdeen* and *Kincardine*; *Orkney*, Mr. Cowan; *Caithness*, Mr. James Mitchell; *Ross (West)*, Rev. D. Campbell; *Ross (East)*, the late Dr. D. M. Fraser; *Ross* (from numerous localities about Strathpeffer, the Black Isle, etc.), Mr. and Mrs. Farquharson of Haughton; *Inverness* (Glen Urquhart), Dr. A. M'Gillivray;

Inverness (Brin, etc.), Mr. and Mrs. Farquharson ; *Inverness* (Cairngorm), Mr. A. I. M'Connochie ; *Nairn*, Mr. and Mrs. Farquharson ; *Banff*, Rev. Dr. Gregor ; *Aberdeen*, Dr. Walker, Mr. G. Sim, Mr. Wm. Anderson, Col. Ch. Leith-Hay, Mr. and Mrs. Farquharson, Mr. J. P. Bisset, Mr. Alex. Kemlo, Rev. Dr. Davidson, Mr. J. Roy, jun., Mr. T. Roy, C.E., Miss H. J. Roy, and Mr. Wm. S. Duncan ; *Kincardine*, Mr. J. P. Bisset, Mr. Alex. Kemlo ; *Forfar*, Rev. Dr. Anderson, Rev. J. Fergusson, Mr. Scott, Mrs. Farquharson of Haughton, and Miss Aglon ; *Perth*, Mrs. Farquharson, Dr. F. B. White, Sir Thos. Moncreiffe, Mr. Wm. Rutherford, Mr. Alex. Croall, Messrs. J. P. and J. Bisset, Mr. Wm. Archer ; *Argyle*, Mr. Wm. Archer, Mr. G. Ross, Dr. F. B. White, Mr. Wm. Anderson ; *Fife*, Mrs. Farquharson ; *Stirling*, Mr. Alex. Croall ; *Dumbarton*, Dr. Watson ; *Renfrew*, Mr. Thos. Fisher ; *Bute* and *Arran*, Messrs J. P. and J. Bisset. Besides these I have notes of species found in *Inverness* by Mr. W. Wills ; *Breadalbane*, by Mr. H. G. Stewart ; in *Kinross*, by Mr. G. Lawson ; in *Kirkcudbright*, by Mr. M'Andrew ; and in various parts of Scotland by Mr. W. West, Bradford ; also notes of species found in *Banff*, *Aberdeen*, and *Kincardine* by Dr. Dickie and Mr. Peter Grant.

To Mr. J. P. Bisset my thanks are specially due for most valuable assistance in every part of the work. The drawings are wholly from his facile and accurate pencil.

Several matters which it has been found impossible to introduce are reserved for a supplement, including several species not seen by us. Any notes of species, distribution, etc., which may be received while the present portion of the work is being published will also be inserted there.

(*To be continued.*)

ZOOLOGICAL NOTES.

Water Shrew (*Crossopus fodiens*) **in the Isle of Kerrera.**—Having observed under the head of *Crossopus fodiens* in the "Fauna of Argyll and the Inner Hebrides" the statement that "as yet all endeavours to trace this species in any of the islands have utterly failed," it struck me that it might interest you to know that in 1836

I picked up, near Gylen Castle, in the Isle of Kerrera, two dead specimens of the above species. They were both males, and in very good condition, and were within a few yards of one another.—Wm. Borrer, Horsham.

Variations in the Field Vole (*Arvicola agrestis*).—It has been somewhat surprising, considering the untold myriads of Voles that have overrun the sheep pastures for a year or two past, that so few variations in colour have been reported. It is true that one observer stated in a communication to the Highland and Agricultural Society's "Transactions" that they were "of all colours," but the statement has been entirely uncorroborated, and I am afraid there was exceedingly little foundation in fact for the remark. I have not seen any noteworthy aberration amongst those I have seen in peregrinating through their haunts, but the shepherds have reported an occasional pied example. I have, however, a very strong impression that the "hill voles" are decidedly of a more smoky tint than those to be found in the lower lands amongst the hedges and plantations. The latter seem to develop a much ruddier colour on the fur along the back, and the general tone of gray seems much brighter than that of the Voles that have ravaged the upland pastures. A short time ago I received for examination a very fine variety of the Field Vole from Blackaddie. It is not an albino, although the fur, on a cursory examination, seems quite white from nose to tail. On blowing the fur tips aside it is seen that only about one-fifth of the length of each hair is white, the remainder being a very pale brown or fawn, but the fur being so close set it really appears to be all white. The eyes are not pink, as in every albino, but they are much paler than the normal eyes. The whiskers and the hairs on the tail are entirely white. This curious specimen is undoubtedly an example of the variation usually termed "leucotism." It would be interesting if we could hear of any specimen of the other striking variations known as "albinism" and "melanism."—Robert Service, Maxwelltown.

[Mr. Wm. Evans presented to the Museum of Science and Art, Edinburgh, a beautiful pale isabelline variety of this species, which was obtained near Hawick in December 1891.—W. E. C.]

The Wild Cat (*Felis catus*) **in Caithness.**—The local newspapers record the capture of a Wild Cat in the month of January 1893 by a gamekeeper (Andrew Steenson) at Rangay, Forse, in the parish of Latheron. It measured 3 feet 2 inches in length, and is described as being very fat and in good condition.—John Gunn, Edinburgh.

Common Dolphin (*Delphinus delphis*) **dredged off Mull.**—Mr. Cecil H. Bisshopp of Oban forwarded to me for identification a skull of this species, which had been obtained in Loch Scriden in the middle of November last. This Cetacean is perhaps an addition

to the fauna of "The Isles," for it is not recorded to have occurred in the "Fauna of Argyll and the Inner Hebrides."—WILLIAM EAGLE CLARKE, Edinburgh.

The Ring Ouzel (*Turdus torquatus*) **in winter in Perthshire.**—With regard to the appearance of this bird in winter in Galloway, as mentioned in the last issue of the "Annals" by Mr. Robert Service I may state that it is not only "in the mild West of Scotland" that the Ring Ouzel remains the winter, but that it has long been noticed as an occasional resident in the colder East of Scotland, namely, in Perthshire. Mr. P. D. Malloch says "that it sometimes remains all the year round in some of its habitats" ("Report on the Ornithology of the East of Scotland," 1886, H. M. D. H.), and in support of this I would mention that there is a ♀ specimen in the museum of the Perthshire Society of Natural Science in Perth, bearing date of 5th February 1882, as shot on the Ochils. This bird was sent in the flesh at the time for preservation to the museum by Mr. James Dow, Balmano.—H. M. DRUMMOND HAY, Perth.

Wheatear (*Saxicola œnanthe*) **in the Forth District in January.**—On 2nd January, while sitting in a shelter on the south side of Cramond Island, waiting for some duck that were drifting round with the tide, I was surprised to see a Wheatear alight on a stone on the rising ground behind me. It was within easy shot, but, trusting to get a chance later on, I did not fire, and so missed the only opportunity I had of securing it. In summer Cramond Island is a favourite haunt of this bird.—CHARLES CAMPBELL, Dalmeny Park.

Bluethroat (*Cyanecula*) **in Moray.**—On 15th September 1890, I saw at Hopeman, on the coast near Elgin, a Bluethroat. I followed the bird for some time, and with the aid of a strong telescope identified it beyond a doubt, though it would be impossible to say to which of the two forms it belonged.—H. BRINSLEY BROOKE, Forres.

Bohemian Waxwing (*Ampelis garrulus*) **in Scotland.**—During the months of January and February the Waxwing has occurred in many districts in Britain. The following occurrences have been recorded from Scottish localities so widely separated as Wick and Golspie (Sutherland), Inverewe (West Ross), New Pitsligo (Dee), Carse of Gowrie (Tay), Roxburgh (Tweed), and Mugdoch (Solway).

The "Dundee Advertiser" of 9th January records a specimen shot near Errol, in the Carse of Gowrie; and Mr. W. A. Brown, 2 Grosvenor Terrace, Dundee, writes that four more were seen and two shot between Dundee and Errol, shortly after the date of this paragraph. On 9th January one was shot near New Pitsligo, Aberdeenshire, by Mr. J. Burnett of Glasgow. The "Rod and Gun" of 4th February mentions a specimen received from Mr. George Lawson of Golspie by Messrs. W. A. Mackay and Sons,

Inverness: the first received by them for ten years. Mr. George E. Paterson, Ravenslea, New Kilpatrick, identified a bird seen on the roadside hedge, eating haws, at Mugdoch on 5th February as a Waxwing. On the 5th of February a female was captured alive at Wick, as we are informed, by Mr. Lewis Dunbar. Mr. Osgood H. Mackenzie of Inverewe, West Ross, writes under date 29th February: "We have had a Bohemian Waxwing here lately. I have been on the look out for rare birds here for over forty years, but have never before seen a Chatterer." Dr. Stewart of Chirnside informs us that Mr. Aitchison of Duns has lately received for preservation two specimens, one of which was obtained at Roxburgh.

Mr. George Sim sends the following records.—On the 2nd of January an immature specimen was shot near New Pitsligo. On 7th January, one, a female, flew into a house in the parish of Tough, and was caught there: its stomach contained some seeds. Another female was killed near Rhynie, on 25th February, and its stomach contained juniper berries. One was picked up dead on the shore near Pennan. Lastly, an immature male was obtained in the Parish of Arbuthnot in Kincardineshire, about the 15th of March.

Mr. Fred Box killed a good specimen of this rare visitant, in the neighbourhood of Tongue, on the 11th January last; and on the 27th of the same month Mr. G. R. Lawson obtained another in his garden at Golspie.

Sparrow and Mouse.—On 3rd February 1893, while walking along the road at the foot of the Calton Hill, opposite the Gaol, I saw a Sparrow swoop down several times at a Mouse, which was running along a bare part of the hill, a little way up from the wall. The Mouse eventually escaped into a hole.—William Loudon, Edinburgh.

Lapland Bunting (*Calcarius lapponicus*) **in Shetland.**—By a clerical error this species was described in my "Autumn Notes" from Shetland, in the last number of the "Annals," pp. 14 and 15, as a Reed Bunting (*Emberiza schœniclus*).—J. A. Harvie-Brown, Dunipace.

Jackdaw (*Corvus monedula*) **in Tiree.**—The only new bird I have seen this winter was a Jackdaw. It was among a flock of Rooks, and is the first Jackdaw I have seen in Tiree.—Peter Anderson, Tiree.

Magpie (*Pica rustica*) **in Orkney.**—Towards the end of August last the boatman on Loch Kirbister informed us that he had one morning seen a curious black and white bird hopping about the roof of the cottage, which from his description was obviously a Magpie. The Magpie appears to be very rarely seen in Orkney.—A. Noel Skelton, Edinburgh.

Tufted Duck (*Fuligula cristata*) **and Wigeon** (*Mareca penelope*) **in Selkirkshire during the breeding season.**—Mr. E. S. Marshall's note in the "Annals" for January last (p. 46) reminds me that on 14th June 1889 I observed six Tufted Ducks (two pairs and two fine males swimming singly) on one of the lochs in the upland district of Selkirkshire between Ettrick and Teviot. Though I did not see a nest (I made in fact no search), there can be little doubt some of the birds had nests among the broad beds of rushes which extend all along one side of the loch; indeed the behaviour of the two single drakes seemed clearly to indicate they had mates sitting in the immediate neighbourhood. The Tufted Duck now breeds so freely throughout the east of Scotland that I have for some years ceased to be struck by its presence on any of our lochs during the nesting season. Beginning at the Borders and proceeding north to Aberdeenshire, I could name over twenty lochs on which it has already been ascertained to breed. The species, as is well known, is a late breeder. Particulars of over thirty Scotch nests and young broods are now before me, and show that laying seldom begins before the last week of May, and in many cases not till June is well in.

But of much more interest to me than the Tufted Ducks on the occasion above mentioned was the sight of three Wigeons, a male and two females, resting on the glassy surface of the loch. As I approached, they soon began to show signs of uneasiness, and in a minute more were winging their way out of sight. From this loch I walked over a bit of rough and rather spongy moor to a smaller sheet of water a mile or so distant, on which a beautiful male Wigeon in adult summer plumage was swimming all alone. As I drew near, he exhibited considerable anxiety, and when put up flew round the moor in a manner which made me feel sure he had a mate sitting on eggs among the heather. I at once began a diligent search for the nest, but all to no purpose. I may add that I have since been assured that Wigeon have been killed on a loch in the same neighbourhood during the month of August. Though actual proof is still wanting, the facts here stated seem to me to render it highly probable that a few pairs of this interesting duck now breed annually in the south of Scotland.—William Evans, Edinburgh.

Pintail Ducks (*Anas acuta*) **in the Forth District.**—Mr. James Robertson, Ticket Office Clerk at Larbert Station, caught a male Pintail upon the railway line, about 150 yards from the station, on Friday, 8th December last. He still has the bird alive, and it has become very tame. Another, a female, was shot on the estuary of the Eden, in Fife, by Mr. J. Lonie. It was amongst Wigeon, and the date of its capture was the 6th or 7th December. This species is gradually increasing in numbers—or at all events the records of them are—within recent years upon our Scottish coasts. It certainly

appears to be one of the Anatidæ which is extending its range; slowly at present, but which may perhaps be expected to do so more rapidly within a few years.—J. A. Harvie-Brown, Dunipace.

Gray Plover (*Squatarola helvetica*) **in Barra.**—This is a bird that is now very rare in the Outer Hebrides, and I think therefore its occurrence in Barra is worth recording. About the middle of January 1892, one bird, which was with a flock of Bartailed Godwits, was shot by Mr. Murdoch Macgillivray of Eoligary, the head and feet of which he kept. He had never seen any of the species in Barra before; and the only one of them I ever saw in the Outer Hebrides was one bird which I saw with a flock of Golden Plover on the Valley Strand in North Uist some nine or ten years ago.—John MacRury, Barra.

Variety of Golden Plover (*Charadrius pluvialis*) **in Barra.**—Variations in this species are somewhat rare. It may be worth recording that I shot one this winter with its wings and tail feathers nearly all white, the rest of the plumage being of the usual colour.—John MacRury, Barra.

Knot (*Tringa canutus*) **in Barra.**—On the 31st of August 1892 I shot three birds out of a small flock of this species on the big strand at Eoligary in this island. I have never met with any of them in the Outer Hebrides before, although I have been looking out for them. No doubt some of them may visit us now and then, for a few days, on migration, without being noticed, but they certainly do not remain any time. On the 26th January 1893 I saw a flock of about a dozen Knots in the same place where I shot three of the species last autumn, but although I am frequently in the locality I never saw any of them except on these two occasions.

My old friend the *Whimbrel* has spent another winter with us, as I saw it lately at its usual station quite fresh and lively.—John MacRury, Barra.

Ruff (*Machetes pugnax*) **in Benbecula.**—On the 9th October 1892 I saw a Ruff in reeds in a swamp in Benbecula. This is now the third occasion, within the last three or four years, I have seen birds of this species in Benbecula.—John MacRury, Barra.

Curlew Sandpiper (*Tringa subarquata*) **in Orkney.**—I observe it stated in "The Fauna of the Orkney Islands" (page 302) that it was mentioned in "Rod and Gun" that a specimen of the Curlew Sandpiper (*Tringa subarquata*) had been shot at Renniebister, but Mr. Ranken traced it to Mr. Small, the birdstuffer, in Edinburgh, and the latter had told Mr. Ranken it was a Reeve. We had Swanbister and the shooting this year, and towards the end of August one of our

party shot, out of a small flock of small wading birds, a bird like a miniature Curlew, which on being sent to Mr. Small was pronounced by him to be a Curlew Sandpiper.—A. Noel Skelton, Edinburgh.

The Curlew Sandpiper (*Tringa subarquata*) in summer plumage in the Firth of Forth.—As an autumn migrant the Curlew Sandpiper visits the Forth annually; but in the many flocks which I have examined during the past ten years I could never detect a single adult bird till last September, when I had the satisfaction of seeing two in Aberlady Bay. On the 28th of August I noticed a party of six, and on 3rd September a flock of about 100; and as usual these were all young birds in first plumage. On the 4th (Sunday) I counted 120 in the Bay, eighty of which were feeding together in one group, and among them were the two adults. For nearly half an hour I stood watching them, at times not more than twenty to twenty-five yards off. The two old birds were conspicuous even to the unaided eye, but when viewed through my binocular one was seen to be nearly in full summer plumage, while the other had lost something like half of it. Next morning I was early on the sands, but could find only some fifty or sixty of the birds, and of course the two old ones were not among them. Up to the 11th of the month I daily observed this remainder of the flock feeding about the same spot, but by the following day they too had nearly all gone off in a body. The last seen—two or three with a group of Dunlins—was on the 16th. Mr. Gray records ("Birds of the West of Scotland") p. 317) seeing a flock of Curlew Sandpipers at Dunbar on 9th May 1870, some of which would most likely be adult birds on their way to their breeding grounds; but, with this possible exception, I cannot call to mind a record of the species having been previously noticed in summer plumage on the Scottish coasts.—William Evans, Edinburgh.

The Protection of the Osprey.—Something more than a rumour has reached us that the Council of the Zoological Society of London has decided to award its Silver Medal to the protectors of one of our rarest British birds—the Osprey. It will be remembered that the Council presented its medals in 1891 to the families of Edmondston and Scott for the protection of the Great Skua on their respective domains. This well-deserved recognition was the means of doing great good, as it stimulated an increase of vigilance for the bird's welfare; and we trust that similar results will accrue to the Ospreys.

Occurrence of the Ivory Gull (*Pagophila eburnea*) in Shetland.—In December last I received from my friend Mr. Frank Traill, who was sojourning in the island of Foula, a beautiful specimen, in the flesh, of the Ivory Gull, which had been captured there on the 8th of that month. This Gull was taken in the following curious

manner. After a gale from the north-west, the bird was observed in the vicinity of the houses. A hooked line, attached to a rod, was baited with fish and placed on the green. The would-be captor had not long to wait. The bird took the bait and endeavoured to fly off, but the rod proved too much for it, and it was easily secured. This specimen is a male in immature plumage, but is not a very young bird, for there are no black spots on the upper and under tail coverts, or on the back; while the chin is only slightly barred with gray, and the dark shaft stripes on the wing-coverts are very obscure. —William Eagle Clarke.

Black Guillemot (*Uria grylle*) in black or breeding plumage in winter.—In our books on Ornithology the plumage of this bird is said to be grayish white in the winter, and black with a white patch on the wing in the summer. Considerable numbers of them breed in the rocks on the Barra coast, and during the breeding season they all seem to be in the black plumage; at any rate, I never saw any in the gray, although I carefully watched during the last two or three seasons. The most of the birds leave us in the autumn, but a few remain during the winter. On the 15th of February of this year I saw one bird in the black or full breeding plumage, and a day or two after that I came across three more, all in the same plumage. Two of these were accompanied by companions in the gray plumage, the third being a solitary bird. Now, I think these birds must have retained the dark plumage during the whole winter, as the date is too early for them to have acquired the summer dress completely if they had lost it in the autumn. I notice that Mr. Nicol, a lighthouse-keeper in Shetland, observed in 1888 that the old birds retained the black plumage during the whole year, and that it was only the young birds that were gray in their first winter. I think he is right, but the matter is worthy of further observation.—John MacRury, Barra.

The Palmated Newt (*Molge palmipes*) in West Ross-shire.—On the 4th of June last we captured several specimens of this Newt in Loch Coire nann Faradh, in the Applecross district. In 1848 Mr. Wolley recorded ("Zoologist," 1848, p. 2265) this species for the extreme north of Sutherland. In 1880 Mr. E. R. Alston wrote ("Proc. Nat. Hist. Soc. Glasgow," 1880, p. 149), commenting thus upon this Sutherlandshire record, "We are not aware of this species having been found in any other parts of the North Highlands."—Lionel W. Hinxman and W. Eagle Clarke, Edinburgh.

The Palmated Newt (*Molge palmipes*) in Mid-Perth.—In May last, while staying at Fearnan, on the north side of Loch Tay, I found the Palmated Newt in abundance in a ditch by the road leading to Kenmore under the shelter of Drummond Hill. For many weeks previous to 18th May practically no rain had fallen in the district, and the thick layer of dead leaves which well nigh filled the ditch

was perfectly dry for the greater part of its depth. On the 20th, which was a warm, sunny day, some two inches of water stood in a section of the ditch about fifty yards in extent, and in this I counted between sixty and seventy Newts, all of the present species. They were nearly all in pairs, each female being accompanied by a single male with tail invariably curved round towards his head and vibrating rapidly. In other respects they remained quite still, seldom showing any desire to move from the spots on which they rested unless an attempt was made to capture them. Two or three small ones, scarcely half grown, were observed, which struck me as rather odd, looking to the season of the year. Some of the adults I sent home laid eggs shortly afterwards.

The Palmated Newt is doubtless common and widely distributed in Scotland, but records bearing on its actual distribution north of the Tweed are extremely meagre, although it is now nearly fifty years since it was first discovered by Wolley in the neighbourhood of Edinburgh, where it still exists.—WILLIAM EVANS, Edinburgh.

Coleoptera at Loch Awe in June 1892.—During the beginning of June I spent four or five days at the Loch Awe Hotel, and while there worked pretty hard for beetles. On the hill at the back of the hotel I took the following species amongst others: *Carabus arvensis*, *Pterostichus æthiops* and *vitreus*, *Patrobus septentrionis*, *Phyllopertha horticola* (including the black variety), *Corymbites impressus* (2)—one under dead leaves, the other beaten from birch.

Corymbites cupreus, *tesselatus*, *quercus*, and the var. *ochropterus*; *Telephorus palustris*, *figuratus* (*Scoticus*), including a form with the elytra entirely black and the legs, except knees, black. These specimens I at first mistook for *elongatus*, and in fact recorded them as such; they belong, however, to *Telephorus* proper, and not to *Rhagonycha*, and there can be little doubt they are a variety of *figuratus*: they occurred on sweeping coarse grass in a damp place.

Otiorhynchus maurus, *Gonioctena pallida*, *Clythra 4-punctata*, *Megacronus cingulatus*, *Luperus flavipes*, *Aphodius lapponum*, *Coccinella 16-guttata*, and *Anthophagus testaceus*.

Crossing the loch and working round home again by the railway bridge I found that beating flowers of the mountain ash, young oaks, poplars, and sallows, produced numbers of beetles, including *Elater nigrinus*, *Sericosomus brunneus*, *Rhynchites cupreus* and *æneovirens*, *Elleschus bipunctatus*, *Orchestes avellanæ*, *Rhamphus flavicornis*, *Erirhinus tortrix*, and *pectoralis*; also *Coccinella 16-guttata* in great numbers. Both the common species of *Rhagium* were abundant everywhere.

On the banks of the river above the loch I found *Geodromicus nigritus*, and in the pools at and near the top of the hill at the back of the hotel, which pools were full of water beetles, there were *Agabus arcticus*, *congener* and *nitidus*, *Hydroporus morio*, etc.

The place is well worth working in fine spring weather. The steep hill facing the south forms a sort of natural sun-trap, and this being almost always damp, is very favourable to the production of beetles, and probably other orders of insects. There were a large number of Tenthredinidæ about; some of these I took, but I have not yet worked out the species.—ARTHUR F. CHITTY, Queen's Gate Gardens, London.

The Food of the Sagitta: Additional Note.—In "Annals of Scottish Natural History," Part 2, p. 142 (1892), I submitted a few observations on the food of the Sagitta; and, as supplementary to these observations, I desire in the following remarks to record an interesting occurrence recently observed while examining some tow-net material collected between Fidra and the Bass Rock, Firth of Forth. Among this there were as usual a number of Sagitta, large and small. While carefully overhauling the material and taking note of the various organisms present, a peculiar wriggling movement attracted my attention, and on clearing away some things that were obstructing the view, I observed that a comparatively large Sagitta had caught hold of another one about half its size; and it was the wriggling of the smaller one to free itself from the grasp of its big brother that had first attracted my attention. Being anxious to ascertain how the two would get on, I continued watching them, allowing nothing to interrupt me from observing what was taking place, and this is what happened. Shortly after the small Sagitta had been seized by the middle by the larger one, and after it had wriggled a while in its efforts to escape, the two halves became gradually folded together, and the wriggling also gradually ceased; every second or two a quick movement of the jaws of the large Sagitta was distinctly visible, and all the while the doubled-up body of the victim passed slowly into the mouth and down the gullet of the devourer, and could be seen through its semi-transparent test. In a short time, the head and tail of the captive disappeared together from view within the jaws of the captor. The time occupied from the capture of the small Sagitta till it vanished from sight was a little over five minutes. It would appear from this incident, and from what is stated in a previous note, that the Sagitta is not over fastidious, provided the object is of a convenient size to suit the capacity of its jaws.—THOMAS SCOTT, Leith.

Damage by the Water Vole (*Arvicola amphibia*) in Berwickshire.—This amphibious animal has come into the pasture-fields at Chirnside and burrowed exactly like a Mole, and is doing much damage. Mr. Cockburn, the forester at Ninewells, has caught twenty-five in the pastures around the mansion-house, and he informs me that their burrows are all over the grounds. The river Whitadder is not a quarter of a mile from where it is working. I spoke to a Mole-catcher to-day [13th March 1893], who told me he

had caught two in his traps, some distance from water, on Maimes farm last week; and he said he had never caught any before. Last autumn the artichokes and carrots in my garden were all eaten by some rodent, and I begin to suspect these Water Voles. There can be no doubt that they are spreading to the fields.—J. STUART, Chirnside.

Niptus hololeucus, Fald., in Caithness.—On the 11th February Mr. Donald Doull sent to the Museum, for identification, several specimens of this beetle, taken in a house at Thurso. So far as I can ascertain, this species has not hitherto been recorded further north than the Moray area, being mentioned for that district by Dr. Sharp in his paper on the Coleoptera of Scotland, "Scottish Naturalist," vol. iv. (1877-78), p. 322. Its occurrence in the Sutherland area may therefore be of interest.—PERCY HALL GRIMSHAW, Museum of Science and Art, Edinburgh.

BOTANICAL NOTES AND NEWS.

Orobanche cruenta, *Bertol.*, "Rar. it. pl.," Dec., iii. 56. = *O. gracilis*, Smith, in "Linnæan Trans.," iv. 672.

For some years I have had in my herbarium a specimen of Orobanche named "*O. elatior*"; the plant, I expect, on which the doubtful record of "Argyll" for *O. elatior* rests. I merely noted on the sheet "certainly not *elatior*"; and so it has been left, until last autumn my friend Mr. Miller kindly sent me specimens of many gatherings of Orobanche from the Channel Isles. These evidently contained one, or probably two species that had not been reported from these isles, or from Britain proper; hence I was led to examine and dissect all my doubtful Orobanche material, with the result that the Argyll one proved to be *O. cruenta*.

Until regathered it seems best to merely publish this note to call attention to the plant, leaving for a future time a full account of the species, and only giving such helps as will assist in refinding it.

It is localised from "near Oban"; and the date of collection is "1845, Miss Harvey."

It grows on *Genista tinctoria*, *Hippocrepis comosa*, *Lotus corniculatus*, *Lathyrus pratensis*, *Anthyllis Vulneraria*, *Ononis arvensis*, *Hedera Helix*, etc.

The occurrence of this species in Scotland may seem somewhat anomalous at first; but the species of this genus are extremely uncertain in appearing, one year occurring in abundance, the next scarce, and sometimes hardly to be found.

O. rubra, Sm. (which Solms-Laubach in Herb. Kew makes a variety of *O. epithymum*, DC., under the name of var. *rubiginosa*) is

equally a plant of Scotland and of the north-west of France (where *O. cruenta* also occurs), so that too great stress must not be laid on its distribution.

O. rubra certainly occurs near Oban, whence came specimens now in Herb. Brit. Museum.

O. cruenta belongs to a section of the genus in which there are no other British species; and it seems to be an exceedingly variable plant on the Continent.—Arthur Bennett.

Alchemilla alpina, *L.*, and **A. conjuncta**, *Bab.*—Mr. Druce, in the January number of the "Annals," quotes Mr. H. Boswell as having produced in his garden *A. conjuncta*, Bab. from *A. alpina*, L., from Ben Lawers.

My experience of the two plants is by no means the same. I have had *A. alpina*, L. (also from Ben Lawers), for eight years, and *A. conjuncta* for sixteen years, and in neither case is there the slightest reversion, one towards the other. *A. conjuncta* seeds much more freely than *alpina;* but both produce seedlings, which I have watched through to the flowering stage. *A. alpina* does not bear our dry Surrey climate so well as *conjuncta*, which grows remarkably well here. *A. alpina* from Shetland (but kept two years only) also shows no sign of any approach to *conjuncta*.

And in none of the numerous specimens of *alpina* from Scotland, the Faroes, Iceland, or elsewhere, have I seen any real approach to *conjuncta*, such as would lead one to suppose that the one could be produced from the other. None the less I do not mean to dispute that conjuncta *may* only be a variety of *alpina;* that is another matter.—Arthur Bennett.

[My experience with plants of *A. alpina* and of *A. conjuncta* during six years in my garden in Old Aberdeen agrees with Mr. Bennett's.—J. W. H. Trail.]

Plants of Glen A'an, Banffshire.—In August 1891, in company with Mr. G. H. Robertson, a few hours were spent in examining the precipices on the south and west sides of the glen which encircles Loch A'an. We had crossed over by the east side of Cairngorm, and found that side poor in plants. The precipices near the head were richer; as also were the shelving rocks down which a stream, fed by the snow on Ben Muic Dhu, falls into the loch.

Arabis petræa, Lamk., occurred on the south side, as did also *Cerastium arcticum*, Lange, which is probably the *C. latifolium* of "Top. Bot." *C. alpinum* occurred on the north side of the glen, on Cairngorm; as did *Rhodiola rosea* and *Saussurea alpina*, DC. *Trollius europæus* and *Cerastium trigynum* occurred on the south side; and towards the head of the glen *Cryptogramme crispa*, *Athyrium flexile*, *Phleum alpinum*, very rare, and *Alopecurus alpinus*, also

scarce. A form of *Polygala serpyllacea* with very large leaves occurred in the lower part of the glen, near the level of the lake.—G. Claridge Druce.

Notes on some Scottish Plants:

Ranunculus petiolaris, *Marshall*, in Easterness.—The above plant I gathered as a curious form of *R. Flammula* on the stony margin of Loch Morlich in Glen More, in August 1888. I have sent a specimen to the Rev. E. S. Marshall, who thinks it is to be referred to the above plant.

Hieracium Schmidtii, *Tausch*, *forma*, in Elgin.—Mr. Hanbury has thus named a curious hawkweed, gathered by the Findhorn in August 1888.

Hieracium tridentatum, *Fries*, in Easterness.—This hawkweed was gathered by the Spey side, near Boat of Garten, in 1888, but was omitted from my lists of Easterness plants which have been published heretofore.

All the foregoing are, I believe, new county records.—G. Claridge Druce.

CURRENT LITERATURE.

The Titles and Purport of Papers and Notes relating to Scottish Natural History which have appeared during the Quarter—January-March 1893.

The Editors desire assistance to enable them to make this Section as complete as possible. Contributions on the lines indicated will be most acceptable and will bear the initials of the Contributor. The Editors will have access to the sources of information undermentioned.]

ZOOLOGY.

Alpine Hare in the South of Scotland. D. A. M. *The Field*, 7th January 1893, p. 15; 21st January 1893, p. 102.—Particulars of introduction about 1847, and its subsequent spread.

The Occurrence of Risso's Dolphin (*Grampus griseus*) in the Shetland Seas. By Professor Sir William Turner, F.R.S. *Proc. Roy. Phys. Soc. Edin.*, xi. part ii. (1891-92), pp. 192-197.—Four females and two males captured off Hillswick in September 1889.

Occurrence of the Carrion Crow in the Island of Coll. L. H. Irby. *Zoologist* (3), xvii. p. 73 (February 1893).—A single bird on the 6th of December 1892.

Nesting of Woodcock. J. J. Armistead. *The Field*, 25th February 1893, p. 296.—Nesting in Dumfriesshire, where they are increasing. Mr. Armistead considers that it is too late to shoot these birds in February.

Variety of Woodcock. J. Whitaker. *Zoologist* (3), xvii. p. 109 (March 1893).—Shot at Invar, in Scotland, in November last.

Little Grebe killed by Telegraph-wires. Robert Service. *Zoologist* (3), xvii. p. 29 (January 1893).—At Maxwelltown, in the first week of December 1892.

Jottings from my Note-book. By David Robertson, F.L.S., F.G.S. *Proc. and Trans. Nat. Hist. Soc. Glasgow*, vol. iii. (N. S.), part iii. (1889-92), pp. 267-271.—Phycis blennioides, Zeugopterus punctatus, Pleurobranchus plumula, P. membranaceus, and Uraster glacialis, are recorded for the Clyde area.

On the British Species of Asterolepidæ. By R. H. Traquair, M.D., F.R.S. *Proc. Roy. Phys. Soc. Edin.*, xi. part ii. (1891-92), pp. 283-286.—Bothriolepis leptochirus, *n. sp.*, described from specimens obtained from the Upper Old Red Sandstone of Heads of Ayr, Hugh Miller Collection, Edinburgh Museum of Science and Art. A list of British Asterolepidæ is also given, with localities for the Scottish species.

List of Shells, etc., observed on the Ardeer and Irvine Beaches, Ayrshire. By John Smith. *Proc. and Trans. Nat. Hist. Soc. Glasgow*, vol. iii. (N. S.), part iii. (1889-92), pp. 243-248.—More than eighty species are recorded.

The Raised Sea-bottom of Fillyside,—Researches in 1869-70 and 1888,—by James Bennie, with Lists of the Mollusca,—by Andrew Scott. *Proc. Roy. Phys. Soc. Edin.*, xi. part ii. (1891-92), pp. 215-237, Plate VIII.—Fifty-six species of Mollusca are recorded.

Coleoptera at Craigellachie, N.B., September 1892. A. J. Chitty. *Ent. Mo. Mag.* (2), iv. p. 19 (January 1893).—Twelve species are recorded.

Coleoptera at Loch Awe, June 1892. A. J. Chitty. *Ent. Mo. Mag.* (2), iv. p. 48 (February 1893).—Ten species are recorded.

Coleoptera in Arran. T. R. Billups. *Entomologist*, xxvi. p. 54 (February 1893).—A list given of seventy-eight species taken by Mr. A. B. Watson in August and September 1892.

Coleoptera in Morayshire. A. J. Chitty. *Ent. Mo. Mag.* (2), iv. pp. 68-71 (March 1893).—Notes taken during the autumn of 1892, on the borders of the Culbin sandhills, about five miles from Forres. A long list of species given, including Balaninus cerasorum, new to Scotland, and Hydnobius punctatissimus, new to the north of Scotland.

Colias edusa in Scotland. J. A. Mackonochie and Rev. A. B. Watson. *Entomologist*, xxvi. p. 17 (January 1893).—Male taken and female seen near Wigtown on 22nd September. Specimen taken at Tarbert, Loch Fyne. Six males (and several more seen) taken at Kilmorie, Arran, and another on the west coast of the island.

Colias edusa in Scotland. William Cowie. *Ent. Rec.*, iv. p. 40 (February 1893).—One specimen captured at Scotstown Moor, Aberdeenshire, on the 29th August 1892.

Collecting in Arran. A. B. Watson. *Entomologist*, xxvi. p. 52 (February 1893).—Fifty-five species of Lepidoptera (larvæ and imagos) seen or taken in August and September 1892.

The Larva of Coccyx nemorivaga, with some Notes relating to the Pupal Structure. T. A. Chapman. *Ent. Rec.*, iv. p. 38 (February 1893).—The information is based on specimens obtained in Sutherlandshire in September last.

Micro-Lepidoptera in the North of Scotland in 1892. Wm. Reid. *Ent. Rec.*, vol. iv. No. 3 (March 1893), pp. 80-85.—A long list of species is given, including Aciptilia tetradactyla, which is probably new to Scotland.

Hystrichopsylla obtusiceps, Ritsema, in Scotland. A. J. Chitty. *Ent. Mo. Mag.* (2), iv. p. 20 (January 1893).—This species, with Typhlopsylla musculi, Dugès, found on a sick or dying mouse near Forres.

On some new or rare Scottish Entomostraca. By Thomas Scott, F.L.S., and Andrew Scott. *Ann. and Mag. Nat. Hist.*, ser. 6, vol. xi. pp. 210-215, Plates VII. and VIII. (March 1893).—Describes two new genera: (1) Parartotrogus, of which P. Richardi, *sp. n.*, is the type, obtained near Fidra Island, Firth of Forth, and from the "Fluke Hole" off St. Monans; and (2) Moraria, of which M. Anderson-Smithi, *sp. n.*, is the type, from Loch Morar, Argyllshire [Inverness]. The other records are Lichomolgus concinnus from Granton, and Cyclops Ewarti and Attheyella cryptorum from Loch Morar.

A Second Contribution towards a Catalogue of the Amphipoda and Isopoda of the Firth of Clyde and West of Scotland. By David Robertson, F.L.S., F.G.S. *Proc. and Trans. Nat. Hist. Soc. Glasgow*, vol. iii. (N. S.), part iii. (1889-92), pp. 199-223.—Sixty species are added for the district, many of which are new to Scotland, and some recently new to science. A new genus (Pararistias) and a new species (Socarnes erythrophthalmus) are also described.

Notes on Cecrops latreillii, Leach, and Læmargus muricatus, Kroyer. By Andrew Scott. *Proc. and Trans. Nat. Hist. Soc. Glasgow*, vol. iii. (N. S.), part iii. (1889-92), p. 266.—Both species were found on a specimen of the Short Sunfish, Orthagoriscus molæ, which was captured near Inchcolm, in the Firth of Forth, on 10th October 1890.

Notes on Rhincalanus gigas, Brady, and Ectinosoma atlanticum, Brady and Robertson. By Thomas Scott, F.L.S. *Proc. and Trans. Nat. Hist. Soc. Glasgow*, vol. iii. (N. S.), part iii.

(1889-92), pp. 264 and 265.—The first-mentioned species was taken at Orkney in 1889, and near Montrose in 1890.

List of Foraminifera dredged in Portree Bay, Island of Skye. By David Robertson, F.L.S., F.G.S. *Proc. and Trans. Nat. Hist. Soc. Glasgow*, vol. iii. (N. S.), part iii. (1889-1892), pp. 239-242.—Over 100 species are recorded.

BOTANY.

Our Endemic List. By William H. Beeby. *Journ. Bot.*, March.—Discusses the claims to be considered endemic of several of the plants noted as such in the second edition of *Island Life*, by A. R. Wallace, and indicates a different conclusion in the case of some, and grave doubts as to others.

First Records of British Flowering Plants (*continued*). By William A. Clarke, F.L.S. *Journ. Bot.*, March.—The only Scottish records in this part are *Saxifraga rivularis*, L., "on Ben Nevis, Dr. Townson, in 1800"; *S. cernua*, L., 1794, "amongst the rocks on the summit of Ben Lawers, James Dickson"; *Epilobium anagallidifolium*, Lam., 1856, "lofty mountains of Scotland, Morne and Lochnagar, etc., Babington"; *E. alpinum*, L., 1777, "on Ben Lomond, about two-thirds of the way up, Lightfoot."

English Botany, Supplement to Third Edition. Part III. By N. E. Brown.—This part brings the supplement to the end of Dipsacaceæ. The completion of the supplement has been undertaken by Arthur Bennett, F.L.S., whose name guarantees the value of the work.

New and Rare Finds in 1891. By George F. Scott-Elliott, B.Sc. *Trans. D. and G. N. H. and A. Soc.*, 1893.—Enumerates a good many species from Dumfriesshire, several being noted as introduced.

Notes on some Scotch Plants, especially with relation to Dumfriesshire and Galloway, and their relation to Native Species. By Arthur Bennett, F.L.S. *Trans. D. and G. N. H. and A. Soc.*, 1893.—This is a valuable analysis of the probabilities of occurrence in S.W. Scotland of several plants.

Notes on a Herbarium collected by Miss E. G. Adams and Miss S. D. Johnston at Cowhill. By G. F. Scott-Elliott. *Trans. D. and G. N. H. and A. Soc.*, 1893.—The collection includes about 300 species, of which five are recorded as new to Dumfriesshire, viz. *Papaver Argemone*, *Primula elatior*, Jacq., *Euphorbia amygdaloides*, *Narcissus Pseudo-narcissus*, and *Galanthus nivalis*, the two last naturalised fully. Mr. Scott-Elliott has since informed us that the *Primula* and *Euphorbia* are undoubtedly only introduced plants.

Notes on the Flora of Moffat District for 1891. By John T. Johnstone. *Trans. D. and G. N. H. and A. Soc.*, 1893. —Includes four species confirmed for the district and numerous local species, many being new to Dumfriesshire.

A Contribution to the Cryptogamic Botany of the Moffat District. By James M'Andrew. *Trans. D. and G. N. H. and A. Soc.*, 1893.—Refers chiefly to Mosses and Hepaticæ, and to some Lichens.

Flora of Dumfriesshire and Dumfries District. Part II. From *Reseda luteola* to end of *Rhamnaceæ*. Edited by G. F. Scott-Elliott, assisted by various botanists and entomologists. *Trans. D. and G. N. H. and A. Soc.*, 1893.—In this are included, in addition to the localities for the several species, a record of the insects observed visiting the flowers in the district.

An Essay at a Key to British Rubi. By Rev. W. Moyle Rogers, F.L.S. Is concluded in *Journ. Bot.*, February, and a full index is given to all the numerous names.—No forms are referred to as Scottish in the two last instalments.

Rubus ammobius, Focke, in East Ross. By Edward S. Marshall. *Journ. Bot.*, March.—A few bushes on shingle by the Carron river.

Further Notes on Hieracia new to Britain. By Frederick J. Hanbury, F.L.S. Concluded *Journ. Bot.*, January.—Two doubtful forms from Scotland are described, but not named.

Ajuga pyramidalis in Scotland. By Arthur Bennett, F.L.S. *Journ. Bot.*, February.—Discusses localities and effects of cultivation. "The Old," in Caithness, is surely a misprint for "The Ord."

Alisma Ranunculoides, var. zosterifolium, Fries, in Britain. By Rev. E. S. Marshall, M.A., F.L.S. *Journ. Bot.*, February. Found in small pits near Beauly, East Inverness. The form is described and full synonymy given.

New British Fungi. By M. C. Cooke. *Grevillea*, March.—This paper includes and describes, among others, two species from Scotland, viz. *Geopyxis majalis*, Fries, "on the ground, Scotland," and *Neottiella ovilla*, Peck, var. *flavodisca*, Cooke and Massee, "on the ground, among moss, Ben Lawers, 2500 feet."

Algological Notes. By T. H. Buffham, A.L.S. *Grevillea* March.—In this paper, and in the accompanying plate, are described and figured the plurilocular sporangia of *Chorda Filum*, *Giffordia Padinæ*, sp. n., conjugation of zoogametes in *Cladophora lanosa*, and antheridia and spores of *Prasiola stipitata*.

REVIEWS.

On the Fossil Fish Remains of the Coal Measures of the British Islands. Part I. Pleuracanthidæ. By James W. Davis, F.G.S., F.L.S., etc. *Trans. Roy. Dublin Soc.*, ser. ii. vol. iv. pp. 703-748, Plates LXV.-LXXIII.

This ambitious memoir, consisting of forty-six quarto pages and nine plates, need only occupy us so far as the author's references to Scottish specimens are concerned; such matters as the remarkable conception of Selachian anatomy involved in the "restoration" of the top of the head of *Pleuracanthus* being safely left to other periodicals. Mr. Davis enumerates the following species of *Pleuracanthus* as occurring in Scottish Upper Carboniferous rocks:

Pleuracanthus lævissimus, Ag.—Shettlestone, near Glasgow.
" *alatus*, Davis—Stonehouse, Newarthill.
" *cylindricus*, Ag.—Quarter, Hamilton.
" *Thomsoni*, n. sp., Davis—Quarter, Kilmarnock.
" *Woodwardi*, n. sp., Davis—Cowdenfoot, Dalkeith.
" *Taylori* (Stock)—Airdrie.

We may refrain in the meanwhile from expressing any opinion upon the validity of several of Mr. Davis's new species, but we did not expect the rehabilitation of Stock's *Taylori*, which we had considered long ago safely relegated to the synonymy of *Pl. cylindricus*, Ag. Mr. Davis seeks to identify two Scottish Lower Carboniferous spines with species occurring in the true Coal Measures; maintaining that *Pl. elegans*, Traq., from the Loanhead Ironstone, is identical with the young stage of *Pl. lævissimus*, Ag.; while he also identifies a small spine from the "Better-bed" Coal, Clifton, Yorkshire, with *Pl. horridulus*, Traq., from the same bed as *Pl. elegans*.

It certainly seems to us that Mr. Davis is not yet sufficiently acquainted with the characters of these Scottish spines, else he would not have committed himself to any such identifications.

Reference is made at the close of the paper to another Scottish Lower Carboniferous spine—*Anodontacanthus fastigiatus*, Davis—in the following terms: "A single specimen, described as a third species [of *Anodontacanthus*], *A. fastigiatus*, from the Blackband Ironstone at Loanhead, is considered by Dr. Traquair, who has other specimens, to belong to another genus, and awaits his further decision." Dr. Traquair has, however, so far back as five years ago (*Geol. Mag.* 1888, p. 101), expressed his opinion that the "species *fastigiatus* falls into *Pleuracanthus*, as that genus at present stands."

A Fauna of Lakeland. *Erratum.*—In our review of this book in the January *Annals*, p. 61, by an oversight it was stated that the Spotted Eagle and the Frigate Petrel were both washed up on Walney Island in the year 1875. We should have said that the Petrel was thus obtained in 1891.

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REPORT ON THE PLAGUE OF FIELD-VOLES IN SCOTLAND.

[It is desirable that the official report on an event so interesting from a natural history standpoint, though so disastrous in its agricultural aspects, as a Plague of Field-voles in Scotland, should find a permanent record in the "Annals of Scottish Natural History." This irruption, so to speak, of vole life was of such magnitude, and so far-reaching in its devastations, that it was deemed necessary by the Board of Agriculture to appoint a Departmental Committee to inquire into its causes; to cope, if possible, with its results; and to suggest means for the prevention of its recurrence.

It was not to be expected, from the very nature of the inquiry, that much, if any, new light would be thrown upon the life-history of this vole; but a mass of interesting information is afforded by the report, bearing upon the extent and probable origin of the plague, and on other matters connected therewith.

We reproduce the report of the Commission, omitting such portions as do not bear upon the present outbreak, and such as relate to matters which are purely agricultural in their aspects.—Eds.]

To the President of the Board of Agriculture.

SIR—The Committee appointed on 28th May 1892 to inquire into and report upon the circumstances attending the plague of voles in some of the southern counties of Scotland, and to ascertain, either experimentally or otherwise as they might determine, whether any, and, if so, what preventive and remedial measures could be adopted, having conducted their inquiry to certain conclusions, beg to submit to your Board the following Report.

Before proceeding to the infected district your Committee received evidence from Major Craigie, Director of the Intelligence Department of your Board, who stated that the attention of his office had not been called to the existence of the plague of voles until the winter 1891-92, when it had been in existence for a considerable time. He laid before us the reports of two of the local inspectors of your Board, Mr. R. F. Dudgeon and Mr. J. I. Davidson, who, early in 1892, had been directed to inquire into the extent of the outbreak in the counties affected. Your Committee also received through the Office of Woods and Forests copies of correspondence relating to former outbreaks of the kind in England, and through the Foreign Office information of similar plagues in other European countries.

Hereafter, your Committee proceeded to the infested district and received evidence from farmers, shepherds, land-agents, gamekeepers, naturalists, and others at Howpasley on 20th June, at Hawick on 21st June, at Moffat on 22nd June, and at Thornhill on 23rd June. They also inspected the farm of Howpasley, about 12 miles from Hawick, which was said to have suffered as severely as any from the ravages of voles.

NATURE AND ORIGIN OF THE PLAGUE.

The animal which by excessive multiplication has caused so much mischief on hill farms in the southern uplands of Scotland is the short-tailed field-vole (*Arvicola agrestis*). Of this vole an excellent and exhaustive account was contributed to the "Proceedings of the Berwickshire Naturalists' Club," in 1878, by the late Sir Walter Elliot, F.R.S. . . .

This field-vole is at all seasons a well-known inhabitant of our pastures, and may be found at all heights from the sea-level to near the summits of our highest hills. The chairman of your Committee saw one in the autumn of 1891 at a height of 2000 feet on Ben Eibhinn, in Strath Ossian. The attention of farmers and shepherds is only attracted to it when circumstances have combined to cause an abnormal increase in its numbers. One shepherd stated that when as a boy he used to find a nest of voles he would "hap" (protect) it, because it was thought rare.

The field-vole usually produces three or four litters a year, each consisting of from four to eight young, but in some seasons they are even more prolific, the breeding season is prolonged, young voles being observed from February to November, and the litter containing as many as ten young. Mr. Service of Maxwelltown, a local naturalist and careful observer, mentioned in his evidence that he had observed females simultaneously suckling young and in a pregnant state.

The present outbreak may be traced back to the year 1888, when the voles were observed to be increasing on the farm of Glenkerry and others in Selkirkshire. In the summer of 1889 the low-lying pastures near Closeburn, in Dumfriesshire, were observed to be infested by enormous numbers of voles, which remained there during 1890, and disappeared in 1891, probably moving up to the hill pastures, where at the time of your Committee's visit they were swarming.

On some of the hill farms this excessive increase was observed as early as the autumn of 1890; elsewhere, however, they attracted no attention till the spring of 1891.

The districts principally affected are the hill pastures in the north-west of Roxburghshire, the south of the counties of Selkirk, Peebles, and Lanark, and the northern part of Dumfries from Eskdalemuir by Moffat to Thornhill. The voles have also appeared in great numbers in the parishes of Dalry and Carsphairn, in the Stewartry of Kirkcudbright.

Your local inspector, Mr. R. F. Dudgeon, has already informed you that at the date of his report he estimated that in Roxburghshire 30,000 to 40,000 acres had been affected,

of which he considered 12,000 to 15,000 acres had been rendered useless ; in Dumfriesshire 40,000 to 50,000 acres, and in the Stewartry of Kircudbright 10,000 to 12,000 acres were described by him as infested by voles.

Your Committee received no estimate of the area affected in the counties of Selkirk, Peebles, and Lanark, nor had they the means of verifying Mr. Dudgeon's calculation in respect to the other counties affected ; but a reference to the map accompanying this Report will show that an area not less than 60 miles in length, and from 12 to 20 miles in breadth, has been overrun.

Causes of the Outbreak.

The rapid increase in the number of voles to the dimensions of a plague was attributed by all the witnesses examined to one of two causes, or to a combination of both. The first of these consists in the character of the seasons. Mr. Service called attention to the occurrence of a series of dry springs in 1890, 1891, and 1892, adducing figures to show that the rainfall in these seasons was very much below the average, and therefore favourable, in his opinion, to the breeding of small mammals. The autumn of 1890 was unusually wet, producing great luxuriance of grass on the hill pastures, which afforded abundant shelter for the voles. The winter which followed, though very severe in England, was a mild one in Scotland. It will be observed that Sir Walter Elliot has traced the cause of the outbreak of voles which took place in 1876 to the unusual mildness of the four or five winters preceding that year.

The second cause assigned by witnesses is the destruction of hawks, buzzards, owls, stoats, and weazels by persons interested in the preservation of game. Major Craigie had previously stated to your Board that "a preponderance of opinion amongst farmers is reported, tracing the cause of the present outbreak to the scarcity of owls, kestrels, hawks, weasels, and other vermin." Of the prevalence of this opinion your Committee were made fully aware, nearly every witness who was examined giving it as his belief that the outbreak was due to the destruction of the "natural enemies" of the

voles. A similar view was expressed by the witnesses before the committee of the "Teviotdale Farmers' Club" appointed to inquire into the cause of the outbreak in 1876; but Sir Walter Elliot states that much weight was not attached to this "popular opinion . . . because no more hawks, owls, weasels, etc., had been destroyed than usual." They had in fact (to use Sir Walter Elliot's own words) "been well nigh extirpated long before the outbreak took place."

Effect upon the Pasture.

Of the damage done to the hill pastures your Committee had ocular demonstration during their visit to Howpasley farm (3000 acres), and nothing short of personal inspection could have given them an adequate idea of the extent of the mischief. The voles had shown themselves there first in what is called the "bog" land, *i.e.* strong marshy land either grazed or cut for hay. Having devoured the grass there, they spread to the "bent," "lea," or dry hill pasture, and to the heather, which they destroyed as effectually as they had done the grass. The stem of the grass is eaten close to the ground where it is white and tender, leaving the blade above withered and useless. Plantations are sometimes attacked, the young trees being peeled and killed, but this has not been the case so much during the present outbreak as in former years. The arable land, so far, has not been much affected; but there is no doubt from the experience of Mr. Oliver, who had three acres of corn damaged by them, that, if unchecked, they might swarm upon the cultivated ground with disastrous effect. Indeed, your Committee have information to the effect that in some districts they have recently appeared in numbers in the harvest-fields.

In walking across the hill your Committee saw numbers of voles darting about in every direction, and caught several for examination. The grass, which, at the end of June, should have been in full flush of verdure, was lying in withered wisps over a large extent of the farm, and the heather, which is valuable for winter feeding of the stock, had suffered to a similar extent.

Effect on the Stock.

Numerous witnesses spoke to the injury to stock owing to the damaged pasture. This injury was twofold, consisting first in the low condition to which the ewes were reduced, at and after lambing, from insufficiency of food, and the consequent increase of death-rate among them, and secondly, in a diminution in the crop of lambs, and deterioration in their quality.

Admitting the serious injury done to the pasture by voles, to which your Committee can testify from personal inspection, it is difficult to avoid the conclusion that the sheep dependent on that pasture must have suffered to a considerable extent. To quote Sir Walter Elliot's words, "The importance of these early grasses to flocks emaciated by previous scanty fare, at a time when the ewes, gravid with young, require more than ordinary nourishment to enable them to rear their lambs, explains how disastrous any diminution in their still scanty food might prove, whether from severity of weather, or other unusual cause, such as the swarming of voles." But it is not easy to estimate the extent to which the death-rate of the ewes was increased, or the crop of lambs diminished as the direct result of scarcity of pasture caused by the voles.

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Remedies.

No concerted or systematic attempts to stamp out the plague in its earlier stages seems to have been undertaken by the farmers of the district affected, and this is the more remarkable because some of them, at all events, had the bitter experience of the outbreak in 1875-76 to warn them of the serious results of allowing the voles to get ahead. Isolated efforts were made by some tenants to rid their land of voles by burning the grass and heather, by killing them with men and dogs, by turning out cats, and by poison; but the effect of such piecemeal endeavours seems to have been well nigh inappreciable. Your Committee are not prepared to declare that landowners and farmers could have arrested the plague,

but they hold a very strong opinion that the best chance of averting its disastrous effects would have been for all interested in the ownership and occupation of land to have combined for the destruction of the voles when they were first observed to increase.

Burning bog-land, bent, and heather, seems to be effective in driving the voles off the portions burnt. Mr. Carthew Yorstoun, Commissioner on the Duke of Buccleuch's Langholm estate, stated that he had written to every tenant of a hill farm in 1892, asking if an extension of the time for burning would be an advantage. Three-fourths of those written to replied in the affirmative, and received permission to burn from 14th April (the usual limit) to 28th. The remaining fourth said they had already burned as much as the ground would stand.

It is not profitable to burn all the rough pasture on a farm, as the sheep depend on it for sustenance when snow is on the ground.

Poison has been tried with partial success. Samples of grain treated with strychnine, and coloured red to prevent mistakes, were supplied from Germany and submitted. It is stated that good results were obtained with this in limited areas; for instance, the tenant of Middlegill, near Moffat, holding a farm of 3000 acres, applied this poison to a meadow of 10 acres, and thereby partly destroyed the voles. Sir Walter Elliot quotes a letter from Sir Robert Menzies, who describes how he got rid of the voles which infested 140 acres of Scots fir plantation, by laying down half a ton of half-inch drain-pipes, in each of which was placed a teaspoonful of oatmeal mixed with phosphorus. But for obvious reasons, the application of poisoned grain over hill farms extending to many thousands of acres, even if practicable, would be attended with much risk to other forms of life.

Pitfalls, *i.e.* holes cut in the ground with precipitous sides, are equally out of the question when a large tract of country has to be dealt with. But they have proved effectual when plantations of limited extent have been attacked. The forester at Branxholm within a week exterminated the voles infesting a plantation of six acres, by digging pits 12

inches wide at the mouth, 15 inches wide at the bottom, and 18 inches deep. These were placed at a distance of from 12 to 20 feet apart.

On the other hand the head-keeper at Drumlanrig said that pitfalls had been tried without much success in the extensive plantations at that place.

As a remedy on sheep-farms, pitfalls were graphically appraised thus by Mr. Whittle: "How many holes . . . would it take to cover my farm of 7600 acres, and what would be the cost?"

The same objection—namely, the nature and extent of the ground affected—applies to the proposal of other expedients which have been resorted to in various parts of the Continent, viz. passing a heavy roller over the ground, trampling it with cavalry, inundating it, injecting water, steam, or noxious fumes into the runs. All of these may be dismissed as wholly impracticable.

Large numbers of voles were destroyed on some farms by men and dogs. The vole is extremely rapid in its movements and difficult to hit with a stick. A more effective weapon is a wooden implement shaped like a small spade.

The tenant of West Buccleuch, in Selkirkshire, killed by this means 13,000 in three months on 3000 acres; the tenant of Glenkerry (3000 acres) employed a man who killed 15,000 in one month, or about 450 per diem. The tenant of Langshawburn hired a man with 12 terriers, who killed from 400 to 600 a day on 4260 acres. In addition he turned out 100 cats, and by the end of June 1892 reported that there was not one vole for every 100 that there had been on his ground.

There can be little doubt that simultaneous and combined action of this sort on the part of owners and occupiers, aided by timely and judicious burning *in the earlier stages of the outbreak*, is the most effective method of staying the ravages of the plague. Unfortunately, not only have these exertions been hitherto isolated and intermittent, but they have been delayed until the voles were swarming over a considerable extent of ground.

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Natural Enemies of the Vole.

No phenomenon in connection with the present plague of field-voles in Scotland has been more marked than the presence of large numbers of the short-eared owl (*Otus brachyotus*). This bird, which is distributed over almost every part of the globe, is a normal winter migrant to these islands, appearing simultaneously with the woodcock (whence it is popularly known as the "woodcock owl") and usually departing in spring. Nests in ordinary seasons are of comparatively rare occurrence in Great Britain, but in consequence of the vast multiplication of their favourite food, the vole, these owls have not only arrived in unusual numbers, but have remained and bred freely all over the district affected, laying from 8 to 13 eggs (though Professor Newton in his edition of Yarrell's "British Birds" mentions seven as an unusual number) and rearing more than one brood. The shepherd on Crooked-stone, near Crauford, has counted 14 nests on his ground. The small wood behind the farmsteading of Howpasly presented a remarkable appearance, the ground being densely covered with the "pellets" or "castings" of owls, composed of the fur and bones of voles. Living specimens of both old and young short-eared owls were produced for the inspection of your Committee at Howpasly.

The short-eared owl differs from most other owls in that he hunts in daylight, and his operations can be observed; but there is no doubt that the nocturnal species are equally useful to the farmer in destroying small rodents, and it would be difficult to condemn too severely the foolish and cruel action of those who allow or encourage the destruction of this useful and beautiful family of birds. It is with much satisfaction that your Committee record that many landowners and game preservers seem to have become convinced in late years that owls of all sorts are not only harmless to game, but most beneficial to agriculturists, and have issued orders for the preservation of these birds.

Next, and hardly second in merit, as a check upon voles and mice, comes the kestrel (*Falco tinnunculus*), and it is to be deplored that popular ignorance as to its food and habits

is even greater than that which prevails in regard to owls. This bird, although possessing the long wings and dark eyes characteristic of a true falcon, is known to gamekeepers as a hawk—*noscitur a sociis*—its death warrant is a standing order in most preserves, though here again there has been some improvement, and the destruction of the kestrel is forbidden on some estates. The food of this bird is known to consist almost exclusively of mice, grasshoppers, coleopterous insects, and their larvæ; but the sort of evidence on which it is condemned may be gathered from the following answers made by a gamekeeper to questions put by your Committee :—

Q. Why did you kill the kestrel?—Well, it was an enemy of the game, of course, and that is why I killed it.
Q. How long have you been a gamekeeper?—Six or seven years.
Q. How often have you seen a kestrel take game?—Many a time.
Q. What kind of game?—Young pheasants.
Q. Had you many young pheasants at West Buccleuch?—No.
Q. Then why did you kill the kestrel?—Because they will kill young grouse.
Q. Did you ever see them take young grouse?—No.
Q. Did anybody of your acquaintance ever see them take young grouse?—No, but I have heard of their taking young grouse.
Q. Would you believe a man if he said that he saw a kestrel taking young grouse?—Yes, if he said it I would.
Q. Any man?—Yes, if he was not drunk.

It is true that one witness, a tenant of shootings, stated his belief that the kestrel is a "deadly enemy of game"; that one of this species took 70 young pheasants from the coops, and was shot one evening in the act of carrying off a young pheasant. But he was not speaking from observation, but from the report of his keeper, and there is little doubt that

kestrels are often attracted to pheasant-coops by the presence of rats and mice drawn thither by the food prepared for the young birds. Against this may be set the evidence of the head-keeper at Drumlanrig (where kestrels are preserved by order of the Duke of Buccleuch), who said that in his experience of over thirty years he thought he could remember twice seeing a kestrel taking a young pheasant.

It will, your Committee feel convinced, be a very gratifying result of the present inquiry if it tends to persuade persons interested in game-preserving that the kestrel preys not so much on game as on the vermin of the farm.

It may be observed in connection with this question of the kestrel's habits, that it is rare to find people able to distinguish between one kind of hawk and another. Few of the witnesses before your Committee were able to describe hawks otherwise than as red, blue, brown, or yellow, and it was often impossible to make out what species they intended to indicate. It is one of the peculiarities of the *Falconidæ* that their plumage varies according to age and sex. In the southern counties of Scotland the sparrow-hawk (which does not prey on mice) is generally known as the "blue hawk," and the kestrel as the "brown" or "red" hawk. But an immature male sparrow-hawk has reddish-brown plumage, and an adult male kestrel has a bluish-gray head and back.

Several witnesses deponed to an increase in hawks "since the mice came," but were unable to identify the species. No doubt they were kestrels, for other species of hawks do not commonly prey on mice, and your Committee, in driving back from Howpasly, observed five kestrels together hovering over the vole-haunted ground. . . .

Buzzards probably destroy large numbers of voles and mice, and are too heavy on the wing to do much injury to winged game; but they have become very scarce in southern Scotland owing to their destruction by gamekeepers.

Ravens and hooded crows have also become rare, but this cannot be regretted in the farmer's interest, as they attack young lambs, and even pick the eyes out of the weakly ewes. Moreover the rooks, which it is to be hoped no short-sighted

policy will greatly reduce in numbers, have done excellent service in digging up the voles' nests and devouring the young.

Mr. Service of Maxwelltown drew attention to a change which had taken place in the habit of rooks in his neighbourhood during the last ten years, having "developed most marked carnivorous habits, taking eggs, young birds, young poultry, young hares and rabbits to an extent they never did before." Simultaneously with this manifestation of carrion crow-like habits, Mr. Service had noted an increase in the number of rooks with feathered faces like the carrion crow, which he was inclined to connect with the change in their diet. (See Stevenson's *Birds of Norfolk*, vol. i. pp. 274-275.) . . .

This alleged modification in the habits of the rook, though favourable to the farmer, has not unreasonably brought him into evil repute with game-preservers.

Amongst other birds which have been observed to prey on voles are certain species of sea-gull.

Stoats and weasels are among the deadliest and most persevering enemies of small rodents. They kill far more than they can devour, apparently out of sheer blood-thirstiness. In woodlands and on low ground they undoubtedly do much harm to game, especially the stoat, which may be easily distinguished from the weasel (known in Scotland as the "whittret") by its greater size and by the black tuft at the end of the tail, which is retained at all seasons of the year, even in winter, when the rest of the body becomes wholly or partially white.

Adders feed readily on voles, and in July 1892 the chairman of your Committee was present when one was killed with a vole in its gullet. This was in Wigtownshire, where no abnormal increase in the number of voles has been observed. But a single adder would probably not kill more than one animal of the size of a vole in a single day—so there is no reason to extend protection to these venomous reptiles.

Some naturalists aver that the mole preys upon voles, but your Committee, though directing inquiries upon this point, were unable to elicit any evidence tending to confirm this belief.

Your Committee deem it right to point out that the popular opinion that the excessive multiplication of field-voles is the direct result of the destruction of birds of prey, stoats, and weasels, which has been admittedly great over part of the affected area, does not appear generally to be the outcome of personal accurate observation.

Your Committee are of opinion that birds and beasts of prey, even had they been wholly unmolested, would not have prevailed to avert the vole plague, though they would probably have greatly mitigated its severity; and they are confirmed in this view by the circumstances attending similar outbreaks in this country in the sixteenth and seventeenth centuries, and in foreign countries of late years. Neither in Essex previous to the outbreak reported by Holinshed, nor in South America previous to the outbreak described by Mr. Hudson in *The Naturalist in La Plata*, nor in Thessaly previous to that prevalent there in 1891-92, was there any check placed by man upon the multiplication of the natural enemies of these rodents.

In reply to the question (*inter alia*) whether "birds of prey and other rapacious animals have assisted to any material extent in the destruction of the voles (in Thessaly)?" Her Majesty's Minister at Athens transmitted the following reply: "Birds of prey and other rapacious animals would never suffice to prevent the alarming multiplication of the voles under favourable climatic conditions."

This view has been amply confirmed by the observations of the chairman and secretary of your Committee during their recent visit to the infested plains of Thessaly. Birds of prey—eagles, buzzards, kites, kestrels, and other hawks—are exceedingly abundant there, and no one thinks of molesting them. Indeed, the Turks (of whom there are about 30,000 in the province) are exceedingly kind to wild animals, and object to their being destroyed. In 1866, when that country last suffered from a visitation of field-voles, Thessaly was under Turkish dominion, and birds of prey were protected. The change from Turkish to Greek rule which took place in 1881 made no difference in this respect, yet in favourable seasons the voles multiply in spite of the presence of a very full stock of their natural enemies.

Conclusions and Recommendations.

Your Committee have reluctantly been led to the conclusion that they are unable to recommend any specific method of dealing with or putting an end to the present outbreak.

It appears to be an instance of the power which small animals are well known to possess, of prodigiously rapid multiplication under favourable climatic conditions and with a plentiful supply of natural food.

Experience shows that a combination of such favourable conditions will always tend to bring about a recurrence of the plague. That being so, it ought to be the endeavour of every farmer and shepherd to be on the alert, and report without delay to the land-agent, and to the secretary of the local farmers' club, or agricultural society, the first signs of the multiplication of vermin, so that palliative measures may at once be adopted, not on isolated farms, but everywhere throughout the district.

The most effective measures appear to be periodical and timely burning of grass and heather, followed by active pursuit of the vermin by men using wooden spades and dogs. If this were promptly done in the earlier stages of the outbreak, it is quite possible that it might be averted altogether, or greatly mitigated in severity.

It is hardly necessary to point out that the proprietor of the land should be informed as soon as any one else, because his keepers and others might be usefully employed in assisting to prevent what amounts, if unchecked, to a common calamity upon all classes connected with land.

Where plantations of limited extent are attacked, pitfalls wider at the bottom than at the top, and about 18 inches deep, should be dug. The voles fall into them and cannot escape, and the ground is soon cleared of them in this way.

Your Committee cannot speak with approval of the use of poisoned grain, except where the area affected is very limited.

Nor have they been able to come to any conclusion favourable to the adoption of Professor Loeffler's method of destroying voles by means of bread saturated in a preparation

of the *bacillus typhi murium*, or mouse typhus. The personal investigations made by the chairman and secretary in Thessaly (where in May 1892 Professor Loeffler was employed at the expense of the Greek Government to combat the plague of field-voles then prevailing in that country) convinced them that the favourable reports circulated as to the complete success of the experiments have not been justified by the results. In certain parts of Thessaly the voles were reported by landowners and others to be as numerous in January 1893 as ever they were.

Your Committee readily admit that when used in a fresh state, the bacilliferous fluid is an effective though somewhat dilatory poison for mice or voles, and has this advantage over mineral poisons that, as has been proved, it is innocuous to human and other forms of life.

It has also been reported by Professor Loeffler that the Scottish voles sent to him alive by instructions from your Committee have been found as susceptible of the mouse typhus bacillus as their Greek congeners. But there are three objections which in the opinion of your Committee render this method almost worthless except for employment in houses, gardens, enclosed fields, or other limited areas:

1. It is very expensive; the virus supplied to the Greek Government was paid for at the rate of about 4s. a tube, containing enough when dissolved to treat about two imperial acres, a cost which in many instances would exceed the rent of the Scottish hill pasture. To this must be added the price of bread used in distributing the virus, which would appreciably raise the cost of the process. Thus to deal effectually with a hill farm of say 6000 acres, would entail an expenditure of from £700 to £1000, making the remedy more costly than the evil.
2. Mouse typhus is not contagious; it can only be communicated to those animals that will swallow some of the virus. The allegation that healthy voles will become infected by devouring the bodies of the dead has not been satisfactorily proved. That Greek voles when in captivity had been observed

to feed upon the corpses of their fellows hardly warrants the assumption that Scottish voles in a state of liberty will do the same; and unless the disease were communicable from one animal to the other, it is not easy to see how the remedy could prove effective on extensive hill pastures.

3. The fluid loses its value in about eight days after preparation. Consequently much disappointment might ensue if, after a supply had been obtained, a fall of snow, or wet weather, were to interfere with its distribution over the land.

The remedy which has been found most effectual in Thessaly is an injection of the fumes of bi-sulphide of carbon into the burrows. This, however, is a more expensive process than the other, besides being injurious to the health of those engaged in its application. It is, moreover, inapplicable to the Scottish vole (*Arvicola agrestis*), which does not burrow to a depth like the vole of Thessaly (*Arvicola Güntheri*), but lives in shallow runs amongst the roots of herbage.

With the under-noted exceptions, the natural enemies of the voles may be divided into two classes, viz. those which destroy the voles, and are harmless to sheep, crops, and game; and those which, though preying on voles, are so hurtful in other ways as to have no claim to preservation:

i. *Vole-killers, harmless, or nearly so to sheep, crops, and game.*

Owls of all sorts,
Buzzards,
Kestrels, and the
Smaller Seagulls.

ii. *Vole-killers, hurtful in other ways.*

Foxes,
Ravens,
Carrion and Hooded Crows,
Great Blackbacked Gulls, and
Adders.

Strict injunctions ought to be given by landowners that the birds mentioned in the first class should not be destroyed. Their presence in full numbers, though inadequate to avert an outbreak, would undoubtedly tend to mitigate it, and, as has been proved in the case of the short-eared owl, they have the faculty of multiplying abnormally in presence of an

unusual supply of food. They are at all events most useful allies to man in combating attacks of ground vermin.

Your Committee further desire to deprecate in the strongest manner possible the use of the pole-trap for the capture of hawks. Besides the inhumanity of this device, it is indiscriminate, and harmless owls, kestrels, and buzzards are just as likely to be taken by it as are the most mischievous species.

Three animals, diligent vole-destroyers, have been omitted from both these lists, because they are undoubtedly hurtful to game. The first of these is the common rook (known to the shepherds as the corn-crow), of which, however, the services to agriculture are now generally recognised.

The other two animals referred to are the stoat and the weasel. Of all the smaller beasts of prey these are perhaps the most hateful to gamekeepers, and it is hardly reasonable to expect that stoats should be allowed to multiply in game-coverts, or in the vicinity of pheasant-coops. But your Committee have no hesitation in recommending that weasels, which are persistent mouse-hunters and do little damage to game, should not be molested, at least on moorlands and hill pastures, where they can do little harm and much good.

Your Committee cannot conclude their labours without expressing gratitude for the consideration with which they were everywhere received in the course of their inquiry, for the hospitality shown to them, and for the exertions made by various individuals to obtain witnesses and arrange their evidence.

HERBERT EUSTACE MAXWELL (*Chairman*).
MINTO.
D'ARCY W. THOMPSON.
JOHN GILLESPIE.
WALTER ELLIOT.

J. E. HARTING (*Secretary*).

THE WHISKERED BAT (*VESPERTILIO MYSTACINUS*, LEISL.) IN EAST LOTHIAN.

By WILLIAM EVANS, F.R.S.E.

ON 28th March last, Mr. George Pow, Dunbar, sent me a Bat which I at once saw was worthy of more than the cursory glance I was at the moment only able to give it. Accordingly it was passed on the same day to Mr. Eagle Clarke to be softened (the wing membranes were already too dry to be stretched without tearing), and then compared with the spirit specimens of British Bats in Mr. Clarke's collection. A couple of days later we examined it together and found it to be an example of the Whiskered Bat (*Vespertilio mystacinus*, Leisl.) I immediately wrote to Mr. Pow for full information as to place and date of capture, and learned from him that the little animal was knocked down on the links about a mile east of Dunbar, on the evening of 20th March, by a fisher-boy, from whom he received it alive.

I am thus enabled to add this interesting species to the fauna of the Forth district; and I do so with real satisfaction, feeling sure that it is not a record of a mere straggler from distant lands, wafted hither by a combination of circumstances which in all probability would not occur again for many years to come, but a genuine addition to the list of our native vertebrates. The specimen, moreover, is but the second that has been recorded for Scotland. The first, which is preserved in the Owen's College, Manchester, was captured by Mr. J. Ray Hardy about four miles from Rannoch on the Pitlochry Road, in June 1874. When referring to this specimen in my "Mammalian Fauna of the Edinburgh District" (April 1892), p. 23, I ventured to point to the species as a very probable addition to our list, and it is therefore gratifying to be able to add it so soon.

For several years past Mr. Pow has rendered me and others invaluable aid in the investigation of various branches of local Natural History, and I gladly avail myself of this opportunity of publicly thanking him and commending his disinterested zeal to the notice of others similarly situated.

REPORT ON THE MOVEMENTS AND OCCURRENCE OF BIRDS IN SCOTLAND DURING 1892.

By Lionel W. Hinxman, B.A.

The usual schedules for recording notes on the movements and occurrence of birds during the past year were sent by Messrs. Harvie-Brown and Eagle Clarke to all the sixty light-stations on the Scottish coasts. Of these, twenty-two have been returned. Schedules were also sent to others who were thought likely to take an interest in the matter, with the result that notes have been received from twenty-five observers in different parts of the country, making a total of forty-three schedules tabulated. To those who have so kindly aided us in these inquiries, and to Mr. T. G. Laidlaw for other assistance, our hearty thanks are accorded, coupled with the hope that we may continue to be favoured with their valuable co-operation in the future.

Further observations are much needed from the faunal areas of Sutherland, West Ross, Moray, Dee, Tweed, Clyde, and Solway—West Ross and Clyde being at present entirely unrepresented; and it is hoped that a larger number of schedules will be available for next year's report. It is also a matter of regret that no returns have been made from the Isle of May, one of the most important stations for migration records.

The following list gives the names of observers from whom schedules and notes have been received. The localities are arranged under the different faunal areas, proceeding from north to south along the east and west coasts.

Northern Isles.

Shetland.

Locality.	*Name of Observer.*
Burrafiord, N. Unst (Shore Station)	James Ferrier, Lightkeeper.
Sumburgh Head L.H.	James Youngclause, „
Dunrossness	J. A. Harvie-Brown.
Foula	F. Traill

ORKNEY.

Locality.	*Name of Observer.*
N. Ronaldshay L.H.	William Ross, Lightkeeper.
N. Ronaldshay	A. Briggs, Holland House.
Hoy Sound (High Light)	Thomas Hughson, Lightkeeper.
Cantick Head L.H.	J. C. Lawrence, ,,
Pentland Skerries L.H.	Malcolm M'Dougall, ,,

SUTHERLAND.

Dunnet Head L.H.	David Laidlaw and J. Carson, Lightkeepers.
Thurso	Lewis Dunbar.
Lochinver	Arthur Beveridge, M.B.

MORAY.

Helmsdale and Brora	Hugh Miller, H.M. Geol. Survey.
Tarbat Ness L.H.	Arch. M'Eachern, Lightkeeper.
Glenlivet and Strathspey	Lionel Hinxman, H.M. Geol. Survey.

DEE.

Fyvie	George Sim.
Girdleness L.H.	John Gilmour, Lightkeeper.

TAY.

Bell Rock L.H.	James Cadger, Lightkeeper.
Arbroath and Montrose	Dr. T. F. Dewar.
Newport and Tayport	W. Berry.
Callander and Loch Tay	W. Evans.

FORTH.

Inchkeith L.H.	Charles M'Fadyen, Lightkeeper.
Doune	Lt.-Col. W. H. M. Duthie, Row.
Linlithgow	P. C. Mackenzie, Longcroft.
Dalmeny	Charles Campbell, Dalmeny Park.
Edinburgh District	T. G. Laidlaw.
The Lothians	Bruce Campbell.

TWEED.

Hallmyre, Peebles	David G. Laidlaw.
Chirnside	Charles Stuart, M.D.

Outer Hebrides.

Locality.	*Name of Observer.*
Butt of Lewis L.H.	Alex. M'Gow, Lightkeeper
Island Ghlais L.H., Harris	"The Lightkeepers."
Monach Isles L.H.	Wm. A. Tulloch, Lightkeeper.
Barra Head L.H.	James Edgar, ,,
Mingalay, Barra	John Finlayson.
Stornoway	H. Mackenzie, Royal Hotel.
Rodel, S. Harris	John Finlayson.

Argyll and Inner Hebrides.

Tiree	Peter Anderson, Kirkapol.
Skerryvore L.H.	John Nicol, Lightkeeper.
Skervuile L.H., Jura	Alex. J. Grant and D. M'Donald.
Kilfinichan, Mull	C. A. M'Vean.
Oban, Canna, Kerrera, etc.	Cecil H. Bisshopp, Oban.
Inverary	His Grace the Duke of Argyll.
Ben Nevis	The Observatory Staff.

Solway.

Loch Ryan L.H.	Rodk. M'Innes, Lightkeeper.
Portpatrick L.H.	Jas. Biggs, ,,
Little Ross L.H.	Neil M'Donald, ,,

General Remarks.

Owing to the long continued northerly winds during the latter half of April, the bulk of the summer migrants were fully a week late in arrival at all localities, though a few isolated early dates are recorded. Redstarts were again very numerous on the West Coast, though perhaps not so much so as in 1891. A noteworthy movement of Skylarks is recorded from the Bell Rock Lighthouse during the last week of February, beginning on 24th February with great numbers, together with a few Blackbirds,—wind S.E.,and fog,—continuing in fewer numbers during the 25th and 26th, and culminating in a rush of hundreds during the night of 27th February, with light variable breezes and thick haze, when many were killed at the lantern.

The first important movement in the autumn is recorded from Pentland Skerries on 20th September, but does not

seem to have been observed at any other station. On that date, with a S.E. gale and haze, a rush of Fieldfares, Redwings, and Redstarts took place, some of the birds remaining for three or four days. At the same locality, on 4th October, at noon, with a S.E. gale, a great rush of Snow Buntings, Ring Ousels, Redwings, and Fieldfares. This was followed on 5th and 6th October by the greatest movement of the year, and of which we have records from most of the East Coast stations. At Dunrossness, a few stragglers came in on the night of 4th October; but on the night of 5th and 6th October, a sudden shift of wind from N. to S.E., rising to a gale, brought in numbers of Twites, Chaffinches, and Bramblings, with stragglers up to 10th October. At Sumburgh Head, under similar conditions, a rush all night of 5th October, and on 6th October during the day, of Chaffinches and Bramblings. A similar record comes from North Ronaldshay for 5th October, with stragglers up to 14th October. At Girdleness, the migration on this date was very heavy; and during the afternoon of 6th October, with a southerly gale and haze, there was an extraordinary influx of Thrushes, Redstarts,—which seemed to be mostly females,—Redbreasts, Goldcrests, Willow Wrens, Chaffinches, and Bramblings. Mr. John Gilmour writes on this date: "A perfect rush of birds here this afternoon, the turnip drills in gardens perfectly swarming with the species mentioned."

During November, the chief movements recorded were on the 5th, 18th, 20th, 23rd, and 24th, and included the usual autumn immigrants, with nothing worthy of special remark. The occurrence of the Great Gray Shrike (*Lanius excubitor*),—a male,—near Haddington, on 15th June, is an interesting fact.

The Iceland Gull (*Larus leucopterus*) seems to have been more than usually abundant on the North and West Coasts, individuals being reported as seen or shot from eight several localities.

NOTES UNDER SPECIES.

Turdus musicus (Song Thrush).

ORKNEY . .	Hoy Sound, Oct. 9. N. Ronaldshay, Oct. 13, numbers about; Nov. 3, large numbers.
DEE . . .	Girdleness, Oct. 5, numerous.

Outer Hebrides	Skerryvore, Nov. 18, in rush with Fieldfares; Nov. 23, 24, great rush all night, with Fieldfares, Blackbirds, etc.; E. light, hazy.
Argyll and Isles	Skervuile, Nov. 18-20, 23-24, in rushes.
	Principal movements, Nov. 3, 18, 20, 23, 24.

Turdus iliacus (Redwing).

Orkney . .	Pentland Skerries, Sept. 20, great rush; Oct. 4, in great rush with Fieldfares and Snow Buntings.
Outer Hebrides	Last seen April 30, Monach I.
	Principal movements, Sept. 20, Oct. 4.

Turdus merula (Blackbird).

Shetland . .	Dunrossness, Oct. 30; Sumburgh Head, Nov. 5.
Dee . . .	Girdleness, Nov. 3, 19, numerous.
Tay . . .	*Spring.* Bell Rock, Feb. 25, March 3, 11.
Outer Hebrides	Skerryvore, Sept. 19, Nov. 20; Nov. 23, 24, in rush.
Argyll and Isles	Skervuile, in rushes, Nov. 18, 20, 23.
	Principal movements, Nov. 18-20, 23, 24.

Turdus pilaris (Fieldfare).

Orkney . .	Pentland Skerries, great rush, Sept. 20; Oct. 4, do. N. Ronaldshay, a few each night, Nov. 5, 22.
Moray . .	Strathavon, first seen Oct. 15; Strath Brora, Oct. 20.
Dee . . .	Fyvie, Oct. 18; last seen April 22.
Forth . .	Edinburgh, Oct. 5.
Tweed . .	Hallmyre, Nov. 5; last seen April 11.
Outer Hebrides	Rodel, Nov. 1; Skerryvore, Nov. 18-20, 23, 24, in rushes; Monach I., "Mid-May."
Argyll and Isles	Skervuile, Nov. 18-20, 23, 24, in rushes.
	First seen Pentland Skerries, Sept. 20; last seen Monach I., "Mid-May." Principal movements, Sept. 20, Oct. 4, Nov. 18-20, 23, 24.

Turdus torquatus (Ring Ouzel).

Orkney . .	Pentland Skerries, in rush with Snow Buntings, Fieldfares, etc., S.E. gale, Oct. 4.
Dee . . .	Girdleness, Oct. 4.
Solway . .	A male, in poor condition, shot at Maxwelltown Dec. 10.

Saxicola œnanthe (Wheatear).

Orkney	N. Ronaldshay, last seen Oct. 15.
Moray	Strathspey, April 8; Cromdale Hills, Oct. 1.
Dee	Fyvie, April 5; Girdleness, Oct. 5.
Tay	Arbroath, March 22, and Oct. 6.
Forth	Doune, April 4; Edinburgh, April 10.
Tweed	Chirnside, April 11.
Outer Hebrides	Mingulay, March 30; Monach I., April 1.
Argyll and Isles	Tiree, one, March 27; plentiful after April 8; last seen Oct. 8.
	First seen Tiree, March 27; last seen N. Ronaldshay, Oct. 15.

Pratincola rubetra (Whinchat).

Shetland	Dunrossness, last seen Oct. 8.
Dee	Fyvie, April 22.
Tay	Glenlyon, May 8th; not numerous till a week later.
Forth	Edinburgh, April 18.
Tweed	Hallmyre, Peebles, May 5.
	First seen Edinburgh, April 18; last seen Dunrossness, Oct. 8.

Pratincola rubicola (Stonechat).

Shetland	Fitful Head, Oct. 8.
Orkney	N. Ronaldshay, one shot, Oct. 15.—"The only one I have noticed here."
Outer Hebrides	Skerryvore, Sept. 11, 12.

Ruticilla phœnicurus (Redstart).

Shetland	Quendale, Dunrossness, last seen Oct. 2.
Orkney	N. Ronaldshay, Sept. 1, 2, and one on Oct. 25; Pentland Skerries, Sept. 20, in rush with *Turdidæ*.
Dee	Fyvie, May 1; Girdleness, Sept. 25 and Oct. 5, in rush, mostly ♀.
Forth	Dalmeny, April 26; Menteith, April 28.
Tweed	Peeblesshire, May 1.
Outer Hebrides	Mingulay, Barra, May 31.
	First seen Dalmeny, April 26; last seen N. Ronaldshay, Oct. 25. Principal movements, Sept. 20-25, Oct. 5.

Erithacus rubecula (Redbreast).

Shetland	Dunrossness, Oct. 8, five or six seen.
Orkney	N. Ronaldshay, Oct. 4.—"Numbers in small parties—a few remaining up to Jan. 7, 1893."

Dee . . .	Girdleness, Nov. 19; numerous, Oct. 5.
Tay . . .	Bell Rock, Feb. 28.
Outer Hebrides	Skerryvore, Oct. 4.
	Principal movements, Oct. 4-8.

Sylvia rufa (Whitethroat).

Orkney . .	N. Ronaldshay, July 10, one, which remained a few days.
Dee . . .	Fyvie, May 12.
Forth . .	Dalmeny, May 12; West Lothian, Sept. 19.
Tweed . .	Peebles, May 24.
Outer Hebrides	Barra, May 13.
Solway . .	Little Ross L.H., May 23.
	First seen May 12; last seen W. Lothian, Sept. 19.

Sylvia curruca (Lesser Whitethroat).

Tweed . .	Nesting at Allantore, Chirnside, June 20.

Sylvia atricapilla (Blackcap).

Shetland . .	Garth, Dunrossness, Oct. 9; one ♀ seen.
Forth . .	Linlithgow, May 19.
Outer Hebrides	Mingalay, Barry, Oct. 5.

Sylvia salicaria (Garden Warbler).

Tweed . .	Chirnside, June 5.

Regulus cristatus (Golden-crested Wren).

Orkney . .	N. Ronaldshay, Nov. 5.
Dee . . .	Girdleness, Oct. 5, numbers in rush with other small birds.

Phylloscopus collybita (Chiff-chaff).

Tweed . .	Chirnside, March 30.—"Increased in numbers of late years."

Phylloscopus trochilus (Willow Wren).

Shetland . .	Dunrossness, Oct. 6, 21.
Orkney . .	N. Ronaldshay, Aug. 31, and first few days of September; large numbers about; wind E.
Moray . .	Glenlivet, May 7.
Dee . . .	Fyvie, April 22; Girdleness, Oct. 5.
Tay . . .	Arbroath, May 11.
Forth . .	Edinburgh, April 18; Callander, April 23.
Tweed . .	Chirnside, April 20; Hallmyre, Sept. 15.
	First seen Edinburgh, April 18; last seen Dunrossness, Oct. 21. Principal movements, Aug. 31, Sept. 5, Oct. 5, 6.

Phylloscopus sibilatrix (Wood Wren).

Tay . . .	Kenmore, May 5, one pair; not numerous till a week later.
Forth . .	Dalmeny, May 8.
West Ross .	Loch Torridon, May 27.

Acrocephalus schœnobœnus (Sedge Warbler).

Moray . .	Helmsdale, May 17.
Dee . . .	Fyvie, May 13, Sept. 13.
Tweed . .	Hallmyre, Peebles, May 25.

Motacilla (Wagtail).

Orkney . .	N. Ronaldshay, Aug. 22, 29, Pied Wagtails.—"In family parties on shore; not observed during breeding season."
Outer Hebrides	Monach L.H., April 27, 30, "Wagtails"; Barra, May 4, White Wagtail; Skerryvore, Aug. 17, two "Wagtails."
Argyll and Isles	Tiree, May 3, 6, White Wagtail, passing N.E.; Sept. 1, White Wagtail.

Anthus trivialis (Tree Pipit).

Forth . .	Callander, April 30; Lothians, May 1.
Tweed . .	Hallmyre, May 24.
West Ross .	Loch Torridon, May 26.

Lanius excubitor (Great Gray Shrike).

Orkney . .	Pentland Skerries, one ♂ shot, Nov. 20.
Sutherland .	Thurso, one ♂ shot, Dec. 16.
Tay . . .	Arbroath, one caught, sex doubtful, Dec. 7.
Forth . .	One ♂ killed near Haddington, June 16.
Tweed . .	One seen near Hutton Village, Chirnside, Oct. 10.

Muscicapa grisola (Spotted Flycatcher).

Forth . .	Edinburgh, May 7; Dalmeny, May 14.
Tweed . .	Peebles, May 17.
Solway . .	Little Ross L.H., May 23.

Muscicapa atricapilla (Pied Flycatcher).

Orkney . .	N. Ronaldshay, July 1, one; Sept. 2, one; Oct. 14, two.—"Seems to occur pretty regularly nearly every autumn."

Hirundo rustica (Swallow).

Shetland . .	Dunrossness, last seen Oct. 8, reported as "unusually abundant in summer of 1892, along with Swifts."
Orkney . .	N. Ronaldshay, Aug. 26, one seen flying W.; wind strong S.W.
Dee . . .	Fyvie, last seen Nov. 16.
Tay . . .	Tayfield, April 23; Arbroath, Oct. 6.
Forth . .	Callander, April 22; Edinburgh, Oct. 14.
Tweed . .	Hallmyre, April 11, Oct. 18.
Outer Hebrides	Butt of Lewis, May 17, Sept. 17.
Argyll and Isles	Inveraray, April 8, one; Jura, April 16.
Solway . .	Loch Ryan, April 22.
	First seen Inveraray, April 8; last seen Fyvie, Nov. 16.

Cotile riparia (Sand Martin).

Shetland . .	Dunrossness, Oct. 8, 13, one seen each day.
Orkney . .	N. Ronaldshay, Sept. 25, one seen after gale from S.W.
Moray . .	Fochabers, last seen Nov. 12.
Dee . . .	Fyvie, May 2 to Oct 14.
Tay . . .	Arbroath, April 29.
Forth . .	Doune, April 15; Edinburgh, Oct. 10.
Tweed . .	Chirnside, April 30; Peebles, Oct. 6.
Outer Hebrides	Monach I., May 25.
	First seen Doune, April 16; last seen Fochabers, Nov. 12.

Chelidon urbica (House Martin).

Moray . .	Helmsdale, May 9.
Dee . . .	Fyvie, May 2 to Oct 10.
Tay . . .	Arbroath, April 28.
Forth . .	Edinburgh, last seen Oct. 10.
Tweed . .	Hallmyre, May 13 to Oct. 14.
Outer Hebrides	Monach I., May 25.
	First seen Arbroath, April 28; last seen Hallmyre, Peebles, Oct. 14.

Fringillinæ (Finches).

Shetland . .	Dunrossness, Oct. 5, Chaffinches and Twites; on succeeding few days Chaffinches in immense flocks, on the 8th associated with Bramblings, the latter forming one-sixth of the whole. Stragglers seen only after Oct. 10, wind shifting from N.-N.N.E. to hard S.E. on night of Oct. 5.

Orkney . .	N. Ronaldshay. Large mixed flocks of Chaffinches and Bramblings on Oct. 5, and in smaller lots till Oct. 10. Last Brambling seen Oct. 14. The Chaffinches seemed to be mostly females. Oct. 18, a few Redpoles. Oct. 19, small flight of Linnets.
Dee . . .	Girdleness, Oct. 5, rush of Chaffinches and Bramblings.
Tay . . .	Bell Rock, March 3, Chaffinches and Linnets; April 12, Linnets.
Outer Hebrides	Rodel, Harris, Nov. 17, several flocks of Chaffinches and Linnets. Mingalay, May 18, one ♀ Goldfinch; Oct. 5, Siskins; Nov. 15, an army of Greenfinches. Principal movements, Oct. 5-10, Nov. 15-17.

Loxia curvirostra (Common Crossbill).

Orkney . .	N. Ronaldshay, July 7; a female taken near the Lighthouse.

Plectrophanes nivalis (Snow Bunting).

Shetland . .	Sumburgh Head, Sept. 13; Dunrossness, Oct. 6 and succeeding few days, considerable flocks passing south. Sumburgh Head, Nov. 13, a rush all night.
Orkney . .	Pentland Skerries, Sept. 7; N. Ronaldshay, Sept. 19, 21, in small flights, and from Oct. 19 to Oct 24 in flocks of thousands.
Sutherland .	Dunnet Head, Sept. 18.
Moray . .	Strath Brora, Oct. 21; Ben Aigan, Oct. 28.
Dee . . .	Fyvie, Oct. 20; Girdleness, Oct. 23.
Tay . . .	Arbroath, Nov. 15.
Outer Hebrides	Butt of Lewis, large flocks, Sept. 17; Rodel, Harris, Oct. 17; Monach I., May 3. First seen Pentland Skerries, Sept. 7; last seen Monach I., May 3. Principal movements, Sept. 17-21, Oct. 6, 19-24.

Alauda arvensis (Skylark).

Shetland . .	Dunrossness, Skylarks observed drawing together in flocks a day or two previous to the great movement of Oct. 5, 6.
Dee . . .	Girdleness, Nov. 19, 23, 24, in rushes with other birds; wind N.E., light.
Tay . . .	Bell Rock, Feb. 24, in great numbers at light, 10 P.M. till dawn, wind E., fog; Feb. 25,

a few; Feb. 29, in hundreds, 9-12 P.M., hazy; March 3, a few.

OUTER HEBRIDES Skerryvore, Sept. 19, three young birds; Dec. 4, four, N.W. gale, snow.

ARGYLL AND ISLES Skervuile, Jura, Nov. 18-20, 23, 24, in rush with *Turdidæ*; wind strong E., haze.

Principal movements, Feb. 24-27, Nov. 18-24.

Sturnus vulgaris (Common Starling).

ORKNEY . . N. Ronaldshay L.H., Nov. 5-22, a few each night, with Fieldfares. Large flights in N. Ronaldshay in early autumn, a few only remaining for the winter.

Hoy Sound. Those wintering here leave about May 1, flying W.

ARGYLL AND ISLES Skervuile, Jura, Nov. 23, 24, in rush with *Turdidæ*.

Cypselus apus (Common Swift).

SHETLAND . . Reported by Mr. John Bruce as occurring with Swallows in Dunrossness during the summer.

ORKNEY . . N. Ronaldshay. Three seen, one killed, Aug. 26, flying west; wind S.W., very stormy.

DEE . . . Fyvie, May 20; Girdleness, Sept. 11.

TAY . . . Loch Tay, May 10; Broughty Ferry, Sept. 3.

FORTH . . Doune, May 9; Edinburgh, May 12; Haddington, Nov. 16 ("Annals," Jan. 1893).

TWEED . . Hallmyre, May 11; Chirnside, May 13.

OUTER HEBRIDES Monach I., May 10.

First seen Doune, May 9; last seen Haddington, Nov. 16.

Alcedo ispida (Kingfisher).

OUTER HEBRIDES Barra, July 25.

Cuculus canorus (Cuckoo).

MORAY . . Glenlivet, May 8; Helmsdale, May 9.

DEE . . . Fyvie, May 9.

FORTH . . Edinburgh, April 27; Callander, April 30.

TWEED . . Hallmyre, April 29.

OUTER HEBRIDES Stornoway, May 11; Rodel, May 15; I. Ghlas, Harris, Aug. 22, first time seen here.

ARGYLL AND ISLES Skervuile, Jura, May 1.

SOLWAY . . Loch Ryan, May 1.

First seen Edinburgh, April 27.

Strigidæ (Owls).

SHETLAND . . Short-eared Owl (*A. accipitrinus*) seen flying at Sumburgh Head in September.
Snowy Owl (*Nyctæa scandiaca*) seen flying south over Loch Spiggie, Oct. 28.

ORKNEY . . N. Ronaldshay. Long-eared Owl (*Asio otus*), male, shot Nov. 24.
A. accipitrinus, Dec. 2, 3; one killed, one seen.
Nyctæa scandiaca, seen Nov. 2.
Scops owl (*Scops giu*), one taken at the Light-house, June 2; the first record of this owl for Orkney.

Circus cyaneus (Hen Harrier).

ORKNEY . . Hen Harrier, a male seen July 16; generally seen in September.

Ardea cinerea (Common Heron).

SHETLAND . . Visits Dunrossness in small parties in autumn. First seen Sept. 1.

ORKNEY . . N. Ronaldshay, in small numbers every year, generally appearing early in August.

Anatidæ.

Wild Geese.

SHETLAND . . Dunrossness, Oct. 10, one Greylag on Loch Spiggie.
Bernicle Geese (*B. leucopsis*) on migration, in numbers Oct. 6 and succeeding few days; wind N.E.

ORKNEY . . N. Ronaldshay, Oct. 7, three Greylag, N.W. gale; Oct. 10, "Wild Geese"; July 4, two Gray Geese. Brent Geese (*B. brenta*) fairly plentiful during winter of 1891-92.

TAY . . . Pink-footed Geese (*Anser brachyrhynchus*), Newport, Fife, April 29. Flock of ten, Sept. 19; "earliest date I have known here."

OUTER HEBRIDES Barra Head, Oct. 17, about 150 Bernicle Geese flying south; wind N. I. Ghlas, May 3, flock of 29 "Wild Geese," flying north.

ARGYLL AND ISLES Tiree, "Wild Geese" left April 30, in flock of 150, going north, and returned Oct. 7, three weeks earlier than usual; strong N. wind.

Swans.

Orkney . .	N. Ronaldshay, Oct. 15, flock of 30 Whoopers (*Cygnus musicus*) crossing the island to west.
Sutherland .	Thurso, March 25, Whooper seen; April 9th, young male shot.
Outer Hebrides	Barra Head, Dec. 7, Swan shot, supposed to be a young specimen of *C. bewicki*.

Ducks.

Shetland . .	Teal (*Querquedula crecca*), Dunrossness, in numbers about Oct. 8, with Widgeon.
	Tufted Duck (*Fuligula cristata*), Sept. 17, a few in Quendale Bay.
	Longtailed Duck (*Harelda glacialis*), Oct. 17, in hundreds off coast at Quendale.
Orkney . .	Pochard (*Fuligula ferina*), N. Ronaldshay, Nov. 14.
	Tufted Duck, Oct. 10.
	Golden Eye (*Clangula glaucion*), Nov. 2.
	Longtailed Duck, Nov. 2, in large numbers.
Moray . .	Ruddy Sheldrake (*Tadorna casarca*), Findhorn estuary, Oct. 19, *see* "Annals."
Tay . . .	Tufted Duck, Newport, Fife, Sept. 12.
Tweed . .	Tufted Duck, nest with eggs in Selkirkshire, July, *see* "Annals."
Outer Hebrides	Pochard, Rodel, June 5, a pair remaining to breed.
	Pintail (*Dafila acuta*), Rodel, Oct. 29.
	Longtailed Duck, a pair seen daily in May, Mingalay.

Turtur communis (Turtle Dove).

Sutherland .	Male shot near Wick June 7.

Rallus aquaticus (Water Rail).

Shetland . .	Loch Hillwell, Sept. 28; Mousa, Oct. 20, "believed to breed in Shetland."
Orkney . .	N. Ronaldshay, in large numbers during the winter; first seen Nov. 9; most of them disappeared by Dec. 9.

Porzana maruetta (Spotted Crake).

Shetland . .	One seen near Lerwick, Sept. 21; said to be not uncommon between September and November.
Orkney . .	One killed and another seen, N. Ronaldshay, Sept. 27.

Crex pratensis (Land Rail).

Orkney . .	Pentland Skerries, April 27, a pair, the male bird killed at lantern; Hoy Sound, May 18; last seen Oct. 16.
Tay . . .	Fearnan, Loch Tay, May 10; Arbroath, May 23.
Forth . . .	Duddingston, May 7; Doune, May 10.
Tweed . .	Hallmyre, May 4.
Outer Hebrides	Stornoway, May 6; Island Ghlais, Aug. 23.
Argyll and Isles	Tiree, May 16.
Solway . .	Loch Ryan, May 18.
	First seen April 27, Pentland Skerries; last seen Oct. 16, same locality.

Charadrius pluvialis (Golden Plover).

Shetland . .	Dunrossness, two shot in September; decidedly scarce in autumn.
Orkney . .	N. Ronaldshay, first seen July 4; in numbers during first half of August, and again at end of November.
Outer Hebrides	Monach I., May 10.

Squatarola helvetica (Gray Plover).

Orkney . .	N. Ronaldshay Sept. 3.
Outer Hebrides	I. Ghlais, Harris, May 10.

Vanellus vulgaris (Lapwing).

Shetland . . .	Dunrossness, scarce on migration; Oct. 3, one; Oct. 6, four.
Orkney . .	Hoy Sound, first seen April 3; N. Ronaldshay, mostly leave early in September.
Tay . . .	Bell Rock, Feb. 26, one; March 3, twelve passing west, wind E.
Outer Hebrides	Barra Head, Nov. 10, two; Oct. 25, one. Butt of Lewis, first seen April 15. Monach L.H., April 18.
Argyll and Isles	Skervuile, Jura, Nov. 23, large flock in rush with other birds, wind E.

Strepsilas interpres (Turnstone).

Orkney . .	N. Ronaldshay, July 4, five; July 27, a score; and numbers later. A few seem to remain all the year.
Outer Hebrides	Monach I.—"A good few always round here: a pair about the same place every year."
Argyll and Isles	Tiree, May 6.—"A few always stay here all summer."

Phalaropus hyperboreus (Red-necked Phalarope).

ORKNEY . . N. Ronaldshay, last seen August 4.
ARGYLL AND ISLES A specimen of *P. fulicarius* (Gray Phalarope), picked up in Oban Bay, Jan. 15.

Scolopax rusticula (Woodcock).

SHETLAND . . Sumburgh Head, one seen, Oct. 20.
ORKNEY . . N. Ronaldshay, Nov. 3, 9.
SUTHERLAND . Dunnet Head, one killed at lantern, Nov. 17.
DEE . . . Girdleness, in rush with other birds, Nov. 19.
FORTH . . Spring migration: Doune, March 4, eight birds, new arrivals; March 11, a great many; all passed by March 15.
OUTER HEBRIDES Barra Head, Oct. 20; Rodel, Harris, Oct. 17; Skerryvore Nov. 23, 24, in rush with *Turdidæ*, wind E., hazy.
ARGYLL AND ISLES Tiree, January 11.—"Very abundant: more than I have ever seen here before."
Principal movements, March 11-15, Nov. 19, 23, 24.

Gallinago major (Double Snipe).

SUTHERLAND . Thurso, Aug. 24, young male killed.
SHETLAND . . Among flights of Snipe visiting Dunrossness at latter end of September were a number of individuals which were doubtless specimens of *G. major*. [1891, J. A. H.-B.]

Gallinago cœlestis (Common Snipe).

ORKNEY . . Arrived in N. Ronaldshay as early as August, but most plentiful in latter half of November and December.

Gallinago gallinula (Jack Snipe).

SHETLAND . . A number seen in Dunrossness: earliest Sept. 28; most between Oct. 6 and 10; a few remained longer.
ORKNEY . . N. Ronaldshay, first seen Sept. 6.

Tringa minuta (Little Stint).

ORKNEY . . N. Ronaldshay, Aug. 26, in flocks of from ten to fifty, and numerous up to Sept. 2.
ARGYLL AND ISLES Tiree, Aug. 31, in large flocks.

Tringa striata (Purple Sandpiper).

SHETLAND . . Dunrossness, Sept. 29.
ORKNEY . . N. Ronaldshay, Aug. 23, five.

Tringa canutus (Knot).

Orkney . .	N. Ronaldshay, Aug. 12, one; Aug. 17 to 23, in flocks.
Argyll and Isles	Tiree, Aug. 12; May 28, flock of seven flying north.

Machetes pugnax (Ruff).

Orkney . .	N. Ronaldshay, Aug. 9, 26, Sept. 1; singly, or not more than three together.
Argyll and Isles	Tiree, Sept. 6, 22, three.

Calidris arenaria (Sanderling).

Shetland . .	Quendale, one shot, Sept. 7; the only one seen.
Orkney . .	Wonderfully numerous in N. Ronaldshay; first seen Aug. 25, flock of fourteen with Ringed Plover.
Argyll and Isles	Tiree, May 16, winter residents have left; May 31, several hundreds in summer plumage, wind S.; Aug. 25, first seen passing south.

Totanus hypoleucus (Common Sandpiper).

Orkney . .	N. Ronaldshay, last seen Sept. 1.
Moray . .	Glenlivet, April 24.
Tay . . .	Arbroath, April 25.
Forth . .	Edinburgh, April 18.
Tweed . .	Peebles, April 24.
Outer Hebrides	Monach I., May 1.
Argyll and Isles	Tiree, May 16.
	First seen, Edinburgh, April 18; last seen, N. Ronaldshay, Sept. 1.

Totanus canescens (Greenshank).

Orkney . .	Scarce on autumn migration; one seen Oct. 25, and two shot out of flock of six in same month. N. Ronaldshay.
Argyll and Isles	Tiree, last seen May 7, returned Aug. 3.

Limosa (Godwit).

Shetland . .	Small numbers of *L. lapponica* (Bar-tailed Godwit) at Virkie Vöe in October.
Orkney . .	A specimen of *L. lapponica* in full breeding plumage seen in N. Ronaldshay, June 8.
Tay . . .	Tay estuary, Sept. 19, *L. lapponica;* pair of *L. ægocephala* (Black-tailed godwit) shot in Montrose basin, Sept. 19; and one near Tayport, Sept. 3.

ARGYLL AND ISLES Tiree, *L. lapponica* last seen April 1, passing Sept. 6. *L. ægocephala*, May 29, one; June 19, two.

Numenius phæopus (Whimbrel).

SHETLAND . . Dunrossness, last seen Oct. 3.
TAY . . . Tayport, Aug. 31.
OUTER HEBRIDES Barra, April 12; Rodel, Harris, April 11.
ARGYLL AND ISLES Tiree, April 28; May 7, flocks passing north; Aug. 25, flocks passing south.

Sterna (Terns).

ORKNEY . . Pentland Skerries, *S. fluviatilis* (Common Tern), May 10.
MORAY . . Glenlivet, *S. fluviatilis*, May 13.
TAY . . . Arbroath, *S. fluviatilis*, May 11, Oct. 1.
OUTER HEBRIDES Butt of Lewis, May 24, "Terns" come to breed; Rodel, June 7.
ARGYLL AND ISLES Tiree, *S. minuta* (Little Tern), May 11, one; plentiful by May 15. Skervuile, Jura, "Terns," May 17; Arctic Tern, May 9.

Larus glaucus (Glaucous Gull).

SHETLAND . . Dunrossness, Oct. 9, one, flying north-west; on Oct. 26, seven, passing south, in single birds and in pairs: wind N.W. by W. Sumburgh Head, Nov. 8, two.
ORKNEY . . N. Ronaldshay, Nov. 10, single birds in mature plumage.
ARGYLL AND ISLES Kerrara, March 3, one shot.

Larus leucopterus (Iceland Gull).

SHETLAND . . One in Grutness Bay, Oct. 13.
ORKNEY . . N. Ronaldshay, Jan. 3; Foula, Jan. 12.
SUTHERLAND . Sandside, Caithness, Jan. 23; Thurso, Dec. 11, two shot.
OUTER HEBRIDES Stornoway, one shot in January, one May 20, and one seen May 23; seen also from July to September, and supposed to have remained all summer. Monach L.H., one seen April 28.
ARGYLL AND ISLES Inverary and Poltalloch, Feb. 4; the latter specimen immature.

Stercorarius (Skua).

ORKNEY . . Single birds identified as *S. pomatorhinus* (Pomatorhine Skua) seen at Stromness Point, Nov. 5, Dec. 29; *S. crepidatus*, Richardson's Skua, common in N. Ronaldshay after Aug. 3.

TAY . . . *S. pomatorhinus* shot near Comrie, third week in September.
ARGYLL AND ISLES Tiree, *S. crepidatus*, May 20.

Procellaria pelagica (Stormy Petrel).

MORAY . . One captured in Strath Brora, 15 miles from sea, Oct. 20.
FORTH . . Inchkeith, twelve seen, Aug. 12.
OUTER HEBRIDES Barra Head, Nov. 16.
SOLWAY . . Loch Ryan L.H., one at lantern, Nov. 25; S.W. gale.

Colymbus glacialis (Great Northern Diver).

SUTHERLAND . Adult male, with breeding plumage not quite complete, caught in nets at Thurso, June 13.
ARGYLL AND ISLES Skervuile, Jura, pair about the rock, April 17-28.

ADDITIONS TO THE AUTHENTICATED COMITAL CENSUS OF THE LAND AND FRESHWATER MOLLUSCA OF SCOTLAND.

WM. DENISON ROEBUCK, F.L.S.

Hon. Secretary and Recorder to the Conchological Society of Great Britain and Ireland.

THANKS to the kindness of several friends,—viz. Mrs. Janet Carphin of Edinburgh, Mr. William Evans, F.R.S.E., of the same city, Mr. Lionel W. Hinxman of the Geological Survey of Scotland, Mr. W. Baillie of Brora, Sutherlandshire, and Mr. W. Duncan of Montrose,—I am able to add a considerable number of new records in continuation of my paper in the "Annals of Scottish Natural History" for October 1892, pp. 235-238, and in former numbers. The paragraphs are numbered in continuation from my last paper.

11. SHELLS FROM LOCHMABEN, DUMFRIESSHIRE.—This is a county from which in former times I have been singularly unsuccessful in obtaining mollusca for authentication and record. I was therefore extremely pleased to receive from Mrs. Carphin a few specimens of *Sphærium corneum* (referable to the var. *nucleus* but not perfectly

characteristic of it), *Pisidium fontinale*, *P. pusillum*, *P. milium* (=*roseum*), *Limnæa palustris*, *L. peregra* var. *lacustris*, *Planorbis fontanus* (=*nitidus*), *Pl. nautileus*, *Pl. albus*, *Pl. spirorbis*, *Pl. umbilicatus* (=*marginatus*), *Pl. contortus*, *Physa fontinalis*, *Valvata piscinalis*, *Succinea putris*, and *Vertigo pygmæa* var. *quadridentata*, sixteen species, from Lochmaben. All of these are, with the exception of the *L. peregra*, additions to the list of Dumfriesshire shells which have passed the scrutiny of the Conchological Society's referees; the specimens have, with one exception, been kindly presented to the Conchological Society's cabinet. Numerous further additions may be anticipated to the Dumfriesshire list, which, so far, only amounts to a total of 38 species.

12. HELIX PULCHELLA AND H. CAPERATA IN PEEBLESSHIRE.—It is to Mrs. Carphin also that we are indebted for an example of *H. pulchella* taken at Peebles, and one of *H. caperata* at Innerleithen, both additional authentications for this county, for which we have now 36 species on record. As Mrs. Carphin points out, it is interesting to find the last-named species so far inland, as in Scotland it is more usually found in districts bordering on the sea.

13. ARION MINIMUS AND PISIDIUM PUSILLUM IN SELKIRKSHIRE.—For these two additions to the county list, which now numbers a total of but 29 species authenticated, we are indebted to Mr. Wm. Evans, by whom they were found at Tushielaw, 10th July 1892. From this place he also forwarded *Cochlicopa lubrica* and *Hyalinia crystallina*, which have been already recorded for the county.

14. LIMNÆA GLABRA IN MIDLOTHIAN.—From Mr. Wm. Evans we have a couple of specimens of this species, collected at Bavelaw Moss, near Balerno, 17th April 1891: an important addition to the fauna of the county of Edinburgh.

15. HELIX HISPIDA (=CONCINNA) AND HYALINIA PURA IN LINLITHGOWSHIRE.—A consignment of shells from this county so far back as the 18th October 1890, which has been mislaid and so escaped my attention, includes these two species, additional to my list. A number of shells collected at Philpstoun on the date mentioned

included an example of *H. pura*, one of *H. cellaria*, a few of *H. nitidula*, some young *Helix rotundata*, a *Cochlicopa lubrica*, and several *Vitrina pellucida*. Another box of shells collected about Linlithgow on the same date included, in addition to several specimens of the type and a few of the var. *albida* of *Helix hispida* (the shell hitherto known as *H. concinna*, and so recorded in my former papers), a young *H. aspersa*, several small *Physa fontinalis*, several encrusted and blackened examples of *Sphærium corneum*, and numerous *Limnæa peregra*, also blackened and encrusted. For the sight of these shells we are indebted to our indefatigable friend Mr. Wm. Evans.

16. VERTIGO PYGMÆA[1] AND OTHER SHELLS IN FIFESHIRE.—I have one addition for the Fifeshire list in *Vertigo pygmæa*, found by Mr. Wm. Evans at Elie, 20th June 1891, along with *Helix pulchella* and *Pupa cylindracea* (= *umbilicata*). From Mrs. Carphin we have a specimen of the var. *maritima* of *Limnæa peregra*, albeit not a very characteristic one, which it is of interest to note, although the species has, of course, been authenticated for the county long ago.

17. ADDITIONAL RECORDS FOR SOUTH PERTH WITH CLACKMANNAN.—From Mrs. Carphin we have received two species additional for this area,—viz. *Planorbis nautileus* var. *crista*, and *Ancylus lacustris*,—both from Bridge of Allan, a locality which, although, as Mrs. Carphin points out, it is included politically in Stirlingshire, is included in the vice-county of South Perth in Mr. Watson's comital scheme, which we follow.

From Strathyre we have a couple of examples of *Cochlicopa lubrica*, which Mrs. Carphin sent us. This, however, has been added (since the census) by Mr. Evans, and is consequently no longer an addition.

18. VERTIGO SUBSTRIATA IN SOUTH PERTHSHIRE.—Mr. Wm. Evans has been so fortunate as to meet with this seldom-detected species on the banks of the Keltie, near Callander, where he found it on the 25th April 1892, in

[1] The Editors remind me that this species was recorded from Elie by Mr. Thomas Scott, F.L.S., so long ago as 1891 ("Scot. Nat.," April 1891, p. 50), but as the specimen in question has not been seen by the Society's referees, it does not come within the scope of this paper.

company with a few examples of *V. edentula*. We have had the opportunity of examining the specimens of both, *V. substriata* being especially noteworthy as an addition to the South Perthshire list.

19. Shells in North Perthshire.—Mrs. Carphin sent us single examples of *Helix granulata* (= *sericea*), *H. arbustorum*, and *Unio margaritifera*, from Dunkeld, and all of them additional records for the vice-county, for which we have now had 52 species placed on record.

20. The White Variety of Arion ater in Kincardineshire.—Although not a new county record, it will be of interest to record that in 1891 I received from Mr. Wm. Duncan, of Montrose, a fine living example of *Arion ater* var. *alba*, which he had found on the banks of the North Esk at Morphie.

21. Unio margaritifera in Banffshire.—The receipt of an example of the pearl mussel from the river Spey at Aberlour, sent by Mr. Lionel W. Hinxman, of the Geological Survey of Scotland, enables us to add this fine species to our list for Banffshire. Another addition for the same county is *Helix rotundata*, of which we have specimens collected at Dufftown in November 1892 by Mr. Hinxman. At the same time and place he found the following, which, however, have already been placed on record by himself and other friends: *Helix hortensis* var. *lutea* 12345, *H. arbustorum*, *Pupa cylindracea* (= *umbilicata*), *Bulimus obscurus*, *Balea perversa*, *Clausilia perversa* (= *rugosa*), *Cochlicopa lubrica*, *Arion ater*, *A. minimus*, *A. circumscriptus*, and *Agriolimax agrestis* var. *sylvatica*.

22. Additional records for Easterness.—A collection of slugs and shells made by Mr. Wm. Evans at Dalwhinnie and received by me on the 17th June 1892 includes three species additional to the vice-county: namely, *Arion subfuscus*, *A. minimus*, and *Hyalinia fulva*; the other species sent with them including *Arion ater* (small), *A. circumscriptus* (= *bourguignati*), *A. hortensis*, *Agriolimax agrestis*, *Hyalinia alliaria*, *H. radiatula*, and *Cochlicopa lubrica* (very young). The elevation at which they were found was 1200 feet.

23. New records for East Sutherlandshire.—From our old friend Mr. W. Baillie of Brora, to whom at various times we have been indebted for much assistance willingly rendered, we received a few specimens each of *Limnæa peregra* and its var. *lineata*, **Planorbis nautileus*, **Pl. spirorbis*, **Pisidium fontinale*, *P. pusillum* and var. *obtusale*, all from Loch Brora, collected on 17th October 1892; and from Brora, the same date, the following land-shells: *Cochlicopa lubrica, Balea perversa*, *Vitrina pellucida*, *Pupa cylindracea* (=*umbilicata*), **P. marginata*, *Hyalinia crystallina*, *H. cellaria*, *H. pura*, *Helix arbustorum*, *H. caperata*, and *H. pygmæa*, the four species marked with the asterisk (*) being additional records.

24. The faunal status in Scotland of Neritina fluviatilis and Planorbis carinatus.—I have been in correspondence with Mrs. Carphin on this subject. She informs me that the former lives in abundance in Loch Stennis, Orkney, and that as to the latter the only Scottish locality given for it is the pond in the Botanic Garden at Edinburgh, which is full of imported plants. There can be no doubt whatever that *Planorbis carinatus* is certainly not entitled to be ranked as a Scottish shell; while with regard to the *Neritina*, it would be a matter of considerable interest to ascertain why it should be found in the Orkneys and nowhere else in the kingdom of Scotland.

25. Helix pygmæa and Vertigo edentula added to the Elginshire list.—So much material has been placed before our referees from the county of Elgin by the kindness of the Rev. George Gordon, D.D., and Mr. William Evans, F.R.S.E., that it is not now an easy matter to add o the number of species that we have had the opportunity of seeing from it. Nevertheless, an examination of a collection of specimens made by Mr. Evans so far back as August 1891 (and which has been mislaid and only just turned up) adds a couple of molluscs to the list of authentications, which now amounts to 55 species. One of these is *Helix pygmæa*, a few examples of which were collected at Ballindalloch Castle, 15th August 1891, along with *Hyalinia nitidula* (one), *H. alliaria* (a few, small), *H. crystallina* (several), *H.*

pura var. *margaritacea* (a few), *H. fulva* (two), *Vitrina pellucida* (one, small), and *Carychium minimum* (several). The second addition is *Vertigo edentula* from Cromdale, near Grantown, a few of which were collected in August 1891 along with *Vitrina pellucida* (several), *Hyalinia cellaria* (one), *H. alliaria* (a few), *H. radiatula* (a few), *Cochlicopa lubrica* (several), *Limnæa peregra* (two), and *Ancylus fluviatilis* (one).

26. Six additions to the Banffshire List.—The examination of specimens collected by Mr. William Evans in Banffshire so long ago as August 1891, which I have had the misfortune to misplace, and which I have just found, brings under the notice of our referees as many as six species which they have not hitherto seen from Banff, and which bring its total list of species up to 32. An example of *Hyalinia radiatula* is among a gathering made at Ballindalloch on the 15th August 1891, which also includes an individual of *Vitrina pellucida* and several of *Helix rotundata* and of *Cochlicopa lubrica*. The other five additions are *Hyalinia fulva*, *H. glabra*, *H. pura* var. *margaritacea*, *Helix pygmæa*, and *Carychium minimum*, of which a few specimens each were collected on the banks of the Avon above Ballindalloch, Banffshire, on the 25th August 1891, along with several *Hyalinia crystallina*, a few *Vitrina pellucida*, several *Cochlicopa lubrica* (both type and var. *lubricoides*), and several *Limnæa truncatula* var. *ventricosa*.

27. Shells from Easterness.—I have to thank Mr. William Evans for an interesting series of shells collected during May of the present year at and near Aviemore, in the vice-county of Easterness, which includes as many as 11 species which our referees have not hitherto seen from that vice-county. These are *Hyalinia nitidula* (one), *Helix lamellata* (one), *H. fusca* (one, young), *H. rotundata* (one), *Vertigo edentula* (one), *Clausilia rugosa* (one, small), *Succinea putris* (several, young), *Limnæa truncatula* (one), *Ancylus fluviatilis* (a few), and a number of *Pisidium pusillum* and *P. fontinale* (these two from Loch Phitinlais). Other shells sent at the same time were *Cochlicopa lubrica* (a few), *Hyalinia fulva* (one), *H. crystallina* (several), *H. radiatula*, *H. pura* var. *margaritacea* (several), *H. alliaria* (several), and *Vitrina pellucida* (one); and they were accompanied by small

examples of three slugs: *Arion subfuscus* (one), *A. minimus* (two), and *Limax cinereo-niger* (one, from Loch-an-Eilan). While recording these, I take the opportunity of mentioning several examples of *Hyalinia alliaria* and a few of *Vitrina pellucida* collected on the 12th of September 1891 at Nairn, which Mr. Evans has been good enough to allow us the sight of. The eleven additions now brought forward raise the total number of authentications for Easterness to 36 species.

ON SCOTTISH DESMIDIEÆ.

By John Roy, LL.D.

(*Continued from p.* 111.)

Plate IV.

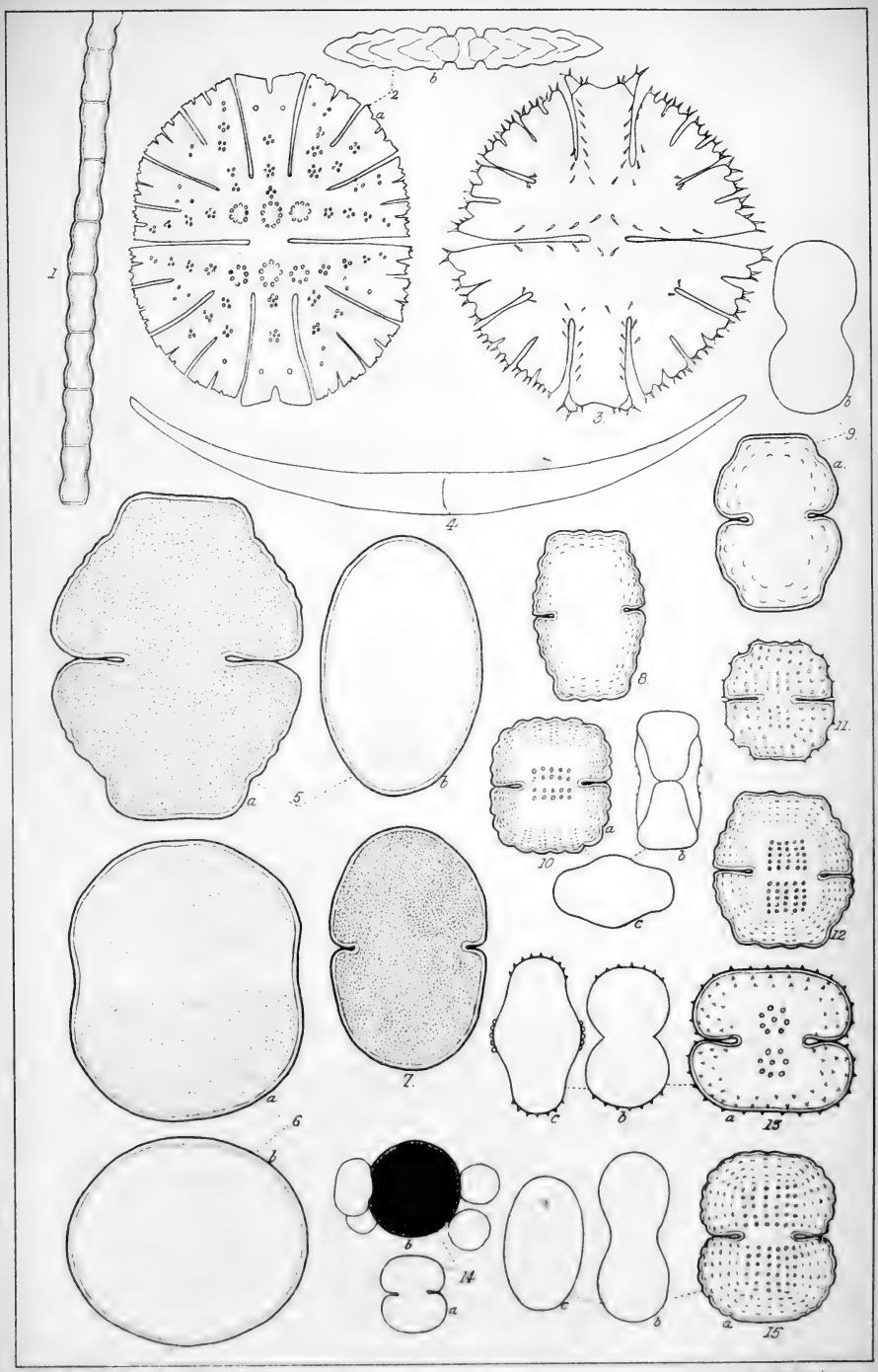
DESMIDIEÆ (Kg.), De Bary.

DESMIDIUM (*Ag.*), *De Bary.*

1. *D. Aptogonum*, Breb.—Not common. Sutherland, Aberdeen, Kincardine, Forfar, Perth, Argyle, Fife.
   β *Ehrenbergii*, Rab.—Rare. Aberdeen—pools beside Birsemore Loch; Kincardine—near Banchory.
2. *D. cylindricum*, Grev.—General. With zygospores, at Slewdrum in Birse.
3. *D. quadratum*, Nordst.—Very rare. Aberdeen—at Slewdrum in Birse.
4. *D. Swartzii*, Ag.—General. With zygospores, at Tomachar, in Aberdeen.
   β *quadrangulatum*, Ralfs.—Rare. Aberdeen—Scotston Moss (Mr. P. Grant and Dr. Dickie), Heughhead near Aboyne, Black Moss in Cromar, Braemar (Mr. W. West).

HYALOTHECA, *Kg.*

1. *H. dissiliens* (Sm.), Breb.—General.
   β *bidentula*, Nordst.—Common.
   γ *tridentula*, Nordst.—Common. Zygospores are abundant.
2. *H. mucosa* (Dillw.), Ehr.—Not common. Inverness, Aberdeen, Kincardine, Perth, Argyle.
   β *minor*, n. var.—Very rare. Only half the usual diameter, 9-12 μ. Aberdeen—plentiful in a small pool at the west end of Birsemore Loch.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3. *H. undulata*, Nordst.—Very rare. Aberdeen—in two pools immediately to the west and north of Loch Dawan.

This species was detected in Sweden by Dr. Nordstedt in 1878, and was published in No. 248 of Wittrock and Nordstedt's "Algæ Exsiccatæ." It was first collected and identified as a new species about 1870 by Mr. W. Archer, F.R.S., in the west of Ireland; and was sent to a few of his friends under the MS. name of *H. tenuis*, but was not otherwise published, though a careful drawing was made at the time. We found it in Aberdeenshire in 1874, and afterwards in North Wales (Plate IV. fig. 1).

GYMNOZYGA, *Ehr.*

G. moniliformis, Ehr. (= *Bambusina Brebissonii*, Kg. = *Didymoprium Borreri*, Ralfs.)—General. With zygospores, in Aberdeen, Kincardine, Perth, and Argyle.

SPONDYLOSIUM, *Breb.*

S. pulchellum, Archer.—Not common. Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Argyle.

This species has been found distinctly stipitate, attached to species of *Conferva*. Mr. Archer drew my attention to this.

SPHÆROZOSMA, *Corda.*

1. *S. Archeri*, Gutwinski ("Flora Glonów Okolic Lwowa," Tab. I. fig. 4, p. 29, 1891; Nordstedt in Witt. and Nord., "Alg. Exsic.," No. 967, 1889, under *Sphærozosma vertebratum* (Breb.), Ralfs. Forma; and Nordstedt in "Alg. Aq. Dulcis Exsic.," Fascic. 21, p. 34, 1889.—Very rare. Aberdeen—pond at Tonley, near Alford, where it is abundant; and near Castleton, Braemar, where we first found it, very sparingly, in 1878.

Nordstedt and Gutwinski think that probably this is the species Archer had in view as having a spiny zygospore. I scarcely think so, for he makes no mention of the two rows of granules on the semi-cell, which he was far too good an observer to miss. Biene's form (Rabenh. "Alg. Europ.," No. 1769) is so completely shrunk, that no amount of coaxing will show the true form of the cells; but no trace of granules can be seen on them. The probability, therefore, is that his form and Archer's are the same.

2. *S. excavatum*, Ralfs.—General. Frequently conjugated, especially among stones in the margins of streams.
   β *Wallichii*, Jacobs.—Probably not uncommon. Inverness, Aberdeen, Kincardine.
   γ *Wallichii* has been observed on Deeside, and is probably common.
3. *S. granulatum*, Roy and Bisset.—Widely distributed, but not common. Sutherland, Inverness, Aberdeen, Kincardine, Forfar, Perth, Argyle.
4. *S. secedens*, De Bary.—Very rare. Aberdeen—at Slewdrum in Birse, Loch Dawan, and Mosston Moor in Cromar.
5. *S. vertebratum* (Breb.), Ralfs.—Not common. Aberdeen, Kincardine, Forfar, Perth.

ONYCHONEMA, Wallich.

1. *O. filiforme*, Ehr. (*Sphærozosma*, Aut.)—Not common. Ross—near Strathpeffer; Inverness—Lochs Ruthven, Aschie, and Coire, etc., near Brin; Aberdeen and Kincardine have numerous localities.
2. *O. læve*, Nord.—Extremely rare. Found once. Aberdeen—by the side of the old road from Aboyne to Kincardine O'Neil, about a mile from Aboyne.
3. *O. Nordstedtiana*, Turner.—Not common. Probably occurs more frequently than its near relative *O. filiforme*; but its separate distribution was not noted till recently.

MICRASTERIAS, Ag.

1. *M. americana* (Ehr.), Ag.—Rare. Aberdeen—Scotston Moor, Powlair, south of Birsemore, Slewdrum, Morven, Lochnagar, corrie of Loch Ceanmhor; Kincardine—Glen Dye and Clochnaben; Forfar—Lundie Bog near Menmuir; Perth—Glen Shee and Glas Maol.
   β Ralfs.—Very rare. Aberdeen—Corrie of Loch Ceanmhor; Kincardine—Crathes, and about Cammie in Strachan.
2. *M. angulosa*, Hantz.—Not common. Sutherland, Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Argyle.
   Conjugated at Slewdrum on Deeside. Zygospore large, globose; spines stout, bi-, tri-, and quadri-furcate at their apices, and not very numerous. Diameter, without spines, 114-116 μ; length of spine, 32 μ (Plate IV. fig. 2).
3. *M. conferta*, Lundell.—Rare. Inverness—Glen Urquhart; Aberdeen—Upper Powlair in Birse, Birsemore Loch and Dalwhing near Aboyne, pool north of Loch Dawan, and

marshes between Loch Kinord and Cambus-o'-May; Kincardine—Muiryhaugh and Dalbrake in Strachan; Argyle—in Glen Coe; Arran—in North Glen Sannox.

4. *M. crenata*, Breb.—Pretty common. Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Argyle, Arran, Fife.

5. *M. Crux-Melitensis* (Ehr.), Ralfs.—Rare. Aberdeen—Scotston Moor, Brimmond, Den of Gowner near Old Meldrum, Slewdrum, beside Birsemore Loch, Tomachar and Homehead in Cromar; Kincardine—somewhere near Cammie in Strachan; Forfar—Clova Tableland; Perth—Durdie, near Perth.

6. *M. denticulata*, Breb.—General.
   β *notata*, Nordst.—Not uncommon.
   γ *angusto-sinuata*, Gay.—Rare, or overlooked. Kirkcudbright (Mr. W. West).

7. *M. fimbriata*, Ralfs.—Rare. Aberdeen—Scotston Moor, near Kintore, Presswhin, Loch Ullachie, near Ballater; Kincardine—near Bridge of Feugh; Forfar—Tannadice Curling Pond, marsh north-west from Menmuir Church.
   β *spinosa*, Bisset, n. var.—Very rare.
   Differs from the typical form in having a row of minute spines along each side of the principal sinuses, three or four close to the base of each semi-cell, and a row of about four under the base of the end lobe. Length, 210 μ; breadth, 200 μ; isthmus, 25 μ (Plate IV. fig. 3). Aberdeen—Slewdrum, Loch Ullachie and marsh west of it.

8. *M. Jenneri*, Ralfs.—Not uncommon. Sutherland, Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Argyle, Arran.

9. *M. mucronata* (Dixon), Rab.—Not common. Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Argyle, Arran.

10. *M. oscitans*, Ralfs.
   This species was reported from Aberdeen by the late Mr. Peter Grant; but we have seen nothing in this country agreeing exactly with Ralfs's drawings of it. From two localities—viz. the head of Glen Tannar, Aberdeen, and Balquhadly Hill, in Fern, Forfar, examples were seen which came near it, but they differed, essentially as I think, in the toothing of the lobes.

11. *M. papillifera*, Breb.—General. Has been found with zygospores in Aberdeen near Dinnet; and in Perth near Fowlis Wester.

12. *M. pinnatifida* (Kg.), Ralfs.—General, but scarce. Forms similar to those noted by Wallich and Elfving have been observed, particularly in a pool a little to the north of Loch Dawan.

13. *M. radiosa*, Ag.—Extremely rare. Aberdeen—Slewdrum, Aboyne, and Birsemore Lochs.

β *ornata*, Nordst.—Extremely rare. Inverness—near Brin; Aberdeen—Slewdrum, and near Craigendinnie Farm; Kincardine—Scolty Dam.

14. *M. rotata* (Grev.), Ralfs.—General. Conjugated examples with zygospores have been found in Aberdeen at Slewdrum, in Kincardine between Bishop's Dam and Clochnaben, and in Forfar on Monroman Moor.

15. *M. Thomasiana*, Archer.—Not very common. Ross, Aberdeen, Kincardine, Forfar, Perth, Stirling, Dumbarton.

16. *M. truncata*, Corda.—General and abundant. A variable species, of which several forms have been observed. One found in Glen Dye, in Kincardine, strongly suggested Nordstedt's *M. adscendens*. Unfortunately only one example was seen, several years ago.

17. *M. verrucosa*, Bisset.—Rare. Figured and partially described by Wolle in the "Bulletin of the Torrey Botanical Club," pp. 127-128, Tab. II. fig. 10, December 1885.

Large, about one-fifth part longer than broad, with numerous lobed or subgranulated prominences scattered over its surface, of which three at the base of the semi-cell close to the isthmus are larger than the others, and distinctly lobed; usually there are four on each side of these, reaching close to the margin—these are smaller, and sometimes indistinct; there are usually about eighteen others,—four on the end lobe, five on the upper side lobes, and two on each of the basal lobes,—but these numbers are liable to vary; the margin of the end lobe and upper side lobes resembles *M. angulosa*, Hantz., while the margin of the basal lobes is nearer *M. denticulata*, Breb.; the end view, owing to the numerous prominences, is very irregular. Cell very thin; membrane brownish.

This very interesting species is related to *M. angulosa*, Hantz., in much the same way as *M. denticulata*, Breb., is to *M. Thomasiana*, Archer. It is not granulated in the ordinary sense; the prominences seem flattened, and their margins cut into rounded segments, similar to the stigma of a species of *Poppy*, only more deeply cut. Length, 210 μ; breadth, 180 μ; isthmus, 29 μ (Plate IV. fig. 2). Aberdeen—Collieston, Bennachie, Powlair in Birse (where it was detected by Mr. Bisset in 1877), Slewdrum, "Old Road" Aboyne, beside Birsemore Loch, Moss of Logie, Morven, Dalbagie; Kincardine—Crathes, pool north-west side of Kerloch.

EUASTRUM (*Ehr.*), *Ralfs.*

1. *E. Aboense*, Elfv.—Rare, or overlooked. Aberdeen—on Ben Muich Dhui, above Loch Etchachan.

2. *E. affine*, Ralfs.—General, not abundant.

3. *E. ampullaceum*, Ralfs.—Not very common. Sutherland, Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Argyle, Arran, Fife. Conjugated with zygospores in Aberdeenshire, in moraine pools near Cambus-o'-May. The zygospores are globular, with numerous short, conical, acute spines. Diameter without spines, 54-60 μ; length of spine 6.4 μ.

4. *E. ansatum*, Ralfs.—General and abundant. Vars. *sublobatum* and *pyxidatum*, Delponte, are common, but scarcely deserve special notice. Found conjugated with zygospores in Aberdeenshire, near Turriff, by Mr. W. Anderson. They are globular, with numerous short, stout, abruptly sharp-pointed spines. Diameter without spines, 38.4 μ; length of spine, 6.4 μ.

5. *E. binale* (Turpin.), Ralfs.—General and abundant. Extremely variable. The following forms from Ralfs are common, and seem pretty constant. Their zygospores are much wanted.
   (*a*) Forma *minuta*, Lund. (Ralfs, "Br. Des.," t. xiv. 8*a*).
   (*b*) Forma (Ralfs, *l.c.* 8*b*).
   (*c*) Forma (Ralfs, *l.c.* 8*c*, *d*).
   (*d*) Forma (Ralfs, *l.c.* 8*e*), etc.

6. *E. crassicolle*, Lundell.—Rare. Ross—Poolewe; Aberdeen—Presswhin and Bogwartle in Cromar, Colonel's Bed in Glen Ey; Forfar—Canlochan; Perth—Rannoch, Craig-an-Lochan; Kirkcudbright—New Galloway.

7. *E. crassum* (Breb.), Lund.—General.

8. *E. cuneatum*, Jenner.—Not common. Sutherland, Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Arran, Kirkcudbright.

9. *E. declive*, Reinsch.—Abundant. Zygospores are not uncommon.

10. *E. denticulatum*, Gay.—General.

11. *E. didelta*, Ralfs.—General. With zygospores, at Dalwhing near Aboyne. They are globular, very thick-walled; spines not numerous, short, stout, and blunt. Diameter without spines, 73.6 μ; length of spine, 12.8 μ.

12. *E. divaricatum*, Lundell.—Very rare. Argyle—in Glen Coe.

13. *E. elegans*, Breb.—General. With zygospores, at Slewdrum. They are globular, with pretty numerous simple spines, tapering to an acute point. Diameter with spines, 64 μ; diameter without spines, 51.2 μ.
    β. bidentatum, Näg.—Common.

14. *E. elobatum*, Lundell.—Rare. Sutherland—Loch Inver; Ross—Poolewe; Aberdeen—Tonley and Tough, near Alford; Kincardine—Cammie in Strachan; Perth—Glas Maol, Ben Chroin, and Craig-na-Lochan (Mr. W. West).

15. *E. erosum*, Lundell.—Not common. Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Argyle, Arran.

16. *E. gemmatum*, Breb.—Not common. Sutherland, Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth.

17. *E. humerosum*, Ralfs.—Not common. Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Argyle.

18. *E. inerme* (Ralfs), Lundell.—Not common. Sutherland, Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Argyle, Arran.

19. *E. insigne*, Hassall.—Not common. Sutherland, Ross, Inverness, Banff, Aberdeen, Kincardine, Forfar, Perth, Argyle, Arran.

20. *E. insulare*, Wittr.—Not common. Sutherland, Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Argyle.

21. *E. intermedium*, Cleve.—Rare. Sutherland—Loch Inver; Ross—Poolewe; Aberdeen—South Birsemore; Forfar—Glen Clova; Perth—Arnbathie Loch; Argyle—Glen Coe.

22. *E. lobulatum*, Breb.—General, but usually occurs very sparingly.

23. *E. oblongum* (Grev.), Ralfs.—General. With zygospores, in Aberdeen at Powlair in Birse.

24. *E. pectinatum*, Breb.—Very common. With zygospores, in Aberdeen at Slewdrum in Birse, and Dalbagie, near Ballater.
    β brachylobum, Wittr.—Not so common.

25. *E. pingue*, Elfv. (*E. Armstrongianum*, Archer's MSS.)—Very rare. Aberdeen—near Cambus-o'-May; Forfar—in Glen Clova; Argyle—in Glen Coe.
    This species was gathered by Mr. Archer in Connemara, and shown as a new species at the meeting of the Dublin Microscopical Club on 29th April 1870. A slight description, without a name, appears in the club's transactions of that date.

26. *E. pinnatum*, Ralfs.—Not common. Sutherland, Ross, Aberdeen, Kincardine, Forfar, Perth, Argyle.

27. *E. Pokornyanum*, Grunow.—Extremely rare. Ross—Poolewe (Rev. D. Campbell).

28. *E. pulchellum*, Breb.—Seems widely distributed, but occurs very sparingly. Sutherland, Aberdeen, Kincardine, Forfar, Perth, Argyle.

29. *E. rostratum*, Ralfs.—General, but scarce.

30. *E Sendtnerianum*, Reinsch.

β latius, n. var.—Extremely rare.

Apices broader. Length, 43.2 μ; breadth at base, 25.6 μ; breadth at apex, 19.2 μ.

Aberdeen, near Den of Maidencraig.

31. *E. sinuosum*, Lenorm.—Rare. Aberdeen—near Kintore, Upper Powlair, Birsemore Loch, South Birsemore, Dalbagie and Castleton; Kincardine—Cammie, Curran, and Dalbrake in Strachan; Perth—Glen Garry, Rannoch, and near Coilantogle Ford.

32. *E. sublobatum*, Breb.—Not common. Sutherland, Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Argyle.

33. *E. ventricosum*, Lundell.—Not common. Sutherland, Inverness, Aberdeen, Kincardine, Perth, Argyle, Arran.

34. *E. verrucosum*, Ehr.—General.

STAURASTRUM (*Meyen*), *Ralfs.*

1. *S. acarides*, Nordst.—Rare. Aberdeen—Craig Phiobaidh near Girnoc, corrie of Loch Ceanmhor; Forfar—Canlochan; Stirling—Alva Glen.

2. *S. aculeatum*, Ehr.—Not common. Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth.

3. *S. acutum*, Breb.—Not common. Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth.

4. *S. alternans*, Breb.—Not common. Sutherland, Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Fife.

β. pulchrum, Wille.—Seemingly very rare. Perth—Glen Garry near Dalnacardoch.

5. *S. amœnum*, Hilse.

Forma *Spetsbergensis*, Nordst.—Not common. Sutherland, Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Dumbarton, Bute.

6. *S. anatinum*, Cooke and Wills.—Very rare. Aberdeen—Slewdrum and Blair Glas, and between Loch Kinord and Cambus; Kincardine—near Curran in Strachan; Argyle—Glen Coe.

This fine species was first detected in Connemara by

Mr. Archer, about the year 1866. He sent it to me with beautiful drawings in 1874. In the following year he gathered it in Argyle, and we found it in Aberdeen. It is very local and rare in this country.

7. *S. apiculatum*, Breb.—General, but scarce. With zygospores, at Slewdrum in Aberdeen.

8. *S. Arachne*, Ralfs.—Distribution peculiar; all but confined to Deeside, where it is not uncommon. Aberdeen—Upper Powlair, Slewdrum, Forest of Birse, near church of Birse, south of Birsemore, Craigendinnie, Steps, Glen Tannar, Dalwhing, Tomachar, Culblean, south of Loch Kinord, Dalbagie, Loch Ullachie, Castleton in Braemar, and Glen Clunie; Kincardine, —Nigg, Crathes, Curran; Argyle—Glen Coe.

9. *S. Arctiscon* (Ehr.), Ralfs.—Very rare. Aberdeen—Birsemore Loch and Dalbagie; Argyle — in Mull near Tobermory (1878).

10. *S. arcuatum*, Nordst. — Very rare. Aberdeen—pool beside Loch Dawan, Dalbagie, and in Glen Clunie.

11. *S. aristiferum*, Ralfs.—Not common. Inverness, Aberdeen, Kincardine, Perth, Dumbarton.

12. *S. armigerum*, Breb. ("Liste," 1856, *S. pseudofurcigerum*, Reinsch, "Acta Senckenb," 1867, and "Die Algenflora," 1867). Not common. Inverness, Aberdeen, Kincardine, Forfar, Perth, Stirling, Arran.

With zygospores, at Heughhead, near Aboyne. They are globular, with numerous spines, which are broad at the base and taper to a fine, slightly bifid apex. Diameter, exclusive of spines, 41 μ; length of spine, 12 μ (Plate IV. Fig. 12).

13. *S. Arnellii*, Boldt.

β *inornatum*, n. var.—Extremely rare. The only difference consists in the granules being scattered. Aberdeen —near Alford (Mrs. Farquharson of Haughton).

14. *S. asperum*, Breb.—Not common. Sutherland, Ross, Aberdeen, Kincardine, Forfar, Perth, Fife.

15. *S. aversum*, Lundell.—Very rare. Aberdeen—near Aboyne; Kincardine—at Cammie.

16. *S. Avicula*, Breb.—General.

Zygospores have been seen in the Feugh, at Heughhead, Kincardine. (Plate IV. fig. 11 is probably a form of this species with zygospore.)

17. *S. bacillare*, Breb.

β *obesum*, Lundell.—Extremely rare. Aberdeen—in a small pool at the south end of Loch Dawan.

18. *S. bicorne*, Hauptfl.—Extremely rare. Aberdeen—north and west margins of Birsemore Loch.

19. *S. bidentatum*, Wittr. (*S. longispinum*, Lundell, not of Bailey). —Very rare. Argyle—Glen Coe (1878).

20. *S. Bieneanum*, Rabenh.—Rare. Caithness—Loch Hempriggs; Kincardine—Kerloch and Blackhall; Forfar—Balquhadly in Fern.

    Forma *Spetsbergense*, Wille. — Very rare. Aberdeen—Lochnagar near the summit.

21. *S. bifidum* (Ehr.), Breb.—Extremely rare. Ross—at Poolewe (July 1889, Rev. D. Campbell).

22. *S. botrophilum*, Wolle.—Extremely rare. Inverness—on Cairngorm, at 3500 feet (Mr. A. I. M'Connochie).

23. *S. brachiatum* (Ehr.), Breb.—Not uncommon. Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Argyle, Arran.

    With zygospores, in Kincardine—at Curran and Clochnaben.

24. *S. brachycerum* (Ehr.), Breb.—Not common. Aberdeen, Kincardine, Forfar, Perth.

25. *S. Braunii*, Reinsch.—Very rare. Aberdeen—near Aboyne on the "Old Road."

26. *S. Brebissonii*, Archer.—Not common. Ross, Aberdeen, and Kincardine, common; Forfar—Barrelwell near Brechin; Perth—Hill of Alyth, Loch Lundie, and Birnam Hill; Fife —Tents Moor.

27. *S. brevispinum*, Breb.—Not common. Sutherland, Inverness, Aberdeen, Kincardine, Forfar, Perth.

28. *S. Cerastes*, Lundell.—Extremely rare. Aberdeen—near Loch Dawan.

29. *S. clepsydra*, Nordst.—Extremely rare. Aberdeen—at Achnerran, in Logie-Coldstone.

30. *S. Clevei* (*St. læve*, Ralfs; *β Clevei*, Wittr.)—Very rare. Inverness—at Brin, and in Skye near Loch Coruisk; Argyle—Glen Coe.

31. *S. coarctatum*, Breb.—Very rare. Kincardine—at Cammie in Strachan.

32. *S. connatum* (*St. dejectum*, *γ connatum*, Lund.)—General.

33. *S. controversum*, Breb.—General.

34. *S. cordatum*, Gay.—Very rare. Inverness—near Brin (Mrs. Farquharson).

35. *S. corniculatum*, Lundell.—Very rare. Aberdeen—Bottomend and Heughhead, Aboyne.

36. *S. cornigerum*, n. sp.—Extremely rare.

Small; length and breadth equal; semi-cells oval, diverging widely from the isthmus, which is broad; sides with one simple or deeply cleft stout spine; end with about six small emarginate spines, and two rows of similar spines within the margin; end view triangular, with a stout spine at each angle, and about four small emarginate spines on the margin of the straight sides, and one row of similar spines within the margin.

Length and breadth, 27 μ, without side spines; isthmus, 11 μ; length of spine, 9 μ (Plate IV. fig. 5).

The nearest ally of this pretty species is *St. Maamense*, Archer; but the stout spines sufficiently distinguish it. Mr. Archer sent it from Connemara many years ago.

Aberdeen—Blairglas, Logie-Coldstone (1878); Argyle—Glen Coe.

37. *S. cosmarioides*, Nord.—Extremely rare. Perth—Ben Chuirn (Mr. William West).

38. *S. crenulatum* (Näg.), Arch.—Pretty common.

39. *S. cristatum* (Näg.), Arch.—Not common. Sutherland, Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Argyle, Fife.

40. *S. cuspidatum*, Breb.—Not common. Ross, Inverness, Banff, Aberdeen, Kincardine, Forfar, Perth, Argyle.

β *divergens*, Nord.—Occurs in many localities, but its distribution has not been noted. It is certainly common on Deeside.

γ *coronulatum*, Gutwinski.—Extremely rare. Aberdeen—Birsemore Loch. This looks like a distinct species.

41. *S. cyrtocerum*, Breb.—Not common. Shetland, Sutherland, Ross, Inverness, Banff, Aberdeen, Kincardine, Forfar, Perth, Argyle. With zygospores, in Aberdeen, at Scotston.

(*To be continued.*)

ZOOLOGICAL NOTES.

The Gray Seal (*Halichœrus grypus*) near Berwick-on-Tweed.—In the stake nets at Goswick Salmon Fishery, belonging to Sir William Crossman of Cheswick, and situated upon the Northumberland coast about six miles from the mouth of the Tweed, the first catch of the season 1893 was a seal, which was found in the nets on the evening of the 16th February. On the following day, when, on the invitation of Sir William, I paid a visit to Goswick, in company with Captain Norman, R.N., for the purpose of seeing a

large flock of Wild Swans (*Cygnus musicus*) which had taken up their quarters there, we were shown the Seal at the fish-house, and the following dimensions were taken: Length, from tip of nose to end of hind flippers, 4 feet 5 inches; girth round chest in front of fore flippers, 2 feet 5 inches; the greatest girth being just 5 inches more, and that immediately behind the shoulders. The weight, we were afterwards informed, was $7\frac{1}{2}$ stones of 14 lbs.; and the seal was, as is usual, very fat. Of fur, properly speaking, there was none; the only covering being a very short stiff hair, of rather scanty growth, and not much exceeding a quarter of an inch in length on the upper parts of the body, slightly longer and thicker below. The hair presented a dirty white or washed-out appearance all over, and on the upper part of the neck and body had been almost entirely rubbed off, as was supposed, by the attempts of the animal to escape from the net. The skin thus bared was of a dark brown or almost black colour, with several apparently natural spots or rings of a lighter hue about the neck. The whiskers and bristles on the face were very strong and pretty numerous, but had also been much worn and broken. Being rather uncertain as to the species, I had the head cut off and forwarded to Mr. Wm. Eagle Clarke a day or two later, when, from the dentition, he was able without doubt to pronounce the specimen to be a young example of *H. grypus*. Although since 1841, when Selby recorded the Gray Seal as a not uncommon inhabitant of the Farne Islands, the species has been well known along the Northumberland coast, one is so rarely properly identified that this notice may not be without interest, while the occurrence, though in England, is so near the Borders that perhaps no excuse is necessary for its insertion in the "Annals."—George Bolam, Berwick-on-Tweed.

Golden Oriole (*Oriolus galbula*) in Orkney.—On the 20th of May, at 6 p.m., I observed a specimen of this beautiful species at Lopness, Sanday. The bird was quite alone, and did not join the starlings and other birds which were near by. The wind was from the south-east, a fresh breeze, with some fog occasionally, and had blown from that quarter for about a week. As this species has no place in Messrs. Buckley and Harvie-Brown's Fauna of Orkney, it is probably an addition to the avifauna of the islands.—Wm. Harvey, Sanday.

Nesting of the Snow Bunting (*Plectrophanes nivalis*) in the Eastern Cairngorms.—On 2nd June, while traversing the bare, stony top overlooking a steep rocky corrie in one of the highest parts of this range, we observed a male Snow Bunting in beautiful summer plumage sitting on a stone a few feet from us and apparently quite unconscious of our presence. On moving nearer, he flew off, and the female was seen creeping amongst the stones close by. From the motions of the birds, we felt certain that the nest was not far off;

but two successive spells of "lying-up" failed to reveal its position, nor indeed did we again see the female bird. The next day we revisited the spot, but saw nothing of either of the birds, and spent some time in fruitlessly tapping and turning over the loose stones in the vicinity, with the hope of putting the female off the nest. On returning in the evening, the male was seen on the point of a rock a little way down the steep scree-face of the corrie, and just below the point where he was first observed. He was singing beautifully, and continued his song while under observation from a distance of a few feet. The female was still invisible, and our chances of finding the nest, owing to the difficulty of driving her out from among such a chaos of loose blocks, seemed almost hopeless. The morning of the 5th, however, saw us back again, accompanied by Captain and Mrs. Savile Reid, Mr. St. Quintin, and Mr. Ogilvie Grant of the British Museum. No sooner had we reached the edge of the corrie than the female was seen a little distance below flitting amongst the stones. Taking up our position in line along the face, we had only to wait ten minutes before the bird was observed to slip in under a rock by one of the writers; the spot was marked, and we knew the nest was ours. Twenty feet or so below the brow of the corrie, and at an elevation of 3700 feet above sea-level, the nest was placed about 18 inches in amongst the loose granite blocks forming the scree, in a position almost exactly similar to that of the nest taken by one of us in Sutherland in 1886. The eggs, five in number, were perfectly fresh, and the nest was composed chiefly of dry bents, with a foundation of moss, and lined with innumerable hairs of the red deer and a few white ptarmigan feathers.—Lionel W. Hinxman, W. Eagle Clarke.

The Red-backed Shrike (*Lanius collurio*) nesting in Lanarkshire.—In going over the collection of eggs of Mr. J. Harkness, Cambuslang, a few months since, I was much pleased to have my attention drawn to the eggs of the Red-backed Shrike, taken at Hallside, near Cambuslang, in the nesting season of 1892. Mr. Harkness, while employed at the steel-works at Newton, had a message sent to him on the afternoon of the 22nd of May by Mr. George Jardine, son of the proprietor of Hallside, to the effect that he had discovered a nest of the Red-backed Shrike, with eggs, there. Mr. Harkness went to Hallside that evening, and found the nest placed in a hawthorn hedge about five feet from the ground. It contained six eggs, which were all taken. Two of these were exhibited at the April meeting of the Andersonian Naturalists' Society. Mr. Harkness informs me that both birds were frequently seen by him and by Mr. Jardine. So far, their return has been looked for this year without result. I have been unable to learn of any previous record of this species nesting in Scotland, although Gray mentions some circumstances which point to this having happened; but perhaps the editors

of the "Annals" may be able to give some information on the subject.—JOHN PATERSON, Govanhill.

[This species is said to have nested in the South-Eastern districts of Scotland. On the West it is only to be regarded as very rare; and we do not remember, at the moment, an authentic instance of its having nested there.—EDS.]

Cuckoos (*Cuculus canorus*) **and Caterpillars.**—It would be interesting to know whether in other places a much larger number of Cuckoos than usual have been noticed, or whether this place has been specially favoured by a convocation of these birds. In ordinary years we usually see a solitary Cuckoo several times in the season, and hear them in the ordinary way; but this spring the walled garden which adjoins the house, and the woods round the house, have for above a week been absolutely alive with them. On the 22nd of May, I noticed an extraordinary number of these birds, and was surprised at the free way in which they showed themselves. As many as three or four would fly up from among the fruit bushes in the garden. One evening, between 8 and 9 p.m., we frightened as many as six of these birds from the garden; while the trees round the house seemed full of others cuckooing loudly. The convocation seems dispersing now. Whether the severe measures the gardener is taking to get rid of a perfect plague of Caterpillars in the gooseberry bushes has brought this about, I do not know, but certainly since he gave the bushes a dressing of black-soap and water and paraffin a few nights ago, our Cuckoos have not been so much in the garden. —E. L. MACDOWALL, Lochwinnoch.

The Merlin (*Falco æsalon*) **as an enemy of the Vole.**—In his evidence before the Commission on the Vole Plague, one of the witnesses states that the Merlin did not prey on Voles. That it does so, when it has the opportunity, is shown by the fact that two Voles newly killed were found lying at the margin of a nest of this bird on the Pentland Hills, which contained young.—T. G. LAIDLAW, Edinburgh.

Quail in Mid-Lothian (*Coturnix communis*).—I had the pleasure of hearing two birds on the afternoon of Thursday, 18th May. The first was in a rye-grass field on the farm of Loanhead, which lies to the east of the village of Pathhead. The other, which was also in rye-grass, was on the farm of Remote, which lies to the east of, and adjoins the first-named farm. The birds were nearly half a mile apart; but I could hear both calling at intervals, while walking from the one field to the other. I was close to both birds, but thought it prudent not to disturb them. Mr. T. N. M'Dowall, farmer, Remote, who was accompanying me, informed me that he had, for a time previously, heard birds on his own and adjoining farms. Remote is near the East Lothian boundary.—P. ADAIR, Edinburgh.

Fulmar Petrel (*Fulmarus glacialis*) **breeding in Papa Stour, Shetland.**—It may be interesting to place on record the fact that thirty pairs of Fulmars had nests on the south-westerly face of the Horn of Papa Stour in 1892. Hitherto, I believe, its only Shetland nesting resort has been Foula.—ADELAIDE L. TRAILL, Edinburgh.

The Palmated Newt (*Molge palmata*) **in Inverness-shire.**—Following up my note on this species in the "Annals" for April last (p. 118), I have now to record it from Inverness-shire, where I found it in May last in some abundance in a pool close to Aviemore, and also at Loch Vaa, about three miles distant.—WILLIAM EVANS, Edinburgh.

Scottish Newts Wanted.—I shall be glad to receive specimens of Newts, for examination, from all parts of Scotland, with the view to working out the distribution of the species. All co-operation will be duly acknowledged. They travel well alive in a little damp moss.—WILLIAM EAGLE CLARKE, Museum of Science and Art, Edinburgh.

On Neæra cuspidata (Olivi) **and Odostomia rufa** (Philippi), var. **fulvo-cincta, in the Firth of Forth.**—These two species have already been recorded for the Forth Estuary, but are apparently rare; and this report of their recent occurrence may therefore be of interest. On the 14th of April last, we were trawling a few miles (6 to 8) east of May Island, in 31 to 32 fathoms of water (ordinary spring tides), when, owing to a slight accident, the bottom tow-net when hauled up was found to contain a considerable quantity of muddy sand; this sand was casually examined when collected, but appeared to include little of anything that was of special interest. It was nevertheless carefully washed, and when afterwards an opportunity occurred for looking over the material, several interesting things were obtained, among which were *Petalomera declivis*, G. O. Sars, and *Campylaspis rubicunda*, Lilljeborg,—two Crustaceans that have been only lately added to the British fauna, and the two species of Mollusca now referred to.

Neæra cuspidata is recorded in Leslie and Herdman's useful little work on the "Invertebrate Fauna of the Firth of Forth," on the authority of Thomas, as occurring off Port Seaton and Fidra, in 17 fathoms. In the same work reference is also made to Firth of Forth records in Forbes and Hanley's "British Mollusca," and in Dr. M'Bain's Catalogue (in Wood's "East Neuk of Fife"); but there appears to be no record of its occurrence in the Forth Estuary within recent years. Though apparently a widely distributed species, there are comparatively few reports of its occurrence on the east of Scotland. Macgillivray has reported it from the Aberdeenshire coast, and I have it from the Moray Firth. The Moray Firth specimen is smaller even than that from the mouth of the Forth

Estuary. Both the Firth of Forth and the Moray Firth specimens were alive when captured.

Odostomia rufa (Philippi), var. *rufa-cincta*, was first recorded for the Forth by Professor Henderson in the "Proceedings of the Royal Physical Society, Edinburgh," vol. viii. p. 313 (1884-85). He obtained one living, and several dead specimens somewhere west of May Island, in 20 fathoms. Our specimens occurred, as already stated, in the same material with the *Neæra;* a few living specimens were secured, all marked with the characteristic rufous band.—THOMAS SCOTT, Leith.

The Water Spider (*Argyroneta aquatica*) in Inverness-shire.—On 19th May last I captured about a dozen examples of this fine Spider among sphagnum, growing in pools by Loch Phitiulais, near Aviemore. The fact is interesting, inasmuch as it carries the distribution of the species much farther north in central Scotland than hitherto ascertained; the only Scotch habitats on record, so far as I know, being Luffness and Balerno near Edinburgh, Possil Marsh, Glasgow, and Scotston Moor, near Aberdeen. No doubt, when carefully looked for in suitable localities, it will be found to have a much more general distribution than we are at present aware of.—WILLIAM EVANS, Edinburgh.

Notes on Forth Annelida.—The Forth Annelids appear to have received less attention than several of the other invertebrate groups. This neglect is perhaps partly due to a certain feeling of repugnance with which many people look upon these animals; yet when this feeling can be overcome, the study of the *Annelida* is found to be exceedingly interesting.

The curious *Lineus marinus*, Mont. = *Nemertes borlasii*, Cuv., though comparatively a common species, has not, so far as I can ascertain, been recorded for the Forth. We occasionally obtain specimens of this species measuring several yards in length; yet these, though large, are but pigmies in comparison with the giant described by Professor M'Intosh in his valuable "Monograph of the British Annelides." This specimen had been cast ashore at St. Andrews during a severe storm in 1864; and when put into a jar 8 inches wide by 5 inches deep, it half filled the vessel. At page 183, part i., of the work referred to, Professor M'Intosh thus describes the length of the specimen: "Thirty yards," he says, "were measured without rupture, and yet the mass was not half uncoiled." We usually obtain *Lineus marinus* about the roots of tangles, among which it winds itself in apparently inextricable confusion.

Ammotrypane aulogaster, Rathke.—The only Forth record of this species seems to be that contained in the report of the German North Sea Expedition, where it is recorded by Professor Möbius from the vicinity of the Bass Rock. We find *Ammotrypane* all over the Forth where there is a muddy bottom, which seems to be the kind

of habitat it prefers. It is also sometimes obtained by us in the stomachs of fishes, *i.e.* haddocks, etc. (a specimen was obtained in the stomach of a haddock captured in the Firth on the 30th ult.) We are indebted to Professor M'Intosh for the name of this species. —THOMAS SCOTT, Leith.

BOTANICAL NOTES AND NEWS.

Alchemilla vulgaris, *L.*—I have been much interested in the translation from A. Kerner, and also in the remarks by Mr. Druce himself on this plant and its forms. It is one to which I have paid some heed, being struck with what appear to me to be two low country forms, and two distinct alpine forms.

1st. We have *A. vulgaris*, *eu.*, almost glabrous, common by the moist waysides and in shady places. This is a strong-growing plant, with the largest leaves on the stem near the roots. The whole plant is of light green colour.

2nd. We have a form, common in similar, but dry situations. It is of a more recent state of growth, with long brown hairs; but otherwise appears to be the same plant. I have always taken this to be *A. montana*, Willd.

3rd. We have on moist rocky ledges at considerable elevations, and beside mountain rivulets, a plant that seems to come very near *A. glabra* of Wimmer and Grabowski. It has long, smooth, and shining petioles, generally of a ruby colour. The leaves are much thinner than in either of the preceding, and their colour is light green when the plant grows at about 2500 feet. The parts of this plant are often larger than are those of the other forms; and, as a rule, the largest stem-leaves are about the middle of the stem.

I sent this form to Mr. Bennett some years ago, but he returned it as *A. vulgaris*, L.; for my own part I have always pointed it out on the hill as *A. vulgaris*, L., var. *alpina?* I have now got a name that pleases me far better, viz. *A. glabrata?*

4th. We have that small form, with short grayish pubescence, which is common on mountain sides, and grows almost to the top of our highest mountains.

It is possible that the difference in these forms is entirely due to situation; but, when extreme forms are compared, it is somewhat difficult to admit this.

Should the opportunity occur I will collect these forms and send out sets of them to one or two of my friends, as well as to Mr. Druce.

The late Professor Balfour told me that a plant of *A. alpina* had become *A. conjuncta* after a few years' cultivation in the Edinburgh Botanical Gardens. I put a plant from Ben Lawers into

a rockery at home twenty-three years ago. It was in every way typical *alpina* last year. I have had at Uddingston *alpina* and *vulgaris* growing side by side, and often intermixed with each other, for eight years, in the hope of getting *conjuncta* by self cross-fertilisation. I get many *vulgaris* seedlings, but no *alpina* seedlings, and nothing approaching *conjuncta*.

Although this shows very clearly what decision I ought to come to in the matter, I hear so often of this plant changing under cultivation, that I am not perfectly sure if it does not under certain conditions. I have a specimen of *conjuncta* in my herbarium that was taken from Ben Lawers by Provost Smith of Kinghorn, many years ago, as a souvenir of his first trip to that mountain. Now if he took *alpina*, and no other person substituted *conjuncta* for it, *alpina* in this case must have changed into *conjuncta*; but as *conjuncta* is such a common garden hardy herbaceous plant, it is just possible that in this case also the change is very much due to the gardener.

I will believe in the change when I see some of my own plants changing.—P. Ewing.

Orchids and Rooks.—There is a piece of undulating moor about three miles from Aberdeen, dear to the botanists of that city, under the name of Scotston Moor. On this some years ago various species of Orchids abounded, including *Orchis maculata*, *O. latifolia*, *Habenaria Conopsea*, and *Habenaria bifolia*, all plentiful. For a number of years the Orchids showed no sign of diminishing; nor did they appear to suffer from the attacks of any animal. But during a severe winter eight or ten years since the rooks, much straitened for food, turned to the Orchids and dug out and ate the tubers. On several days during that winter, and in the succeeding spring, I observed the rooks in large numbers scattered over the surface of the moor, hard at work, and I was able to convince myself of the object of their search. The ground was full of holes made by them. Next summer the Orchids named above had almost disappeared from their old haunts, showing the damage done to them by the birds. The raid has not been repeated, probably owing to the tubers being too few to offer much inducement to seek them out; and the Orchids are slowly regaining ground; but it will apparently be some time before the damage is wholly repaired.—James W. H. Trail.

Sundews and Butterflies.—On the same moorland I was once witness to a somewhat striking reversal of the usual law that animals feed on plants. On a swamp not exceeding ten yards across, on which *Drosera anglica* was growing rather freely, one summer day I noticed upwards of a dozen of the Small Heath Butterfly (*Cœnonympha Pamphilus*) on the leaves. Some were dead; others were still struggling violently. All were caught by the head, thorax, and legs, and seemed quite powerless to free themselves. I have only once or twice seen

these butterflies captured on other occasions by sundews. One might well suppose they are too large to fall easy victims. On the occasion referred to, I saw nothing that could explain the large number captured; nor were the insects at all more numerous than usual on the moor, either at the spot or elsewhere.—ID.

New Scottish Hawkweeds.—In a paper on "British Hawkweeds" by Messrs. E. F. and W. R. Linton, of which two instalments have appeared in the *Journal of Botany* (May and June), several new "species" and "varieties" are named and described, and numerous additions are made to previous county records. Almost all the plants noticed in the paper are from Scotland. The new forms are: *H. graniticolum*, n. sp., from Corrie Etchachan, under Ben Muic Dhui; *H. clovense*, n. sp., fairly abundant in Clova from 500 to 2000 feet above the sea, also in Canness and at Cairnwell; *H. bifidum*, Kit., var. nov. *sinuatum*, W. R. Linton, near the fall of Unich Water, above Loch Lee in Forfarshire; *H. Pictorum*, Linton, var. nov. *dasythrix*, from Corrie Ardran, in Mid-Perth; *H. Boswellii*, n. sp., from near Kirkwall in Orkney, the Strath of Dunbeath in Caithness, several localities in Skye, and Meall-nan-Tarmachan and near Killin in Mid-Perth; *H. cæsium*, Fr., var. nov. *petrocharis*, from the Breadalbane Hills; *H. euprepes*, Hanbury, var. nov. *glabratum*, from Clova district, and from three localities in Mid-Perth; *H. stenophyes*, n. sp., from Bettyhill in Sutherland, from Mid-Perth, from Dumbarton, and from near Moffat.

Experimental researches on the Life-history of Uredineæ.—Dr. Plowright has published in "Grevillea" (June) the results of experiments on certain forms of heterœcismal fungi, of some of which a brief account has already appeared in the "Gardener's Chronicle." He finds that *Æcidium Periclymeni*, Schum., on honeysuckle produces a *Puccinia* on *Festuca ovina* and on *F. duriuscula*, but not on other grasses, and that, conversely, the spores of this *Puccinia* produce only *Æcidium Periclymeni*. He describes the cycle under the name *Puccinia Festucæ*. He has worked out similar relations between *Æcidium Aquilegiæ*, Pers., and a *Puccinia* on *Agrostis alba* and *A. vulgaris*, and describes the cycle under the name *Puccinia Agrostidis*.

He has established a similar cycle between *Uromyces lineolatus*, Desmaz., on *Scirpus maritimus* and *Æcidium Glaucis* on *Glaux maritima*.

Uredineæ in Scotland.—In reference to Dr. Plowright's results as stated in the above paragraph, it may be of interest to mention that *Æcidium Periclymeni* is common in many localities in Scotland, and that *Æc. Aquilegiæ* has been found near Ballater. I have also examples of *Festuca ovina* and of *Agrostis alba*, both bearing uredo and teleutospores of *Puccinia*, found by myself in Aberdeenshire,

but not in either case in the vicinity of the respective *Æcidia*. *Scirpus maritimus* and *Glaux maritima* grow in close proximity on the Links near Old Aberdeen; but I have not detected any fungus of this group on either, despite frequent searches.—James W. H. Trail.

CURRENT LITERATURE.

The Titles and Purport of Papers and Notes relating to Scottish Natural History which have appeared during the Quarter—April-June 1893.

The Editors desire assistance to enable them to make this Section as complete as possible. Contributions on the lines indicated will be most acceptable and will bear the initials of the Contributor. The Editors will have access to the sources of information undermentioned.]

ZOOLOGY.

A Catalogue of Local Lists of British Mammals, Reptiles, and Fishes, arranged under Counties. By Miller Christy, F.L.S. *Zoologist* (3), vol. xvii. pp. 209-216 (June 1893).—The present instalment deals with the Mammals of Scotland.

The Plague of Field Voles in Scotland. Report of the Committee appointed by the Board of Agriculture. *Zoologist* (3), vol. xvii. pp. 121-138 (April 1893).

Ornithological Notes. By George Bolam. *Proc. Berwickshire Nat. Club*, vol. xiii. pp. 345-368.—Notes on forty-eight species, including Waxwing, Pied Flycatcher, Hawfinch, Hoopoe, Hen Harrier, Honey Buzzard, Smew, Spotted Crake, Great Skua, Red-necked Grebe.

Waste Ground and Suburban Bird Life. By John Paterson. *Ann. Andersonian Nat. Soc.*, 1893, pp. 118-127.—Forty-nine species of birds observed in a small area within the present boundaries of the city of Glasgow.

Waxwing in Caithness. *Zoologist* (3), vol. xvii. p. 148 (April 1893).—Specimen captured in February near Rosebank by Mr. John Malcolm, Wick.

The Return of the Swallow. By Hugh Boyd Watt. *Ann. Andersonian Nat. Soc.*, 1893, pp. 83-88.—Includes an addendum by Mr. John Maxwell, on p. 88, giving dates of arrival of Swallows at Baillieston House, Lanarkshire, from 1855 to 1892 inclusive.

Woodcock nesting in March. E. J. W. Wood. *The Field*, 1st April 1893, p. 470.—Nest with four eggs found 21st March in Islay.

Ruff in the Island of Lewis. R. Walters. *The Field*, 11th March 1893, p. 376.—Specimen shot in the first week of September 1892.

The Gadwall in Scotland. H. A. Macpherson. *Zoologist* (3), vol. xvii. p. 153 (April 1893).—Bird shot in December 1892, in the neighbourhood of the Moray Firth.

On some new Reptiles from the Elgin Sandstone. By E. T. Newton, F.G.S. (From *Proc. Roy. Soc.*, vol. 52).—Notice given in *Geol. Mag.* N. S., Dec. III., vol. x. p. 173 (April 1893).

Capture of Large Cod. G. M. *The Field*, 1st April 1893, p. 470.—Cod landed at Hopeman, in the Moray Firth, measuring 4 ft. 4 in., and weighing 72 lbs.; and two others landed at Aberdeen, weighing 52 lbs. and 58 lbs. respectively.

A Large Halibut. J. S. M. *The Field*, 15th April 1893, p. 572.—Specimen landed on the 6th April at Stromness, Orkney, measuring 6 ft. 10 ins. in length, and weighing 245 lbs.

Eigg Shells: Additional notes on the Land and Freshwater Mollusca of the Island of Eigg. By the Rev. John M'Murtrie, D.D. *Journ. of Conchology*, vol. vii. pp. 189-191 (April 1893).—Ten species and two or three varieties added to the record for the island.

Coleoptera at Thurso, 1892. Alfred Thornley. *Ent. Mo. Mag.* (1), vol. iv. p. 142 (June 1893).—Numerous records given for the shore between Thurso and Scrabster, tarns on Holborn Head and Dunnet Head, and the sandhills at Castletown.

Wasps and Wasp-nest Beetles in Scotland. A. J. Chitty. *Ent. Mo. Mag.* (2), vol. iv. p. 91 (April 1893).—Notes made last autumn on the nests of Vespa norvegica (britannica), silvestris, and rufa. Quedius puncticollis, Cryptophagus pubescens, Megacronus analis, and Lathridius minutus taken in or near the nest of Vespa vulgaris.

A new variety of Telephorus figuratus. A. J. Chitty. *Ent. Mo. Mag.* (2), vol. iv. p. 143 (June 1893).—Description given of specimens from Ben Cruachan, previously recorded as T. elongatus, but now named var. cruachanus.

Early Swarming of Bees. B. B. Bantock. *The Field*, 1st April 1893, p. 470.—A hive of bees threw off a swarm on 25th March at New Galloway.

Lepidoptera of the Shetland Islands. By Richard South. *Entomologist*, vol. xxvi. pp. 98-102 (April 1893).—Upwards of sixty species are recorded.

List of Lepidoptera of Aberdeenshire and Kincardineshire. William Reid. *British Naturalist*, part xxv. (January 1893), pp. 8-10.—Tortrices.

Notes on Collecting, etc.—Aberdeen. A. Horne. *Ent. Record*, vol. iv. p. 154 (May 1893).—Cidaria suffumata, var. piceata,

Euchloë cardamines, Macroglossa bombyliformis, Viminia menyanthidis, and V. myricæ taken between 12th April and 1st May.

Note on Retinia duplana, Hb. W. H. B. Fletcher. *Ent. Mo. Mag.* (2), vol. iv. p. 114 (May 1893).—The note refers to specimens taken at Forres in 1891 by the Messrs. Salvage.

Peronea perplexana, Bt., near Glasgow. James J. F. X. King. *Ent. Mo. Mag.* (2), vol. iv. p. 140 (June 1893). Several specimens taken at Cadder Wilderness and Mugdock Woods, near Glasgow, and one specimen on the Mouse Water, Cleghorn, near Lanark.

Hemiptera, Heteroptera, and Homoptera collected in Perth District, 1892. T. M. M'Gregor. *Ent. Mo. Mag.* (2), vol. iv. p. 92 (April 1893).—Fifty-three species are recorded.

Shetland Diptera. C. W. Dale. *Ent. Mo. Mag.* (2), vol. iv. p. 93 (April 1893).—A list of fifty-four species given, collected in June 1890.

BOTANY.

First Records of British Flowering Plants (*continued*). By William A. Clarke, F.L.S. *Journ. Bot.*, May.—The only records from Scotland are *Myrrhis odorata*, Scop., noted by Lightfoot in 1777 as "frequent, but always near houses," and *Ligusticum scoticum*, L., first mentioned by Sibbald in 1684.

New Localities for some rare Border Plants. By John Anderson. *Hist. Ber. Nat. Club*, 1891, p. 386.—The plants are *Linnæa borealis*, *Galium mollugo*, and *Elaphomyces granulatus*, Fries.

Remarks on some New Localities for Rare Plants. By Dr. J. Hardy. *Hist. Ber. Nat. Club*, 1891, pp. 410-411.—The plants referred to are *Milium effusum*, *Nuphar minima*, *Lathræa squamaria*, *Linnæa borealis*, *Pyrola minor*, *Linaria minor*, *Chenopodium polyspermum*, *Lepidium Draba*, *Cetraria sepincola*, and *Squamaria gelida*.

Jed Forest. By Walter Laidlaw. *Hist. Ber. Nat. Club*, 1891, pp. 393-394.—Gives measurements of several of the largest trees.

List of Cultivated Plants and Shrubs grown at Carham Hall. By Mrs. Hodgson Huntley. *Ber. Nat. Hist. Club*, 1891, pp. 387-389.

British Hawkweeds. By Edward F. Linton, M.A., and W. R. Linton, M.A. *Journ. Bot.*, May, pp. 145-149, June, pp. 177-182.—The plants referred to or described in this paper were chiefly collected in Aberdeenshire, Forfarshire, Mid-Perth, and Dumfries-

shire. Numerous new county records are given; and several new forms receive names as new species or varieties. (See "Notes and News.")

Notes on Scotch Freshwater Algæ (with one plate, No. 333). By William West, F.L.S. *Journ. Bot.*, April.—The materials employed in the preparation of this paper were collected on several of the mountains of Perthshire and Forfarshire, in New Galloway, and in the Orkney Islands. It includes a number of forms not previously recorded as British, and the following new to science: *Œdogonium Itzigsohnii*, De Bary, var. nov. *minor*, var. nov. from Orkney; *Oocystis spiculata*, sp. n., from Orkney; and *Trochiscia paucispinosa*, n. sp., from Ben Lawers.

New or Critical British Algæ. By E. A. L. Batters, B.A., etc. *Grevillea*, June.—The following are recorded from Scotland: *Cladophora crossani*, Ktz., dredged in Lamlash Bay in four to five fathoms of water; *Haplospora globosa*, Kjellm., gathered by Mr. G. Brebner near the Lion Rock, Cumbrae; *Ectocarpus tomentosoides*, Farlow, recently found at Weymouth, but new to Scotland, from the estuary of the Clyde, also found by Mr. Brebner.

Lanarkshire Rambles. By Robert Turner. *Ann. Andersonian Nat. Soc.*, 1893, pp. 1-17.—A paper dealing with the Botany of Clydesdale.

Records of Excursions in Renfrewshire. By John Paterson. *Ann. Andersonian Nat. Soc.*, 1893, pp. 18-45.—Notes on the Botany of the parishes of Cathcart, Eastwood, Neilston, Paisley, Renfrew, Inchinnan, Erskine, Kilbarchan, Lochwinnoch, Kilmalcolm, Houston and Kilallan, Port-Glasgow and Inverkip.

Rarer Flowers of East Renfrewshire. By John Wood. *Ann. Andersonian Nat. Soc.*, 1893, pp. 46-54.

Records of Excursions to Loch Lomondside. By John Paterson. *Ann. Andersonian Nat. Soc.*, 1893, pp. 55-65.—Notes on the Botany of the Luss District, Buchanan Castle and District, Arrochar, and Balloch Castle.

The Flora of Stirling and its Neighbourhood. By Johnston Shearer. *Ann. Andersonian Nat. Soc.*, 1893, pp. 66-70.

Alpine Excursions to Cam Chreag and Beinn Doireann. By E. Raymond Burden. *Ann. Andersonian Nat. Soc.*, 1893, pp. 71-77.—Fifty-three species of plants recorded.

On the Fertilisation of the Larch. By Rev. A. S. Wilson, M.A., B.Sc. *Ann. Andersonian Nat. Soc.*, 1893, pp. 78-82.

Scotch Names of Native Wild Flowers. By John Wood. *Ann. Andersonian Nat. Soc.*, 1893, pp. 89-103.

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NOTES ON THE DISAPPEARANCE OF THE SHORT-TAILED FIELD VOLE (*ARVICOLA AGRESTIS*), AND ON SOME OF THE EFFECTS OF THE VISITATION.

By Peter Adair.

Little more than twelve months ago, the plague of voles had reached the maximum of its virulence over a wide area of the districts affected. By the summer of the present year, it had ceased.

This paper is based on particulars of a general character, and applicable to the greater part of the infested area, which have been obtained from the district extending from the top of Teviot on the east to the hills of Galloway on the west; and upon special information obtained from farmers and shepherds in that area, in reply to questions submitted to them; and from personal visits to the Selkirkshire district. The farms from which particulars have been got embrace, on an estimate, 70,000 acres.

In dealing with the advent and disappearance of the animal, it may be stated that an increase began to be observed in the infested area for some years before 1890. By the Autumn of 1890, the numbers on certain farms, chiefly

situated on the upper part of the watersheds of the suffering counties, had assumed formidable dimensions. During 1891, the pastures on these farms were being destroyed. By the end of the same year, the greater part of the whole remaining affected area was suffering seriously. The numbers of the destroying rodent, as a rule, reached their highest point in the summer of 1892. In the autumn of that year, they began to decrease steadily; and by August last they had disappeared.

It is proper to give a few specific instances in illustration of these statements, taken from farms over the whole infested area. Each instance commences with the time when the numbers began to assume the dimensions of a plague.

I. Teviot District.—1. *Howpasley.*—Began Autumn 1890, and Spring 1891. At worst Autumn 1891 and Spring 1892. Diminution from May till August 1892. Increase from September to November of that year, then gradually diminished. Disappeared last May. 2. *Falnash.*—Began 1890. Worst from November 1891 to May 1892. Gradually diminished from October 1892. Disappeared May last. 3. *Commonside.*—Began 1890. Worst Winter of 1891 and Spring and Summer of 1892. Disappeared gradually between Autumn of 1892 and last February. 4. *Carlenrig.*—Began 1891. Worst Spring and Summer 1892. Disappeared gradually between Autumn 1892 and last April. 5. *Shankend* (*Slitrig*).—Began 1891. At its height last Spring. Began to decline in May last. Had disappeared by August. 6. *West Redfordgreen.*—Began, commencement of 1892. Worst June 1892. Decline noticed last Spring. Disappeared last April. 7. *District and Liddesdale.*—Mr. John Martin, farmer, Carlenrig, informs me that, after the plague had ceased on his farm it was still bad on farms in Slitrig and in Liddesdale.

II. Ettrick.—1-9. *Potburn, Broadgarhill, Overkirkhope, Dalgleish* (*Over and Nether*), *Gair, Midgehope, West Buccleuch, Wardlaw, and Annelshope.* — Began in 1890. Ended last Spring. 10. *Scabcleuch.*—Began 1891. Worst August 1891-92. Decline after August 1892, rapid at first, then slower. Disappeared last April. 11. *Glenkerry.*—Began 1891. Worst Autumn 1891 and Spring 1892. Disappeared between October 1892 and last April. 12. *Wardlaw.*—Began 1890. At worst August and September 1892. Disappeared from end of 1892 to March 1893. 13. *East Buccleuch.*—Began 1891. At worst Spring and Summer of 1892. Disappeared gradually from Autumn of 1892 till last Spring. 14-15. *Newburgh and Crosslee.*—Began 1890. Worst Autumn 1891-92. Gradually disappeared between Autumn and April last.

III. Eskdalemuir and Liddesdale.—1. *Castle O'er and Crurie.*—This estate is divided by a river. The plague began in one division in February 1891, and was at its worst in the Summer of 1891. A decrease was observed in Spring 1892, at first gradual, at last rapid, ending in the disappearance of the vole in May of that year. As regards the other division of the property, the plague was at its worst in the Summer of 1892. It began to decline in the Autumn of 1892, and ended, rapidly at the close, in November of that year. 2. *Fingland.*—Began 1890. Worst between November 1891 and May 1892. Disappeared gradually between July 1892 and last February. 3. *Whitrope, Liddesdale.*—Began Spring of 1892, but never so bad as in Teviotdale. At worst December 1892 and January last. Gradual disappearance between January and May.

IV. Yarrow.—1. *Sundhope.*—Began in 1891. At its worst Spring and Summer of 1892. Gradual decline after August 1892. Clear in May last. 2. *District Generally.*—Mr. Martin, head keeper at Bowhill to the Duke of Buccleuch, who is proprietor of much of the infested area in Ettrick and Yarrow, states that the vole appeared as a plague in Ettrick, and disappeared there earlier than in Yarrow. In Ettrick the ground was, as a rule, clear by the end of April. In Yarrow the disappearance occurred about May and June. Mr. Martin further states that voles were not so plentiful in Yarrow as in Ettrick.

V. Moffat District.—1. *Rivox.*—Began Summer of 1890. At worst Spring and Summer of 1892. Disappeared between September 1892 and last May. 2. *Middlegill.*—Began 1890. At worst Spring and Summer 1892. Disappeared gradually between November 1892 and last March.

VI. Galloway.—1. *Barlae, Lorg, and Altry.*—Began 1891. Worst Autumn of 1891 and Spring and early Summer of 1892. Disappeared rather rapidly between last February and April. 2. *District from Moffatdale westward to Carsphairn.*—Mr. Robert Service informs us that the plague was at its worst from the Autumn of 1891 till about May 1892, when a decline was noticed which became rapid towards its close in the early part of the present year. At present, the vole is down to its normal numbers, or less.

With the view of arriving at a reasonable conclusion as to the causes of the disappearance, it is necessary to advert to the fact that the animal was, as a rule, first observed in numbers among the luxuriant growth of grasses which in the districts infested covers the "bog" land and the better quality of soil in the flats and on the hillsides. There, the necessary conditions of food and shelter existed, and the

voles multiplied till everything green was eaten, and the whole herbage destroyed ; being cut at the roots, and lying on the ground like withered hay. No attempt was made to burrow in that description of ground, which is more or less damp, except in the drier areas. Here shelter was sought among the large tussocks of withered herbage, in shallow runs over the surface, and along the sides of the surface drains. But on the firmer ground, where the vegetation was not luxuriant, burrows were made six to fourteen inches deep. After a time, rain and wind levelled the tussocks ; and considerable tracts of the grass were burnt with the view of lessening the cover. Then, food and shelter having disappeared, the areas first occupied were deserted, and the animal appeared in greater numbers upon ground on which it had not been previously numerous, and on the "heights," which, over most of the southern highlands, are covered with vegetation. From these resorts it made its final disappearance.

So far as can be ascertained, the disappearance has been general over the whole infested area. On some farms, the normal numbers remain, on others scarcely a vole is to be seen.

The question arises, To what causes can be ascribed a result so complete and so satisfactory? Inquiry has been made as to the effect of the weather during the decline of the plague, the possibility of the occurrence of an epidemic, and the action of natural enemies.

As regards weather, the summer of 1892 was cold and cheerless, followed by a wet autumn, when the decrease began. A severe frost set in before Christmas, which lasted till February. That frost was succeeded by an exceptionally genial spring. The general opinion of the farmers and shepherds communicated with is, that the state of the weather appeared to have nothing to do with the disappearance. But one or two farmers whose views are entitled to consideration point out that the animal was partial to damp ground, and consider that the exceptional drought of last winter and spring had an effect. All, however, with one exception, agree that the frost of last winter had no effect, though it was severe, and though unaccompanied by much snow.

Turning to the possibility of an epidemic, it has been

ascertained that dead voles were observed on the surface at Howpasley, but not in considerable numbers. A number of dead were also seen on Whitrope, on Middlegill, and on Barlae; but many of those on Barlae were marked on the back of the head, as if they had been killed. Mr. William G. Steuart, Middlegill, mentions that towards the close of the plague there, the animals looked thin and lanky. Mr. Thomas Glendinning, farmer, Fingland, however, states, with reference to his farm, that, though dead voles had not been noticed on the surface, during their disappearance he had sometimes kicked out nests with the dead inside: in some instances only one, in others two or three. This points to some epidemic; as wild animals affected by disease or sickness, as a rule, conceal themselves and die in places where they entirely escape our notice: a fact which renders it most difficult to obtain data regarding an epidemic theory, which some of my naturalist friends are inclined to favour as the cause of the somewhat sudden end of the plague. Their opinion, however, is not based upon specific information, but upon the known fact that such vast increases of life in a single species invariably result in an outbreak of disease: a plague among plaguers it would be in this case.

But it is the almost unanimous opinion of farmers and shepherds that the disappearance is due, in a great measure, to the action of "natural enemies"; stress being laid on the value of the Owl, Kestrel, Rook, and Black-headed Gull, and locally to the Buzzard among birds, and to the Stoat and the Weasel among mammals. Of the birds, the Short-eared Owl was almost entirely a stranger; the Kestrel, partly so. The Owl first appeared in numbers in the autumn of 1891. It bred early in the spring of 1892, and again in the late spring or summer of that year, and reared an abnormal number of young. The Kestrel also remained in greatly increased numbers, and multiplied. The consequence was, that at the close of last summer the Vole had, in addition to its native enemies, a most formidable and rapacious host, foreign to the district, to contend with.[1] I was long

[1] For much valuable and interesting information concerning the Short-eared Owl and the Kestrel in the vole-plague district, see Mr. Adair's paper in the "Annals," 1891, pp. 219-231.—Eds.

uncertain as to the value of rooks as destroyers of full-grown voles, as I had watched them repeatedly through good binoculars, without result. But the point has been put to rest by Mr. Martin, Bowhill, who shot five rooks at Tushielaw, in Ettrick, and three on Dryhope, in Yarrow, and found that the birds had been feeding on old as well as young voles. Mr. Martin has several times seen Black-headed Gulls rise out of a meadow with voles, so close that he could hear the vole "squeak" and see it "wriggle." The Buzzard is so scarce and local on these uplands as not to deserve much notice. But on the farms frequented by a stray bird or two, the shepherds have unbounded faith in its virtue as a vole-killer.

Of the part taken by the Stoat and the Weasel in the work of destruction, little information can be obtained. The only point certain is that, during the plague, few were visible, though now they are showing themselves. Our view is that, while the voles were in plenty, they got their food so quickly and so abundantly that they never required to be much out of their accustomed quarters.

The present has been truly an instance of the birds of prey flocking to the carcase; and when the numbers and rapacity of the horde which gathered together are taken into account, it may fairly be assumed that they were a considerable factor in the gradual disappearance, and the final extermination of the Vole.

Mr. Robert Service, whose views are of very great value, is of opinion that the plague was due to a set of favourable and very unusual weather conditions, leading to abnormal reproductive power; and while giving due weight to the ravages of natural enemies in bringing the plague to a termination, considers that the principal factor was "the loss of those abnormal powers of increase, which, until they ceased, no number of natural enemies ever likely to be present could have coped with."

The effects of the disappearance of the Vole on the Short-eared Owl and the Kestrel have been disastrous. The Owl began to nest last spring as early as February; but the nests on the various farms were very much below the numbers of the spring of 1892, so far as we have learned, except in four

instances: one on Sundhope, Yarrow, where Mr. Barrie, the tenant, states there were 40 or 50 nests; another on Whitrope, where 7 or 8 were seen; another on Middlegill, where there were a dozen nests; and the last on Rivox, where Mr. Scott, the tenant, mentions that 10 nests were seen. The nests, as a rule, contained a less average number of eggs than last year, though in instances 12 and 14 were seen. The young appear to have hatched out well. But after the plague ceased, the supply of food having failed, the old birds almost entirely disappeared from the farms, and the greater number of the young died. A number of full-feathered birds were also seen dead on most of the farms; but these may have been birds of an early hatching. The survivors dispersed over the country, betaking themselves to districts often a long way from the area of the plague. Mr. Service informs us that a great number betook themselves to the game coverts, where they wrought havoc among the young pheasants. Mr. Martin, Bowhill, states that numbers appeared in the natural wood there about the end of June and in July, where they remained for a while; and that at the present time hardly a bird is to be seen on the hills. And I lately flushed a pair on a heathery fell near Portpatrick. I have not learned that this Owl had, during its stay in the vole districts, any enemy, except perhaps one. Mr. David Glendinning, Howpasley, informs us that on digging out the earth of a Fox on that farm which had acquired a taste for lamb, there were found "5 young Foxes, 76 dead Short-eared Owls, and a number of Grouse, Black-game, Partridges, Ducks, Curlew, Plover, Rats, Voles, and Lambs." The circumstance of so many Owls being found in the burrow prompted me to make full inquiry: and Mr. Glendinning was good enough to inform me that the burrow was an old one; that it was dug out on the 10th or 11th of last May; that the Owls found inside consisted of 8 old birds and 68 young of all ages, but all unable to fly; that some of the birds had been recently killed, while others were in various stages of decay, some appearing to have been killed a month before.

The disappearance of the Vole has also led to an enormous decrease in the numbers of the Kestrel. It is true, many

birds are still seen on the ground ; but it is seldom that two are to be seen hovering over the same hillside. These birds have also suffered seriously from want, and many have died.

The concurring testimony of farmers and shepherds is that, since the cessation of the plague, the grass has come away beautifully, and that there is at present an abundant supply of excellent pasture. In one or two instances, complaint is made that there are "wants" in the pasture which have not yet been filled up. Only in one instance has the information been unsatisfactory. The tenant of West Redfordgreen tells us that, where the greatest damage was done on that farm, the ground is "covered with thistles."

Farmers and shepherds are almost unanimously of opinion that the recent vole plague is a result of the destruction of birds and animals of prey. I have obtained much information on this point, but cannot say that the evidence goes to confirm their views. It is not suggested that birds and animals of prey were seriously molested even in Thessaly or in La Plata, and yet we know that destructive plagues have occurred there ; and we have the familiar instance of the oft-occurring Lemming plagues in the north of Europe and America, where the "balance of nature" cannot be much interfered with. Besides, if the late plague was a result of the destruction of natural enemies, it is singular that the periodical vole visitations, the last of which occurred in 1876 or 1877, have not been more frequent. The districts of Ettrick and Yarrow have suffered much from the vole plague ; and we made special inquiry at Mr. Martin in regard to the destruction of Stoats and Weasels in the wide district there under his eye. We find that during the eleven years of his residence in Bowhill, very few have been killed by the game-watchers, except those caught in rabbit-traps during the trapping-season, which were not on ground infested by voles. A few were also found in mole-traps. Mr. Martin points out that the plague in Ettrick and Yarrow began and was confined to ground where game-watchers are few, or entirely absent, and that, with the exception of the man employed by Mr. Massey, whose doings were reported to the Commission last year, none of the

watchers had, to his knowledge, set traps for stoats or weasels.

As matter of fact, vermin, so called, does not seem to increase whether molested or not. A few scattered Stoats and Weasels are found in suitable localities; and the same localities harbour the animal year after year, without apparent increase or decrease. In the same way, the Kestrel has always been scarce, even in the most favoured districts. Mr. Martin estimates the normal number in Yarrow between Bowhill and St. Mary's Loch, including Bowhill Woods, at eleven pairs, and the number in Ettrick from its junction with Yarrow to Tushielaw (say 16 miles) at ten pairs. We estimate the number between Tushielaw and Ettrick Pen at the head of the river (say 12 miles more) at six pairs.

I further think that a great deal too much is made of the bloodthirsty character of the Stoat and the Weasel. My view is that the reputation of the animal has very largely arisen from the great slaughter sometimes committed by it among young game. But these instances occur during the breeding season, when the animal cannot afford to miss an opportunity of securing and storing food, and when its prey is young, and in numbers together. In its normal state, I believe it simply kills to eat, and not for destruction, and that the numbers of birds and animals which fall a prey are not comparatively great. In the same way, the propensity of the Kestrel to take young game has, so far as I have been able to ascertain, manifested itself in the nesting-time alone. I have never known an instance of the bird molesting game at any other season of the year.

The above remarks as to the characters of the Stoat, the Weasel, and the Kestrel, may not be relevant to the present paper; but I cannot close without expressing my views on this subject.

Special thanks are due to the gentlemen who have furnished the particulars which have enabled me to complete the paper. I would particularly mention among farmers and shepherds in Teviot district, Mr. Chas. J. Grieve, Mr. Stevenson, Mr. John Martin (Carlenrig), Mr. David Glendinning, Mr. Simon Rutherford, Mr. Thos. Elliot; in Eskdalemuir and Liddesdale, Mr. Bell, Mr. Thos. Glen-

dinning, and Mr. John Oliver; in Ettrick, Mr. Mitchell, Mr. Brydon, Mr. Graham, and Mr. Wm. Grieve; in Yarrow, Mr. Barrie; in Moffat district, Mr. Steuart, and Mr. Scott; and in Galloway, Mr. Wm. A. M'Turk; and among observers, Mr. Robert Service, Mr. Alexander Sturrock, Mr. Jas. Mathieson, and Mr. John Martin (Shielshaugh, Bowhill, Selkirk). Mr Martin has taken a very great deal of trouble, and supplied much valuable information.

ON SOME REMARKABLE SPECIMENS OF *RANA TEMPORARIA* FROM SCOTLAND.

By G. A. Boulenger.

It has long been known that the common frog grows to a large size in Scotland, and occasionally assumes so peculiar a physiognomy as to have been described as a distinct species, *Rana scotica*, by Thomas Bell. During a recent visit to Cannisbay, Caithness, Dr. J. Anderson, F.R.S., has come across such specimens, of which he has kindly sent me three alive. They are so handsome, and so aberrant in some of their markings, that it may be of interest to put them on record. Two are females, measuring 95 and 93 mm. from snout to vent; the third is a male, 80 mm. long. They are therefore not only much above the average size, but two even surpass any specimens on record, whether from other parts of Great Britain or from the Continent. In fact, the largest specimen I had seen before is a female from Exeter, preserved in the British Museum, measuring 87 mm.; and the following are the dimensions of some of the largest Continental specimens examined by me:—

Milan	♀	82 mm.	♂	69 mm.
Brussels	♀	75 „	♂	69 „
Paris	♀	80 „	♂	79 „
St. Malo	♀	82 „		
Mt. Ducan, Bellunine Alps, 5300 feet,			♂	80 „

Bedriaga records a female from the Tyrol 90 mm. long.

In both female specimens the ground colour, above and beneath, is sulphur yellow. In the larger specimen, the

ground colour of the upper part is obscured by brown and mustard-coloured vermiculations; the yellow appearing in the form of dots. Six pretty regular longitudinal series of large, deep black blotches, like ink-spots, extend along the body: two series between the glandular folds, and two on each side. The glandular folds are yellow, with a few brown dots, and edged on the outer side with brown and with a series of more or less confluent black spots; the temporal spot dark brown, edged below with yellow. Hind limbs with black spots; the dark cross-bars traceable, though interrupted and irregular. The throat, belly, and lower surface of thighs are clouded with very pale brownish.

The other female is more remarkable: both for its very warty skin, which gives it a quite toad-like appearance, and for its coloration. The ink-black spots noticed in the preceding specimen invade the upper parts in such a manner as to cover them, including the glandular lateral folds and the streak below the temporal spot; the yellow appearing merely here and there in the form of dots or fine vermiculations. The exposed upper surface of the limbs show accordingly no trace of cross-bands. On the sides the black is abruptly limited by the bright yellow of the lower parts. The belly is devoid of spots; but the throat is a little obscured by brownish mottlings.

The male is olive brown, more yellowish on the vertebral area, with a few large, irregular, deep black blotches. No cross-bands on the limbs, but small, deep black spots, which are rather crowded on the tibia. Temporal spot not much darker than the ground colour. The throat is pale lilac or pearl grey, as normal in males in summer, and the belly of a very pale yellow marbled all over with grey.

A black and yellow male specimen, somewhat similar to the smaller female noticed above, was found in May 1892 at Kinlochewe, Ross-shire, by my colleague Mr. Ogilvie-Grant, and presented by him to the British Museum. Among some specimens obtained by the same gentleman in June last at Glen Avon, Banffshire, one is interesting in showing a pale, black-edged vertebral stripe as distinct as in the striated variety of *Rana arvalis*: it is a female, measuring 75 mm. from snout to vent.

SCORPÆNA DACTYLOPTERA, DELAROCHE, IN SCOTTISH WATERS.

By GEORGE SIM, A.L.S.

THIS fish has been long known to the writer under the name of *Sebastes norwegicus*. So abundant is it some twelve miles off Troup Head, that frequently from one to four hundredweight have been brought in by one vessel; while smaller quantities are of much more frequent occurrence. This fish is caught in comparatively deep water, varying from 40 to 110 fathoms. It is an excellent article of food, and as it attains to a length of 18 to 20 inches, it is of some economic importance.

As an inhabitant of the British North Sea Area, however, *Scorpæna dactyloptera* was first placed on record by Mr. W. Eagle Clarke, of the Science and Art Museum, Edinburgh, who received a young specimen from the Yorkshire coast. His remarks thereupon were embodied in a paper on this species generally, read before the Royal Physical Society of Edinburgh during the present year.

As already stated, *Scorpæna dactyloptera* has been known to the writer, on the east coast of Scotland, under the name of *Sebastes norwegicus;* and it might still have been looked upon by him as that species, but for the recent occurrence of another closely allied form, known as *Sebastes viviparus*, Kröyer. When *Sebastes viviparus* first came under his notice, the writer compared it with what he believed to be *Sebastes norwegicus*, and found so many marked differences that he reported his observations in the present volume of the "Annals of Scottish Natural History," p. 47, with a view to show that the two forms were specifically distinct: a point that is still doubted by some.

Subsequently he sent specimens of both forms to Dr. Günther of the British Museum, and that gentleman pronounced the *Sebastes norwegicus* of the writer to be *Scorpæna dactyloptera;* and since then this view has been supported by Dr. Traquair, and Mr. Eagle Clarke of the Edinburgh Museum. And to all three gentlemen the writer tenders his thanks.

It is considered necessary to make these statements, so that the writer may point out that his remarks in "Annals," p. 47, are now of no value, otherwise than as a record of the occurrence of *Sebastes viviparus*. The chief external difference between *Scorpæna dactyloptera* and *Sebastes norwegicus* is, that the latter has fifteen spinous rays in the first dorsal fin, while the former has but twelve in the same organ. It appears, however, that far too much value is placed upon spines and rays of fins as a specific distinction. Organs that are subject to such variation in number cannot surely be taken into account; and the species now under notice is no exception to this. The most common number of spines in the first dorsal fin of *Scorpæna dactyloptera* is, as already stated, twelve. However, on the 19th of May last, nineteen examples of this form were brought into Aberdeen, and three of these had each thirteen spines in the first dorsal. Again, on 12th June, twelve more were brought in, one of which possessed thirteen spines in its first dorsal. And further, the writer is in possession of an example of *Scorpæna dactyloptera*, in which the rays of the second dorsal fin stand clear of the connecting membrane for nearly half their length; and the line is so exactly drawn that it does not seem to be the result of accident. These things considered, he repeats that fin-ray numbers cannot have much value placed upon them as a specific distinction.[1]

As some excuse for the error into which the writer has fallen, it may be pointed out that the names *Sebastes* and *Scorpæna* have been so mixed up together, and applied to *Sebastes norwegicus*, that he for some time believed these names were synonymous, and that there was no real *Scorpæna dactyloptera*. In speaking of the latter form, Cuvier and Valenciennes say that "this species is so much like *Sebastes norwegicus* in appearance that it is necessary to place the two species side by side to distinguish them." It may be further pointed out that this *Scorpæna dactyloptera* has gone under the name of *Sebastes dactylopterus* (Günther,

[1] [*Scorpæna dactyloptera* and *Sebastes norwegicus*, though much resembling each other in general appearance, are perfectly distinct species belonging to equally distinct genera. The characters by which they are defined are well marked, and not by any means confined to the spine and ray formula of the dorsal fin.—EDS.]

"Cat. Acanth. Fishes," ii. p. 99); and Savage gives it the name of *Sebastes bibroni*. On the other hand, *Sebastes norwegicus* has figured under the name of *Scorpæna norwegicus* by Richardson ("Faun. Bor. Amer.," iii. p. 52), Jenyns ("British Vert." p. 347), and Johnston ("Trans. Berw. Nat. Club," 1838, i. p. 170). Now this continual change and substitution of names is an endless source of trouble and perplexity that could, to a large extent, be easily obviated; and it is earnestly hoped that some mitigation of this growing evil may be soon brought about.

ON THE DISCOVERY OF *CEPHALASPIS* IN THE CAITHNESS FLAGS.

(Abstract of a paper read before Section C of the British Association at Nottingham, September 1893.)

By Dr. R. H. Traquair, F.R.S.

It is remarkable that although *Cephalaspis* is so characteristic a genus of fossil fishes in the Lower Old Red Sandstone of Forfarshire and of the West of England, there has been hitherto no record of its occurrence in the great Orcadian area of Old Red Sandstone which lies to the north of the Grampians. This autumn, however, a magnificent specimen was discovered in the pavement quarry at Spital, about ten miles from Thurso, and presented by the Caithness Flagstone Company to the Edinburgh Museum of Science and Art.

This unique specimen constitutes a new species, which is the largest known, exceeding in this respect even *C. Salweyi*, Egert., and *C. Jexi*, Traq. The length of the shield is $8\frac{1}{2}$ inches, and its breadth, were the right cornu entire, would be 12 inches; but this excessive proportional breadth may be so far accounted for by its having been crushed absolutely flat. The snout is pointed, as in *C. Campbelltownensis*, Whiteaves, though not quite so acutely; but the cornua, instead of being long and curved, as in that species, are comparatively short and broad based,—the orbits are also proportionally smaller and farther apart. The surface-ornament,

where seen, consists of an excessively minute and close tuberculation, which is, however, coarser and more prominent round the margins of the orbits: the cornua are not provided with denticles along their inner margins. The pseudo-tesselation of the middle layer is proportionally minute.

The remains of the *body* are scanty and badly preserved; but on its scales clear evidence is afforded of a tubercular ornament similar to that of the cranial shield.

To this new species of *Cephalaspis*, which is so interesting from its geological position and locality, I propose the name of *C. magnifica.*

The occurrence of *Cephalaspis* in the Caithness Flags has however, no important bearing on the question of the relative ages of the Orcadian Old Red Sandstone and that of Forfarshire and the West of England; as a species of the same genus (*C. laticeps*) has already been described by me from the Upper Devonian of Canada.[1]

THE MARSH TITMOUSE IN STRATHSPEY.

By William Evans, F.R.S.E.

A detailed account of the distribution of the Marsh Tit in Scotland is much to be desired, and would form a capital subject for a paper in the "Annals." But such a paper, to be of any real value, would have to be based on a much more extensive series of observations than is yet available; for it must be admitted that our knowledge of the distribution of this interesting bird north of the Tweed is still very imperfect. It has, to be sure, been recorded from practically every county in the Lowlands; but even there it is much overlooked, while in the Highlands and the northern parts of the country generally, records of its occurrence are very scarce indeed.

Though undoubtedly local, and, as a rule, far from common, I am persuaded it is neither so very local nor so rare as is generally supposed. Among tiny and inconspicuous

[1] "Geol. Mag." (3), 1890, vol. vii. p. 16.

woodland species, like the Tits and the Warblers, only the more common kinds come, as a rule, within the ken of the ordinary observer; but it may well be doubted if any other native bird of equal population has succeeded in maintaining an *incognito* existence so long and so thoroughly as the Marsh Tit has. The surest way to detect these tiny species is by their call-notes; a thorough knowledge of which is invaluable to the ornithologist. The observer who trusts to his eyes rather than to his ears will allow many a Marsh Tit to pass by unnoticed; for the unmistakable tzay, tzay, tzay, may constantly he heard proclaiming its presence when all attempts to get a clear view of the bird itself in the thicket are unavailing.

My own experience of the Marsh Tit in Scotland is limited to the Tweed, Forth, and Spey districts, in all of which I have found it breeding and resident. Hitherto the Lothians seem to have been looked upon as its Scottish stronghold; but unquestionably they cannot compete with Strathspey for this distinction.

Before narrating my own observations on the species in Strathspey, let me state what other writers have recorded of it in respect of the "Moray" area.

The first to detect it in the district appears to have been Charles St. John, in whose "Natural History and Sport in Moray" (ed. 1882, p. 16) we find it stated that the "Marsh Titmouse (*Parus palustris*, L.) is numerous in the fir woods during winter, forming part of the large flocks of birds which are constantly passing in search of food, hanging on the branches and prying into every crevice for insects or their eggs and larvæ." Then A. G. More, in his paper "On the Distribution of Birds in Great Britain during the Nesting Season," published in "The Ibis" for 1865, tells us it extends to Fifeshire according to MacGillivray, and breeds in Perthshire, occasionally in Aberdeenshire, "and even as far north as Inverness (Mr. W. Dunbar)." It does not appear to have been again noticed—at any rate I am not aware of any further record—till I met with it in the Kingussie district of Strathspey, in the autumn of 1889, as recorded in the "Scottish Naturalist" for January 1891, and here shortly repeated. St. John's observations were no doubt made much

farther down the valley, presumably chiefly in the country around Elgin.

In 1889, I spent about five weeks, beginning 3rd August, at Kincraig, and employed a great part of the time in noting the birds frequenting the valley between Kingussie and Grantown. From the day of my arrival, the Marsh Tits were a constant source of interest, and their abundance a continual subject of remark. Between the points mentioned, a party of Tits and Goldcrests was seldom encountered where birch or alder was prevalent, in which two or three were not present; and occasionally as many as six to eight might be counted in one group. Though struck at the time with their abundance,—not having elsewhere in Scotland found them so numerous,—I afterwards thought little of the circumstance on subsequently reading St. John's statement: which, by the way, loses some of its weight, however, when read along with his next statement, namely that the "Cole Titmouse (*Parus ater*) is more uncommon than the Marsh Titmouse"; for the Cole Tit is particularly abundant in the pine woods of "Moray," and could hardly have been otherwise when St. John wrote.

In August 1891, I was again in Strathspey, this time at Cromdale, a few miles below Grantown, and again met with my friends the Tits, but in much smaller numbers than in the Kincraig district.

My experience was, I understand, of much interest to Mr. Harvie-Brown, who has been working at the Ornithology of "Moray" at intervals for a number of years past, inasmuch as he had never met with the Marsh Tit there himself, and had practically no information concerning it beyond the statements of St. John and More quoted above. He was therefore inclined to regard the birds seen by me in 1889 and 1891 as migrants from Scandinavia, and consequently not likely to be found breeding in Strathspey. Various considerations, which need not be referred to now, led me to hold an opposite opinion; but as the question could only be adequately settled by the detection of the birds in the breeding season and the discovery of a nest, I was not sorry to find myself on the 2nd of May last *en route* for Aviemore, where, within a couple of hours of alighting at the railway station, I had the satisfaction of seeing a pair of veritable

Marsh Tits evidently quite at home in a mixed wood of birch and pine. Several other pairs were soon detected, some busy drilling holes in old stumps; and in a few days two nests were under observation. In one of them, the first egg was laid on 10th May and the last (the seventh) on the 16th; and the other was found to contain eight eggs fully a week incubated on the 17th. Both were in dead portions of old alders: the first within a few inches of the ground, the other about twelve feet above it. The latter was in a remarkably well-made hole fully a foot deep, and must have cost the little artificers much labour to excavate. The fibre of the outside wood was still close and firm, and could scarcely have been pierced at any other point than that which had been selected, namely where a branch had formerly sprung from. Nesting-holes of former years were observed in many parts of the woods in the district; and I cannot help thinking that not a few of the so-called woodpecker borings in the forests of Spey have been formed by the Marsh Tit, and perhaps also by its crested relative: not that I for a moment doubt the existence of true woodpecker borings in Strathspey—I have myself seen them,—but from conversations with keepers and foresters, none of whom knew the Marsh Tit, I feel sure its work is often mistaken for that of the now almost traditional Woodpecker.

While engaged in the duties of incubation, the birds were little seen or heard; and it was only after the young had left the nests, and the family parties were wandering through the woods, that their abundance could be fully realised. Though constantly observed feeding in the pines in company with Cole and Crested Tits and Goldcrests, they were seldom to be seen where birches or alders were totally absent.

When seen at close quarters in the beginning of May, some of these Spey Marsh Tits gave one the impression of being a shade lighter than southern examples; and to test this, a specimen was secured on 17th May, which, on comparison with the only other specimen I possess, namely one shot in Stirlingshire in autumn, seemed to bear out this impression. Curious to know to what extent the Spey bird differed from English and Continental examples, I asked

Dr. R. B. Sharpe to compare it with the specimens in the British Museum. This he kindly did, and replied that my bird is referable to the British form, to which Stejneger has given the name of *Parus palustris dresseri* (Dr. Sharpe designates it shortly *Parus dresseri*). It is, he adds, a little greyer, however, than examples from the south of England.

When sending Dr. Sharpe the Marsh Tit, I also enclosed a couple of Cole Tits from the pine woods of Strathspey,—one obtained at Castle Grant on 4th September, immediately after the autumn moult; the other in Rothiemurchus on 11th May,—and he pronounces both to be true *Parus britannicus*. Having been informed that Professor Newton possessed a Cole Tit, obtained by Wolley in the neighbouring forest of Dulnan, which approximated closely to the Continental form, —the typical *Parus ater* of Linnæus,—I wrote to him on the subject, and was kindly favoured with a sight of the specimen, which was killed in the beginning of May 1851. It agrees exactly with my Spey skins. When sending this Dulnan specimen, Professor Newton remarks that it is "intermediate" between ordinary English examples and those from the Continent: an observation which he made twenty years ago, and was able to confirm on the day he wrote me, after a comparison with Cambridgeshire specimens. While I write, I have before me two examples procured in Peeblesshire (near West Linton) in September, for which I am indebted to Messrs. T. G. and D. G. Laidlaw. One of these in no way differs from the Spey specimens; and the other is only very slightly more dingy.

Without a large series of specimens from various districts for comparison, it would be rash to jump to the conclusion that Scotch Marsh and Cole Tits are always, or even generally, perceptibly greyer than those from England. Still, I think it is a fair inference to draw from the facts I have stated that in all probability the tendency on the part of these birds is to assume a lighter aspect as we proceed northwards; so that those from the pine woods of Scotland (of the Highlands in particular) can without much difficulty be distinguished, when in good plumage, from those of the south of England.

My main object, however, in referring to these Spey specimens, is to show that they are referable to the British

rather than to the Continental forms, and that therefore any attempt to trace in them a Scandinavian origin will have to deal with a period many thousands of years back into the past, and not with a nineteenth-century immigration. That these two species are in any proper sense migratory,—as between one part of the British Isles and another, or from the Continent to Great Britain,—I cannot believe. The very fact that so many geographical races exist, and the absence of any trace of migration at Heligoland and the lighthouses on the British coasts, seems well nigh conclusive on the point. One tit no more makes a migration than a swallow a summer. Our Tits are essentially non-migratory birds: they wander continually, no doubt, through the woods in search of food; but these peregrinations are confined within very narrow limits. Wherever I have met with the Marsh Tit in autumn or winter,—it is most easily detected then,—I have invariably been able to find it again in spring and summer, when carefully looked for.

With regard to the vexed question, namely the best form of nomenclature to use for the designation of geographical races, I do not presume to speak with the authority of an expert. I cannot refrain, however, from confessing to a certain amount of repugnance to the raising of them all to specific rank. In the interests of science, it is of course highly desirable that these races should be recognised and named; but it seems to me the objects in view would be better attained by giving them merely sub-specific rank and adopting a trinomial system of nomenclature, than by raising them to full specific rank under a purely binomial system. To my mind, the old-fashioned plan, or some modification of it, of adding var. (variety) so and so to the binomial appellation of the species, regarded in the broad sense, is as good, and would meet with as general acceptance as any yet devised. By its adoption, the less learned among us would be saved much bewilderment, and at times more serious troubles; while full scope would still be given for the genius of those who desire, or find it necessary to employ further subdivision. The more elastic the system, the greater will be its utility. For it must be remembered that Ornithology, with its many aspects, appeals to an unusually large con-

stituency, and includes among its votaries men of very different attitudes of mind, and every degree of scientific attainment; many of whom, like myself, would no doubt be glad to be able, without risk of being misunderstood, to speak on ordinary occasions of our Marsh Tit and our Cole Tit as *Parus palustris* and *Parus ater* respectively, reserving the use of the sub-specific additions *dresseri* and *britannicus* (some day it may have to be *scoticus*) for special occasions, when greater precision is necessary or desirable. Species-making, like other good things, may easily be overdone; and I cannot help feeling that the very laudable practice of occasionally naming plants and animals after outstanding personages is also rapidly assuming undue proportions. *Linnæa borealis*, for instance, is excellent in every way—a tribute to the memory of a great naturalist, descriptive of the plant, euphonious, simple; but as much can scarcely be said for the majority of names (already too numerous) of the *Scarabæus schneideri* type.

A LIST OF THE HEMIPTERA HETEROPTERA AND HOMOPTERA OCCURRING IN PERTHSHIRE.

By T. M. M'Gregor
(Perthshire Society of Natural Science).

Heteroptera.

Sehirus biguttatus, Lin.—Pitlochry (Norman); Loch Rannoch (Marshall).

Pentatoma baccarum, Lin.—Kinnoull Hill in April, on Hesperis and Verbascum (Dr. F. Buchanan White).

Piezodorus lituratus, Fab., Stål.—Perth, on broom and furze, in autumn (Dr. F. Buchanan White).

Tropicoris rufipes, Lin.—Perthshire (Dr. F. Buchanan White).

Picromerus bidens, Lin.—Perthshire (Dr. F. Buchanan White).

Asopus punctatus, Lin.—Kinnoull Hill in May, upon blaeberry (Dr. F. Buchanan White); Rannoch (Marshall).

Zicrona cærulea, Lin.—Muir of Durdie (?) (Dr. F. Buchanan White).

Acanthosoma dentatum, De Geer.—Ardargie, September; three specimens off birch. *A. interstinctum*, Lin.—Ardargie, September. Common on birch.

Berytus Signoreti, Fieb.—Perthshire (Norman).

Nysius thymi, Wolff.—Perthshire (Norman); Stanley, July; one specimen.

Stygnus pedestris, Fall.—Rannoch (Dr. F. Buchanan White). *S. arenarius*, Hahn.—Banks of Tay below Barnhill (Dr. F. Buchanan White).

Trapezonotus agrestis, Panz.—Bankfoot, August; one specimen off heather by sweeping.

Drymus sylvaticus, Fab.—Kinnoull (Dr. F. Buchanan White); Aldie, by Methven; and Bankfoot. Not common. *D. Brunneus*, Sahlb.—Rannoch (Marshall).

Scolopostethus affinis, Schill.—Rannoch (Dr. F. Buchanan White). *S. decoratus*, Hahn.—Fairly common.

Gastrodes abietis, Lin.—Kinnoull and Moncreiffe Hills, in winter, in spruce cones (Dr. F. Buchanan White); Pitlochry (Norman).

Piesma quadrata, Fieb.—Banks of Tay at Invergowrie, in April, under stones (Dr. F. Buchanan White).

Derephysia foliacea, Fall.—Minkie Moss (Dr. F. Buchanan White).

Monanthia cardui, Lin.—Common on thistles. *M. humuli*, Fab.—At Quarrymill Den (Dr. F. Buchanan White).

Hebrus ruficeps, Thoms.—Minkie Moss, amongst sphagnum (Dr. F. Buchanan White).

Velia currens, Fab.—Very common.

Gerris rufoscutellata, Latr.—Pitlochry (Norman). *G. costæ*, H. S.—Loch Rannoch (Marshall); Pitlochry (Norman); Perthshire (M'Lachlan); Birnam (Dr. F. Buchanan White); Aldie by Methven, May; one specimen. *G. aspera*, Fieb.—Pitlochry (Norman). *G. lacustris*, Lin.—Almond; four specimens. *G. odontogaster*, Zett.—

Rannoch (Dr. F. Buchanan White). Common on pools at Methven Moss.

Ploiaria vagabunda, Lin.—Minkie Moss, September; six specimens off Scots fir.

Nabis flavomarginatus, Scholtz.—Loch Rannoch (Marshall); Pitlochry (Norman); Stanley; Methven Moss. *N. limbatus*, Dahlb.—Rannoch (Dr. F. Buchanan White). Fairly common throughout Perthshire. *N. ferus*, Lin.—Perth (Dr. F. Buchanan White); Bankfoot, August; three specimens. *N. rugosus*, Lin.—Almond, June. Fairly common.

Salda saltatoria, Lin.—Rannoch (Marshall); var. *vestita*.—Linn of Campsie, July; one specimen. *S. C.-album*, Fieb.—Rannoch (Dr. F. Buchanan White); Almond, May; one specimen. *S. orthochila*, Fieb.—Rannoch (Dr. F. Buchanan White). *S. riparia*, Fall.—Rannoch (Marshall, Rye). *S. scotica*, Curt.—Rannoch (Dr. F. Buchanan White, Marshall); Birnam (Dr. F. Buchanan White); Perth (Reuter); Linn of Campsie, July; common. *S. Morio*, Zett.—Shores of Loch Rannoch (Marshall). *S. littoralis*, Lin.—Rannoch (Dr. F. Buchanan White). *S. elegantula*, Fall.—Perth, March (Dr. F. Buchanan White).

Cryptostemma alienum, H. S.—Tay shingles (Dr. F. Buchanan White); Linn of Campsie, July. Not uncommon.

Cimex lectularius, Lin.—Perth (Dr. F. Buchanan White).

Temnostethus pusillus, H. S.—Widely distributed, and fairly common.

Elatophilus nigricornis, H. S.—Moncreiffe Hill (Reuter). One specimen on *Pinus sylvestris* (1876). Kinnoull, Stanley, Aldie by Methven; three specimens. Rare.

Anthocoris confusus, Reut.—Common and widely distributed. *A. nemoralis*, Fab.—Rannoch (Dr. F. Buchanan White), Perth. Common and widely distributed. *A. sarothamni*, D. and S.—Perth (Reuter); Stanley, July; one specimen. *A. sylvestris*, Lin.—Rannoch (Dr. F. Buchanan White); Perth. Common and widely distributed.

Acompocoris pygmæus, Fall.—Rannoch (Dr. F. Buchanan White); Perth. Common on Scots fir.

Microphysa pselaphiformis, Curt.—Dunkeld, on juniper (Dr. F. Buchanan White); Rannoch (Marshall).

Pithanus mærkeli, H. S.—Rannoch (Dr. F. Buchanan White); Aldie, Stanley; two specimens; July.

Miris calcaratus, Fall.—Perth. Widely distributed and fairly common. *M. lævigatus*, Lin.—Perthshire (Dr. F. Buchanan White); Ardargie, September; four specimens. *M. holsatus*, Fab.—Rannoch (Dr. F. Buchanan White); Perth. Widely distributed and fairly common. *M. longicornis*, Fall.—Pitlochry (Norman); Rannoch (Marshall).

Megalocerœa ruficornis, Fourc.—Rannoch (Dr. F. Buchanan White); Perth. Fairly common.

Teratocoris viridis, D. and S.—Rannoch (Marshall); Perthshire (Norman).

Leptoterna ferrugata, Fall.—Rannoch (Dr. F. Buchanan White); Perth. Common and widely distributed. *L. dolobrata*, Lin.—Glenfarg, July; five specimens.

Monalocoris filicis, Lin.—Perthshire (Dr. F. Buchanan White).

Bryocoris pteridis, Fall.—Rannoch, on lady-fern (Dr. F. Buchanan White).

Phytocoris populi, Lin.—Rannoch, on hazel (Dr. F. Buchanan White). *P. tiliæ*, Fab.—Minkie Moss, September; five specimens. *P. longipennis*, Flor.—Perth (Reuter); Minkie Moss, September; one specimen. *P. dimidiatus*, Kb.—Kinnoull, Almond, Minkie Moss. Fairly common. *P. pini*, Kb.—Pitlochry (Norman); Dunkeld; Minkie Moss (Dr. F. Buchanan White); Bankfoot. Common.

Calocoris striatellus, Fab.—Kinnoull, Minkie Moss, Almond. Not uncommon. *C. sexguttatus*, Fab.—Stanley. Common in Glenfarg in July. *C. bipunctatus*, Fab.—Common and widely distributed. *C. Chenopodii*, Fall.—Almond, July; two specimens. *C. roseomaculatus* D. T.—Rannoch, on low plants near water (Dr. F

Buchanan White); Bankfoot, July; a few specimens by sweeping low plants. *C. striatus*, Lin.—Pitlochry (Norman); Rannoch; Perth (Dr. F. Buchanan White); Minkie Moss, July; one specimen off broom by beating.

Dichrooscytus rufipennis, Fall.—Perth. Common on Scots fir.

Plesiocoris rugicollis, Fall.—Pitlochry (Norman); Perth. Fairly common.

Lygus pratensis, Fab.—Rannoch (Dr. F. Buchanan White); Perth. Common. *L. rubricatus*, Fall.—Bankfoot, August; three specimens. *L. contaminatus*, Fall.—Rannoch (Dr. F. Buchanan White); Perth. Common. *L. lucorum*, Mey.—Perth, July; two specimens. *Var nigronasutus*.—Perth, July; one specimen. *L. pabulinus*, Lin.—Perth. Common. *L. cervinus*, H. S.—Rannoch (Dr. F. Buchanan White); Perth. Common and widely distributed. *L. kalmii*, Lin.—Woody Island, May (Dr. F. Buchanan White); Almond, June; four specimens.

Pœciloscytus Gyllenhallii, Fall.—Almond, June, one specimen Ardargie, September, one specimen. *P. unifasciatus* Fab.—Stanley, July; three specimens.

Liocoris tripustulatus, Fab.—Barnhill, February, in hollow stems of Umbelliferæ and nettles (Dr. F. Buchanan White).

Bothynotus pilosus, Boh.—Bankfoot, July; one specimen. Very rare.

Rhopalotomus ater, Lin.—Rannoch (Dr. F. Buchanan White).

Strongylocoris leucocephalus, Lin.—Pitlochry (Norman); Rannoch (Dr. F. Buchanan White).

Labops saltator, Hahn.—Rannoch (Dr. F. Buchanan White); Stanley, July; one specimen.

Macrolophus nubilus, H. S.—Pitlochry (Norman).

Dicyphus constrictus, Boh.—Perth, on *Symphytum* (Reuter). *D. stachydis*, Reut.—Perth. Common on Foxglove. *D. pallidicornis*, Fieb.—Perth, off Foxglove (Dr. F. Buchanan White).

Cyllocoris histrionicus, Lin.—Minkie Moss, Aldie, Kinnoull. Not common.

Ætorhinus angulatus, Fab.—Rannoch (Dr. F. Buchanan White); Almond; Bankfoot. Not common.

Mecomma ambulans, Fall.—Rannoch (Dr. F. Buchanan White); Almond; Stanley. Not common.

Orthotylus bilineatus, Fall.—Rannoch, on aspen (Dr. F Buchanan White); Pitlochry (Norman). *O. flavinervis* Kb.—Rannoch (Dr. F. Buchanan White). *O. marginalis*, Reut.—Rannoch (Dr. F. Buchanan White); Perth. Common. *O. tennellus*, Fall.—Almond, July; one specimen. *O. nassatus*, Fab.—Rannoch (Marshall). *O. viridinervis*, Kb.—Pitlochry (Norman). *O. concolor*, Kb.—Perth (Reuter). *O. adenocarpi*, Perr.—Perth (Reuter); Almond, July; one specimen. *O. ericetorum*, Fall.—Rannoch (Dr. F. Buchanan White); Methven Moss, August. Common off sallows.

Heterocordylus tibialis, Hahn.—Perthshire (Dr. F. Buchanan White); Aldie; Minkie Moss, July. Common on broom.

Malacocoris chlorizans, Fall.—Rannoch, on hazel and alder (Dr. F. Buchanan White); Minkie Moss, September; one specimen.

Macrocoleus hortulanus, Mey.—Pitlochry (Norman). *M. molliculus*, Fall.—Almond, July; two specimens.

Harpocera thoracica, Fall.—Kinnoull; Almond; Minkie Moss, May; three specimens.

Phylus melanocephalus, Lin.—Almond, Kinnoull, Minkie Moss, July and August. Fairly common off oaks. *P. coryli*, Lin.—Rannoch (Dr. F. Buchanan White).

Plesiodema pinetellum, Zett.—Perth (Reuter); Aldie, by Methven, July; one specimen off Scots fir. Rare.

Psallus ambiguus, Fall.—Rannoch (Dr. F. Buchanan White); Perth. Common. *P. betuleti*, Fall.—Perth, July. Fairly common on birch. *P. variabilis*, Fall.—Rannoch (Dr. F. Buchanan White); Perth. Common. *P. quercus*, Kb.—Almond, July; four specimens off oak. *P.*

lepidus, Fieb.—Rannoch (Dr. F. Buchanan White); Perth. Fairly common, and well distributed. *P. fallenii*, Reut.—Rannoch (Dr. F. Buchanan White); Perth. Not common. *P. varians*, H. S.—Rannoch (Dr. F. Buchanan White); Perth. Common. *P. diminutus*, Kb.—Perth (Reuter). Common, and widely distributed. *P. sanguineus*, Fab.—Rannoch (Dr. F. Buchanan White); Perth. Common.

Plagiognathus viridulus, Fall.—Rannoch (Dr. F. Buchanan White); Perth. Common, and widely distributed. *P. arbustorum*, Fab.—Rannoch (Dr. F. Buchanan White), Perth. Common, and widely distributed. *P. pulicarius*, Fall.—Rannoch (Dr. F. Buchanan White). *P. saltitans*, Fall.—Perth (Reuter). *P. Wilkinsonii*, D. and S.—Moncreiffe Hill (Reuter).

Asciodema obsoletum, D. and S.—Almond, July; two specimens.

Notonecta glauca, Lin.—Common in pools.

Corixa Geoffroyi, Leach.—Almond, August; three specimens. *C. Sahlbergi*, Fieb.—Rannoch (Dr. F. Buchanan White); Methven Moss. Common. *C. Linnæi* (var.), Fieb.—Rannoch (Dr. F. Buchanan White). *C. semistriata*, Fieb.—Perth (Reuter); Almond; May; one specimen. *C. venusta*, D. and S.—Almond. Common. *C. striata*, Lin.—Invergowrie (Dr. F. Buchanan White); Almond. Common. *C. distincta*, Fieb.—Perth (Reuter, Dr. F. Buchanan White). *C. mœsta*, Fieb.—Rannoch (Dr. F. Buchanan White); Methven Moss; four specimens. *C. fossarum*, Leach.—Stanley; Almond; six specimens. *C. Scotti*, Fieb.—Rannoch (Dr. F. Buchanan White). *C. Fabricii*, Fieb.—Rannoch; Perth (Dr. F. Buchanan White). *C. præusta*, Fab.—Common at Methven Moss in August. *C. præusta*, var. *Wollastoni*, D. and S.—Rannoch (Dr. F. Buchanan White); Methven Bog, August; one specimen. *C. Bonsdorffi*, Sahlb.—Methven Moss, May (Dr. F. Buchanan White).

Sigara minutissima, Lin.—Common at Woody Island in May.

Homoptera.

Cixius pilosus, Ol.—Almond ; Dupplin. Not common. *C. cunicularis*, Lin.—Almond ; Glenfarg, July and August. Not common. *C. nervosus*, Lin.—Very common, and widely distributed.

Liburnia difficilis, Edw.—Almond, June and July ; two specimens. *L. discreta*, Edw.—Almond, July ; one specimen. *L. denticauda*, Boh.—Aldie, May ; six specimens. *L. limbata*, Fab.—Bankfoot, Minkie Moss, Methven. Not common.

Dicranotropis hamata, Boh.—Almond, June and July ; two specimens.

Stiroma albomarginata, Curt.—Aldie, July ; one specimen.

Aphrophora alni, Fall.—Almond, July ; two specimens.

Philænus spumarius, Lin.—Very common and widely distributed. *P. exclamationis*, Thunb.—Minkie Moss ; common at Bankfoot. *P. lineatus*, Lin.—Common, and widely distributed.

Ulopa reticulata, Fab.—Common at Aldie and Bankfoot amongst heather.

Megophthalmus scanicus, Fall.—Minkie Moss, September ; one specimen.

Macropsis lanio, Lin.—Common on oak.

Bythoscopus alni, Schr.—Stanley, July ; five specimens. *B. rufusculus*, Fab.—Fairly common, and well distributed. *B. flavicollis*, Lin.—Common on birch, and widely distributed.

Idiocerus confusus, Flor.—Well distributed, and not uncommon on sallows.

Evacanthus interruptus, Lin.—Not uncommon, but not numerous.

Acocephalus nervosus, Schr.—Bankfoot and Methven, July and August. Not numerous. *A. bifasciatus*, Lin.—Glenfarg, July ; one specimen. *A. albifrons*, Lin.—Minkie Moss, August ; two specimens.

Doratura stylata, Boh.—Pitlochry (Buckton); Stanley, July; one specimen.

Athysanus brevipennis, Kbm.—Pitlochry (Buckton); Perth. Fairly common. *A. sordidus*, Zett.—Almond, May; one specimen. *A. grisescens*, Zett.—Minkie Moss, June. Fairly common. *A. communis*, Sahl.—Almond; Stanley, June and July; three specimens. *A. obscurellus*, Kbm.—Almond; Bankfoot, August; two specimens. *A. obsoletus*, Kbm.—Bankfoot, August; two specimens.

Deltocephalus abdominalis, Fab.—Common, and widely distributed. *D. distinguendus*, Flor.—Common, and widely distributed. *D. striatus*, Lin.—Not common. *D. pulicaris*, Fall.—Bankfoot; Stanley, July and August. Not common.

Allygus mixtus, Fab.—Perth; three specimens. Rare.

Thamnotettix prasina, Fall.—Common. *T. subfuscula*, Fall.—Common.

Limmotettix quadrinotata, Fab.—Minkie Moss; Ardargie, August and September. Not common. *L. sulphurella*, Zett.—Almond; Stanley, July; three specimens.

Cicadula sexnotata, Fall.—Aldie, July; two specimens.

Gnathodus punctatus, Thunb.—Stanley, July; one specimen.

Alebra albostriella, Fall.—Common throughout.

Dicraneura variata, Hardy.—Dupplin, September; two specimens.

Kybos smaragdulus, Fall.—Common throughout.

Eupteryx atropunctata, Goeze.—Common throughout. *E. Germari*, Zett.—Kinnoull, July, one specimen; Minkie Moss, September, off Scots fir. Common. *E. pulchellus*, Fall.—Common in August and September on oak. *E. concinna*, Germ.—Common on oak; August and September.

Typhlocyba sexpunctata, Fall.—Dupplin, September; one specimen. *T. quercus*, Fab.—Minkie Moss, September; one specimen.

SOME NEW SCOTCH LOCALITIES FOR ARACHNIDS.

By Geo. H. Carpenter, B.Sc.

Through the kindness of Messrs. W. Evans and W. Eagle Clarke of Edinburgh, and Professor D'Arcy Thompson of Dundee, I have lately had the opportunity of examining a number of spiders from Scottish localities. Most of Mr. Evans' specimens were collected around Edinburgh and in the Grampians near Aviemore and Kingussie. Special lists of the species from these districts are now in preparation. The present list of spiders and harvestmen from other localities is put forward as a modest contribution to our knowledge of the distribution of these animals in Scotland. We have already Rev. O. Pickard-Cambridge's paper "On the Spiders of Scotland" ("Entom.," x., 1877), Professor Trail's "List of Spiders of Dee" ("Trans. Nat. Hist. Soc. Aberd.," 1878) and Mr. Young's lists from the Glasgow district ("Proc. Nat. Hist. Soc. Glasg.," vols. iii. and iv.), besides various Scottish records in Mr. Pickard-Cambridge's "Spiders of Dorset." The localities now indicated have not, I believe, been searched for spiders before; and I accordingly enumerate all the species found, including those common forms which may be presumed to range over the whole of the British Isles. Some of Professor Thompson's specimens are from Dundee, and the opposite coast of Fife; but the majority were taken at Buckie in Banffshire. Mr. Evans's collections were made in 1889 at Tushielaw in the Ettrick district, and near Callander in Perthshire. Mr. Evans has also placed in my hands some specimens collected for him by Mr. C. Campbell at Morven, Argyleshire. Two of the harvestmen from this locality—*Oligolophus ephippiatus*, Koch, and *O. palpinalis*, Herbst.—are now recorded for the first time as Scottish. The former species is, according to Mr. Pickard-Cambridge, widely distributed in England; but the latter has hitherto been found only in Dorset and North Wales. Mr. Evans has also sent me a few specimens taken by Mr. A. Robertson at heights of over 3000 feet on Ben Alder and Creag Meaghaidh in the

Laggan district. Through Mr. Eagle Clarke, I have had the opportunity of examining small collections made by Mr. Forrester of Glenmiln, at Callander, and at Kilmalcolm, Renfrewshire. I would place on record my indebtedness to Rev. O. Pickard-Cambridge, of whose readiness to assist students in determining difficult species I have had ample experience.

ARANEIDA.

DRASSIDÆ.

Drassus troglodytes, C. L. Koch—Sidlaw Hills (D'A. W. T.)
D. lapidicolens, Walck.—Callander (W. E.)
Clubiona reclusa, Cb.—Callander (F.)

DICTYNIDÆ.

Amaurobius similis, Bl.—Buckie (D'A. W. T.), Callander (F.)
A. fenestralis, Str.—Callander (W. E.)

AGELENIDÆ.

Textrix denticulata, Oliv.—Callander (W. E.)
Tegenaria derhamii, Scop.—Morven (C. C.)

THERIDIIDÆ.

Theridion pallens, Bl.—Fife (D'A. W. T.)
T. sisyphium, Cl.—Buckie (D'A. W. T.)
T. tepidariorum, C. L. Koch—Morven (C. C.)
T. varians, Hahn.—Morven (C. C.)
Phyllonethis lineata, Cl.—Callander (F.)
Pedanostethus lividus, Bl.—Callander (W. E.), Kilmalcolm (F.)
Linyphia triangularis, Cl.—Buckie (D'A. W. T.), Callander (F.)
L. pusilla, Sund.—Morven (C. C.)
Drapetisca socialis, Sund.—Buckie (D'A. W. T.)
Leptyphantes tenebricolus, Wid.—Callander (F.)
L. zebrinus, Menge.—Morven (C. C.)
L. leprosus, Ohl.—Kilmalcolm (F.)
Tmeticus bicolor, Bl.—Buckie (D'A. W. T.), Kilmalcolm (F.)
T. abnormis, Bl.—Callander (W. E.)
Erigone atra, Bl.—Buckie (D'A. W. T.)
E. dentipalpis, Wid.—Buckie (D'A. W. T.)
Pachygnatha degeerii, Sund.
P. clerckii, Sund. } Callander (W. E.)

EPEIRIDÆ.

Meta segmentata, Cl.—Buckie (D'A. W. T.), Callander (F.), Morven (C. C.), Kilmalcolm (F.)
M. merianæ, Scop.—Tushielaw (W. E.), Callander (W. E.)
Tetragnatha extensa, Linn.—Callander (F.)
Zilla x-notata, Cl.—Buckie (D'A. W. T.), Callander (F.)
Z. atrica, C. L. Koch.—Buckie (D'A. W. T.), Callander (F.), Kilmalcolm (F.), Morven (C. C.)
Epeira cucurbitina, Cl.—Dundee (D'A. W. T.), Callander (F.)
E. cornuta, Cl.—Buckie (D'A. W. T.), Tushielaw (W. E.)
*E. diadema*ta, Cl.—Buckie (D'A. W. T.), Callander (F.)
E. quadrata, Cl.—Buckie (D'A. W. T.)

THOMISIDÆ.

Xysticus cristatus, Cl.—Callander (W. E.), Buckie (D'A. W. T.)

LYCOSIDÆ.

Trochosa pulverulenta, Cl.—Callander (W. E.), Morven (C. C.)
T. terricola, Thor.—Callander (W. E.)
Lycosa amentata, Cl.—Creag Meaghaidh (A. R.), Ben Alder (A. R.), Morven (C. C.), Callander (W. E.), Buckie (D'A. W. T.)
L. pullata, Cl.—Callander (W. E.), Tushielaw (W. E.), Morven (C. C.), Buckie (D'A. W. T.), Ben Alder (A. R.)
L. lugubris, Bl.—Morven (C. C.)
L. nigriceps, Thor.—Buckie (D'A. W. T.), Morven (C. C.)
Pirata piraticus, Cl.—Morven (C. C.)

ATTIDÆ.

Epiblemum scenicum, Cl.—Buckie (D'A. W. T.)

PHALANGIDA.

Phalangium opilio, L.—Dundee (D'A. W. T.)
Oligolophus morio, Fab.—Buckie (D'A. W. T.), Callander (F.), Kilmalcolm (F.), Morven (C. C.)
var. *alpinus*, Herbst.—Callander (F.), Creag Meaghaidh and Ben Alder (A. R.)
O. agrestis, Meade.—Buckie (D'A. W. T.)
O. ephippiatus, C. L. Koch—Morven (C. C.)
O. palpinalis, Herbst.—Morven (C. C.)
Platybunus corniger, Herm.—Callander (W. E.)
Megabunus insignis, Meade—Callander (W. E.)

CONTRIBUTION TOWARDS A FLORA OF EAST SUTHERLAND.

By Arthur Bennett, F.L.S.

The county of Sutherland (East 107, West 108 of Watson) extends across the north of Scotland from the Atlantic Ocean to the North Sea. On its west and north-west seaboard it is deeply indented by numerous sea-lochs; its eastern seaboard is much less so. East Sutherland is divided by Watson from West by the water-parting on the central ranges of mountains; towards the south the county parting thus becomes very complicated, and it may be that parts of West Sutherland, hitherto so considered, are really drained into East Sutherland. West Sutherland has been much more searched by botanists than East, and its flora is much better known and is probably more extensive; although in both cases the information is much scattered. As so much has been put on record respecting the West division of the county, and so little about the East, I have thought it would be well to put into print what I have been able to get together, especially as some of it is contained only in my own collection. I do not pretend to have exhausted the literature, but name such sources of information as are known to me, and appear in my notes on the county. These are as follows:—

1. *Excursions into the Highlands of Scotland*, by Dr. Graham, in Jameson's "Edin. New Phil. Journal," 1825, 1827, 1833.
2. *The Northern Flora*, by A. Murray, M.D., 1836.
3. H. C. Watson. Catalogue in Kew Library, Nos. 39 and 41, contains "Lists of Plants seen about Golspie in Sutherland in August 1832."
4. List of plants seen in East and West Sutherland in 1881, by Mr. W. F. Miller, embodied in *Notes on the Flora of Caithness and Sutherland*, by Arthur Bennett, in "Journal of Botany," 1882, pp. 117-119.
5. *Records of Characeæ*, by Messrs. Groves, in "Journal of Botany," 1883, 1884, 1886.
6. A collection of plants made by Mr. Grant of Wick, in 1888, and transmitted to me in the same year.

7. *Excursion of the Scottish Alpine Botanical Club to Sutherland and Caithness in* 1888, by Dr. W. Craig, in "Transactions of the Botanical Society of Edinburgh," 1889, p. 372.

8. Records, by Messrs. Linton, in "Journal of Botany," 1889, p. 208.

9. Notes of plants gathered by the late Mr. Henderson, in a notice of his life by Mr. Grant in "The Northern Ensign."

10. In *Record Club Report for* 1883 (quoted as R. C.), are numerous notices by Mr. Grant; but many of the stations here given as in East Sutherland are in West Sutherland, such as "Trantlebeg," which is at least ten miles to the west of the water-parting, though others are really in both East and West Sutherland.

11. *Notes on Highland Plants in* 1890, by Messrs. Marshall and Hanbury, in "Journal of Botany," 1891, pp. 108-118.

For brevity the authorities for the specific names are omitted, unless *not* contained in the usual Floras.

References.—The names of the authorities responsible for the several localities are printed in italics, and refer to the above records in each case: "sp." denotes that I have seen a specimen from the locality; "exs." denotes that dried specimens exist.

RANUNCULUS HEDERACEUS.—Golspie, *Watson;* Lairg, *Miller.*

RANUNCULUS FLAMMULA.—Golspie, *Watson;* Lairg, *Miller.*

RANUNCULUS ACRIS.—Golspie, *Watson.*

RANUNCULUS REPENS.—Golspie, *Watson;* Lairg, *Miller.*

RANUNCULUS BULBOSUS.—Golspie Links, *Grant*, sp.

(RANUNCULUS SCELERATUS.—Not recorded.)

RANUNCULUS FICARIA.—*Grant*, Cat.

CALTHA PALUSTRIS.—Golspie, *Watson;* Lairg, *Miller.*

TROLLIUS EUROPÆUS.—Between Kinbrace and Kildonan, *Grant*, 81; Lairg, *Miller;* near Invershin, *Craig.*

NYMPHÆA ALBA.—Between Rosehall and Oykell Bridge, *Marshall* and *Hanbury.*

PAPAVER DUBIUM.—Golspie (1843), *Watson.*

PAPAVER RHŒAS.—*Watson.*

CORYDALIS CLAVICULATA.—Gordonbush, *Grant*, sp., 1888.

FUMARIA OFFICINALIS.—Lairg, *W. F. Miller.*

RESEDA LUTEA.—Banks of railway above Invershin Station, *Craig.*

THLASPI ARVENSE.—*Watson.*

Capsella Bursa-pastoris.—Lairg, *Miller*.

†Lepidium latifolium.—(107), *Watson*.

Cochlearia officinalis.—Mouth of the Golspie Burn, *Grant*, sp.

Draba incana.—Heaths near Wilkhouse Inn, "*Flora Scotica*."

(Draba verna.—Not recorded.)

Cardamine pratensis.—Lairg, *Miller*.

Nasturtium officinale.—*Watson*.

Sisymbrium officinale.—East Coast, *Watson*.

Sinapis arvensis.—*Watson*.

Raphanus Raphanistrum.—Lairg, *Miller*.

Helianthemum vulgare.—Strathsteven, *Grant*, sp.

Viola palustris.—*Watson*.

Viola sylvatica (Riviniana).—*Watson*.

Viola arvensis.—Lairg, *Miller*.

Viola lutea, amœna.—Falls of the Shin, *Dr. Craig*.

Viola Curtisii, *var.* Mackaii.—Golspie Links, *Grant*, sp.

Drosera rotundifolia.—Kildonan, *Grant*, R. C. 1884.

Drosera anglica.—*Graham*, sp. in herb. *Watson*; Falls of the Shin, *Craig*.

Polygala eu-vulgaris.—Lairg, *Miller*.

Polygala depressa.—Oykell Bridge, *Marshall* and *Hanbury*.

Montia fontana, *var.* rivularis.—Helmsdale, *Messrs. Linton*. *var.* minor, Lairg, *Miller*; *Grant*, sp.

Silene inflata.—Golspie Burn mouth, *Grant*, sp.

Silene acaulis.—Ben Griam, *Henderson*.

Silene maritima.—Seashore at Golspie, *Grant*, sp.

Lychnis Flos-cuculi.—Lairg, *Miller*.

Lychnis diurna.—*Watson*.

(Lychnis Githago.—Not recorded.)

Sagina procumbens.—Lairg, *Miller*.

(Sagina apetala.—Not recorded.)

Spergula arvensis.—Lairg, *Miller*.

Honckeneya peploides.—Golspie Burn mouth, *Grant*, sp.

Spergularia marginata.—Seashore at Dunrobin, *Grant*, sp.

(Spergularia rubra.—Not recorded.)

Arenaria serpyllifolia.—Lairg, *Miller*.

Arenaria sedoides.—Ben Clibrich, *Marshall*, 1888.

Arenaria trinervia.—Dunrobin Glen, *Grant*, sp.

Stellaria media.—Lairg, *Miller*.

Stellaria Holostea.—Golspie Burn, *Grant*. sp.

Stellaria graminea.—*Grant*, 1883; but in West Sutherland.

Stellaria uliginosa.—*Watson*.

Cerastium semidecandrum.—Golspie Links, *Grant*, sp.

Cerastium alpinum.—Ben Griam, *Henderson*.

Cerastium glomeratum.—Golspie Links, *Grant*, sp.

Cerastium triviale.—Lairg, *Miller*.

(Cerastium tetrandrum.—Not recorded.)

Cerastium trigynum.—Ben Griam, *Henderson*.

Linum catharticum.—*Watson*.

†Malva moschata.—Golspie Burn mouth, *Grant*, sp.

Hypericum perforatum.—Between Kinbrace and Kildonan, *Grant*, 1881.

Hypericum pulchrum.—*Watson*.

Erodium cicutarium.—*Watson*.

Geranium molle—*Watson*.

Geranium dissectum.—*Watson*.

Geranium Robertianum.—*Watson*.

Rhamnus Frangula.—"planted?" *Watson*.

Ulex europæus.—Along the East Coast, *Graham*, exs.; Strath Fleet, *Graham*, exs.

Anthyllis Vulneraria.—Lairg, *Miller*.

Cytisus scoparius.—Plentiful on the East Coast, *Graham*, exs.

Medicago lupulina.—Field at Golspie, *Grant*, sp.

Trifolium medium.—Lairg, *Miller*.

†Trifolium hybridum.—By the station at Helmsdale, *Hanbury* and *Marshall*.

Trifolium repens.—Lairg, *Miller*.

Trifolium pratense.—*Watson*.

(Trifolium procumbens and Trifolium minus.—Grant, R. C., 1883, but in West Sutherland.)

Lotus corniculatus.—Lairg, *Miller*.

Astragalus hypoglottis.—"*Gordon* M.S.," fide *Watson*.

Vicia sylvatica.—Free Vater, *Graham*, exs.

Vicia Cracca.—Lairg, *Miller.*

Vicia sativa.—*Watson.*

Vicia angustifolia.—Pict's House, at Dunrobin, *Grant*, sp.

Vicia sepium.—Lairg, *Miller.*

Vicia hirsuta.—Cornfields, Kildonan, *Grant*, R. C. 1883.

Lathyrus pratensis.—Lairg, *Miller.*

Orobus tuberosus.—Lairg, *Miller;* between Kinbrace and Kildonan, *Grant; var.* tenuifolius.—Lairg, *Miller.*

Prunus spinosa.—Between Rosehall and Oykell Bridge, *Marshall* and *Hanbury.*

Prunus Padus.—Between Kinbrace and Kildonan, *Grant.*

Prunus Avium.—Golspie Burn, *Grant*, sp.

Spiræa Ulmaria.—Lairg, *Miller.*

Geum urbanum.—Golspie Burn, *Grant*, sp.

Potentilla anserina.—*Watson.*

Potentilla alpestris.—Ben Griam, *Henderson.*

Comarum palustre.—Lairg, *Miller.*

Fragaria vesca.—Between Kinbrace and Kildonan, *Grant.*

Rubus Chamæmorus.—Between Kinbrace and Kildonan, *Grant;* or near Achintoul, *Grant.*

Rubus saxatilis.—(Forsinain, *Grant*, 1883; but this is in West Sutherland.)

Rubus Idæus.—Between Kinbrace and Kildonan, *Grant;* Lairg, *Miller.*

Rubus corylifolius.—Near Invershin, *Marshall* and *Hanbury.*

Rubus plicatus, Rubus leucostachys, and Rubus mucronatus.—Between Rosehall and Invershin, *Marshall* and *Hanbury.*

Rosa spinosissima.—Golspie, *Watson.*

Rosa involuta, forma.—*Grant*, sp.

Rosa mollis.—Golspie Burn, *Grant*, sp.

Rosa tomentosa.—Dunrobin, *Grant*, sp.
var. scabriuscula, Sm. (*teste*, Baker).—Golspie Burn side, Grant, sp.

Rosa canina, *var.* aspernata.—Rosehall
,, *var.* subcristata.—Invershin
,, *var.* Borreri, *f.*—Invershin
} *Marshall* and *Hanbury.*

Alchemilla vulgaris.—Golspie, *Watson;* Lairg, *Miller.*

ALCHEMILLA ALPINA.—Ben Duhain (Dobhrain, 2030 ft.), *Grant*, R.C., 1883.

ALCHEMILLA ARVENSIS.—*Watson.*

CRATÆGUS OXYACANTHA.—Near Rosehall, *Marshall* and *Hanbury*; Lairg, *Miller.*

PYRUS AUCUPARIA.—*Watson*; Lairg, *Miller.*

EPILOBIUM MONTANUM.—*Watson.*

EPILOBIUM PALUSTRE.—Between Kinbrace and Kildonan, *Grant.*

EPILOBIUM OBSCURUM.—Near Rosehall, *Marshall* and *Hanbury.*

HIPPURIS VULGARIS.—Kildonan, *Grant*, R. C., 1883.

MYRIOPHYLLUM ALTERNIFLORUM.—Loch Brora, *Grant*, sp.

CALLITRICHE PLATYCARPA.—*Miller*, Cat.

SCLERANTHUS ANNUUS.—*Watson.*

SEDUM RHODIOLA.—Central corrie of Ben Clibrich, *Marshall.*

SEDUM ACRE.—Golspie Burn mouth, *Grant*, sp.

SAXIFRAGA STELLARIS.—Roadside between Rosehall and Oykell Bridge, *Marshall* and *Hanbury.*

SAXIFRAGA AIZOIDES, "Syme, sp."—*Watson.*

SAXIFRAGA TRIDACTYLITES.—Dunrobin, *Watson*, also "*Dr. Gordon.*"

CHRYSOSPLENIUM OPPOSITIFOLIUM.—Golspie Burn, *Grant*, sp.

PARNASSIA PALUSTRIS.—Kildonan, *Grant*, R. C., 1884.

HEDERA HELIX.—Kildonan, *Grant*, R. C., 1883.

CORNUS SUECICA, *Watson.*

HYDROCOTYLE VULGARIS.—Lairg, *Miller.*

SANICULA EUROPÆA.—Kildonan, *Grant*, R. C., 1883.

HELOSCIADIUM INUNDATUM.—Near the Mound, Golspie, *Grant*, sp.

ÆGOPODIUM PODAGRARIA.—Golspie Links, *Grant*, sp.

BUNIUM FLEXUOSUM.—Lairg, *Miller.*

ANGELICA SYLVESTRIS.—Golspie Burn, *Grant*, sp.

HERACLEUM SPHONDYLIUM.—Lairg, *Miller.*

TORILIS ANTHRISCUS.—Seashore at Golspie, *Grant*, sp.

ANTHRISCUS SYLVESTRIS.—*Watson.*

†ANTHRISCUS VULGARIS.—Golspie, *Watson.*

SAMBUCUS NIGRA.—Lairg, *Miller.*

VIBURNUM OPULUS.—"Stables," *Watson.*

GALIUM SAXATILE.—Lairg, *Miller.*

GALIUM APARINE.—*Watson.*

GALIUM BOREALE.—Rosehall, *Marshall* and *Hanbury.*

SHERARDIA ARVENSIS.—Invershin, *Marshall* and *Hanbury.*

ASPERULA ODORATA.—Between Kinbrace and Kildonan, *Grant.*

VALERIANA OFFICINALIS.—*Watson.*

VALERIANELLA OLITORIA.—Banks on rocks in Strathsteven, *Grant*, sp.

SCABIOSA SUCCISA.—*Watson.*

LEONTODON AUTUMNALIS.—*Watson.*

HYPOCHÆRIS RADICATA.—Lairg, *Miller.*

SONCHUS ARVENSIS.—Golspie Tower, *Grant*, sp.

SONCHUS ASPER.—Helmsdale, *E. F. Linton*, "Journ. Bot." 1889, p. 208.

SONCHUS OLERACEUS.—*Watson.*

CREPIS VIRENS.—Roadside, Golspie, *Grant*, sp.

CREPIS PALUDOSA.—Lairg, *Miller.*

HIERACIUM PILOSELLA.—Lairg, *Miller.*

HIERACIUM MURORUM, *seg.*—Lairg, *Miller*, sp.

HIERACIUM RIVALE, Hanb.—On rocks by the Oykell at Oykell Bridge, *Marshall* and *Hanbury*, 1889; "Journ. Bot." 1893, p. 368.

HIERACIUM VULGATUM, H. CORYMBOSUM, AND H. RIGIDUM.—All at Lairg, *Miller.*

HIERACIUM PALLIDUM, Back.—"*Oliver*, sp." fide *Watson.*

HIERACIUM DURICEPS, Hanb., and H. STRICTUM. Fr.—Both at Oykell Bridge, *Marshall*, sp.

HIERACIUM LANGWELLENSE, Hanb.—Oykell Bridge, *Marshall* and *Hanbury;* Dunrobin Glen, *Grant*, sp.

HIERACIUM SPARSIFOLIUM, Lindeb.—Oykell Bridge, *Marshall* and *Hanbury.*

HIERACIUM OREADES, Fr.—Rocks by the sea, Strathsteven, *Grant*, sp.

TARAXACUM OFFICINALE.—Lairg, *Miller.*

LAPSANA COMMUNIS.—Lairg, *Miller.*

CARDUUS LANCEOLATUS.—*Watson.*

CARDUUS ARVENSIS.—*Watson.*

CARDUUS PALUSTRIS.—Lairg, *Miller.*

Carduus heterophyllus.—Rosehall, *Marshall* and *Hanbury.*

Saussurea alpina.—Ben Griam, *Henderson.*

Centaurea Cyanus and C. nigra.—*Watson.*

(Artemisia vulgaris.—Not recorded.)

Gnaphalium dioicum.—Moors about Golspie, *Watson;* between Kinbrace and Kildonan, *Grant;* Lairg, *Miller.*

Gnaphalium sylvaticum.—*Watson.*

Gnaphalium supinum.—East side of Ben Clibrich, *Marshall.*

Gnaphalium uliginosum.—Between Kinbrace and Kildonan, *Grant.*

Gnaphalium minimum.—Near Lairg, *Craig.*

Tussilago Farfara.—*Watson.*

Aster Tripolium.—*Watson.*

Solidago Virga-aurea.—*Watson.*

Senecio vulgaris.—Lairg, *Miller.*

Senecio sylvaticus.—Lairg, *Miller.*
(*var.* lividus.—Abundant near Lairg, *Dr. Graham.*)

†Senecio viscosus.—Among stones scarcely above high-water mark at Helmsdale, *Messrs. Linton*, "Journ. Bot.," 1887, p. 208.

Senecio Jacobæa.—*Watson.*

Senecio aquaticus.—Lairg, *Miller.*

Bellis perennis.—Lairg, *Miller.*

Chrysanthemum segetum.—Lairg, *Miller.*

Chrysanthemum Leucanthemum.—Golspie, *Grant*, sp.

†Chrysanthemum Tanacetum.—*Watson.*

Chrysanthemum inodorum.—Lairg, *Miller.*

Matricaria Chamomilla.—Railway bank at Golspie, *Grant*, sp.

Achillea Ptarmica.—*Watson.*

Achillea Millefolium.—Lairg, *Miller.*

Campanula rotundifolia.—*Watson.*

Erica Tetralix and E. cinerea.—Lairg, *Miller.*

Calluna vulgaris, *f.* "incana."—Near Bonar Bridge, *Graham*, exs.

(Arbutus alpina.—Not recorded.)

Arbutus Uva-Ursi.—Moors on East Coast, *Watson;* Falls of Shin, *Craig;* Killean, *Grant*, sp.

Vaccinium Myrtillus.—*Watson.*

(Vaccinium uliginosum.—Not recorded.)

Vaccinium vitis-idæa.—Golspie, *Watson;* between Kinbrace and Kildonan, *Grant.*

Loiseleuria procumbens.—Ben Griam, *Henderson.*

Pyrola media.—Falls of Shin, *Craig.*

Pyrola minor.—Golspie Burn, *Grant*, sp.

Pyrola secunda.—Ben Bhraggie, *Grant*, sp.

Pyrola uniflora.—"*G. Gordon* MS.," *Watson.*

†Fraxinus excelsior.—Lairg, *Miller.*

Gentiana campestris.—*Watson.*

Gentiana Amarella.—Kildonan, *Grant*, R. C., 1883.

Erythræa Centaurium.—Links west of Golspie, *Grant*, sp.

Menyanthes trifoliata.—Loch Brora, *Grant*, sp.; between Kinbrace and Kildonan, *Grant.*

Convolvulus arvensis.—*Watson.*

Veronica Anagallis.—*Watson.*

Veronica Beccabunga.—*Watson.*

Veronica arvensis, V. scutellata, V. officinalis, and V. chamædrys.—All at Lairg, *Miller.*

V. hederifolia.—Roadsides near Golspie, *Grant*, sp.

V. agrestis.—Trantlebeg (in West Sutherland), *Grant*, R. C., 1883.

Bartsia Odontites.—Forsinard, *Grant*, in R. C., 1883. This parish is on the water-parting between East and West Sutherland.

Euphrasia officinalis.—Lairg, *Miller.*

Rhinanthus Crista-galli.—Lairg, *Miller.*

Melampyrum pratense.—Lairg, *Miller.*

Pedicularis palustris.—Lairg, *Miller.*

Pedicularis sylvatica.—Lairg, *Miller.*

Scrophularia nodosa.—Near Invershin, *Dr. Craig*, l.c.

Digitalis purpurea, Lairg, *Miller.*

Mentha sylvestris.—*Grant*, sp.

Mentha aquatica.—*Grant*, R. C., 1883.

Thymus Serpyllum, *agg.*—Lairg, *Miller.*

Teucrium Scorodonia.—Forsinard, *Grant*, R. C., 1883.

Ajuga reptans.—Between Kinbrace and Kildonan, *Grant.*

Ajuga pyramidalis.—Between Kinbrace and Kildonan, *Grant;* Burn of Culdgour (Killiegower), *Hooker* and *Arnott;* south of the Ord, near the sea.

Lamium amplexicaule.—*Watson.*

Lamium purpureum.—Invershin, *Marshall* and *Hanbury.*

(Lamium intermedium.—Not recorded.)

Galeopsis Tetrahit.—Lairg, *Miller.*

(Stachys palustris, and S. ambigua.—Both in Strath Halladale, *Grant*, R. C., 1883; but this is in West Sutherland.)

Stachys sylvatica.—Cornfield at Golspie, *Grant*, sp.

Stachys arvensis.—Helmsdale, *Messrs. Linton*, "Journ. Bot.," 1889, p. 208.

Nepeta Cataria.—*H. C. Watson*, "introduced."

Prunella vulgaris.—Lairg, *Miller.*

Scutellaria galericulata.—Near Invershin, *Craig.*

Myosotis cæspitosa.—*Watson.*

Myosotis arvensis and M. versicolor.—Lairg, *Miller.*

(Mertensia maritima.—Not recorded.)

Lycopsis arvensis.—*Watson.*

Asperugo procumbens.—Dornoch Burn, 1808, *Borrer*, fide *Watson.*

Pinguicula vulgaris.—Coast, *Watson;* Lairg, *Miller;* between Kinbrace and Kildonan, *Grant.*

Pinguicula lusitanica.—Invershin, and abundant nearly to Oykell, *Graham;* Oykell, *H. W. Campbell;* roadside between Shin Bridge and Rosehall, *Murray* in "Northern Flora."

Utricularia intermedia.—*Graham.*

Primula vulgaris.—Lairg, *Miller.*

(Primula scotica.—Not recorded.)

Trientalis europæa.—Falls of Shin, *Dr. Craig*, l.c.; between Kinbrace and Kildonan, *Grant*, sp.

Lysimachia nemorum.—Lairg, *Miller;* between Kinbrace and Kildonan, *Grant.*

Anagallis arvensis.—Roadside near Rosehall, *Marshall* and *Hanbury.*

(Glaux maritima.—Not recorded.)

Armeria maritima.—Strathsteven, *Grant*, sp.

Plantago major and P. coronopus.—Both at Lairg, *Miller.*

PLANTAGO MARITIMA.—Golspie, *Watson;* Lairg, *Miller.*

PLANTAGO LANCEOLATA.—*Watson.*

LITTORELLA LACUSTRIS.—Lake Brora, *Grant*, sp.

CHENOPODIUM ALBUM.—*Watson.*

CHENOPODIUM BONUS-HENRICUS.—Roadside near Golspie Tower, *Grant*, sp.

(ATRIPLEX BABINGTONII.—Not recorded.)

ATRIPLEX ANGUSTIFOLIA.—Seashore, Golspie, *Grant*, sp.

SALSOLA KALI.—Seashore west of Golspie, *Grant*, sp.

POLYGONUM AMPHIBIUM.—*Watson.*

POLYGONUM PERSICARIA.—Lairg, *Miller.*

POLYGONUM AVICULARE.—*Watson.*

POLYGONUM CONVOLVULUS.—In a field near Golspie, *Grant*, sp.

RUMEX CRISPUS.—Invershin, Rosehall, *Marshall* and *Hanbury.*

RUMEX DOMESTICUS.—Seashore, Helmsdale, *E. F. Linton.*

RUMEX OBTUSIFOLIUS, *Watson.*

RUMEX ACETOSA.—Lairg, *Miller.*

RUMEX ACETOSELLA, *Watson.*

OXYRIA RENIFORMIS.—East side of Ben Clibrich, at 2000 ft., *Marshall.*

EMPETRUM NIGRUM.—Golspie, *Watson.*

EUPHORBIA HELIOSCOPIA.—Cornfield near Golspie Tower, *Grant*, sp.

(EUPHORBIA PEPLUS.—*Grant*, R. C., 1883. This locality is in West Sutherland.)

URTICA DIOICA AND U. URENS.—Both at Lairg, *Miller.*

ULMUS MONTANA.—"Clearly native near Rosehall," *Marshall* and *Hanbury.*

QUERCUS ROBUR, *var.* SESSILIFLORA.—Dunrobin Glen, *Grant.*

FAGUS SYLVATICA.—Roadside near Golspie, *Grant*, sp.

CORYLUS AVELLANA.—Dunrobin Glen, *Grant*, sp.

ALNUS GLUTINOSA.—*Watson.*

BETULA ALBA, *agg.*—Between Kinbrace and Kildonan, *Grant.*

POPULUS TREMULA.—Near Invershin, *Craig.*

(SALIX PENTANDRA.—Strath Halladale, *Grant*, R. C. This locality is in West Sutherland.)

SALIX VIMINALIS.—*E. F. Linton*, 1888

Salix cinerea.—Lairg, *Miller;* Golspie Burn, *Grant*, sp.

Salix aurita.—Lairg, *Miller*, sp.

Salix Caprea.—Golspie Burn.

Salix ambigua.—*Watson.*

Salix repens.—*Watson.*

Salix herbacea.—East side of Ben Clibrich, *Marshall.*

Salix aurita × cinerea.—Oykell Bridge, *Marshall* and *Hanbury*, l.c.

Myrica Gale.—Between Kinbrace and Kildonan, *Grant.*

Pinus sylvestris.—Oykell Bridge, near Rosehall, *Marshall* and *Hanbury*, l.c.

Juniperus nana.—Between Rosehall and Invershin, *Marshall* and *Hanbury*, l.c.

Goodyera repens.—Ferry Wood, Golspie, *Grant*, sp.

Listera cordata.—Ben Bhraggie, Golspie, *Grant*, sp.

Listera ovata.—Near Invershin, *Dr. Craig*, l.c.

(Orchis mascula.—Not recorded.)

Orchis latifolia, *agg.*—*Miller*, Cat.

Orchis maculata.—Lairg, *Miller.*

Habenaria Conopsea.—Kildonan, *Grant*, R. C., 1883.

Habenaria bifolia.—Oykell Bridge, *Marshall* and *Hanbury*, l.c.

Habenaria viridis.—Golspie Links, *Grant*, sp.

Habenaria albida.—Lairg, *Miller.*

Malaxis paludosa.—Roadside above Invershin. On the hill behind Oykell, near Free Vater, *Graham*, exs.

Iris pseudacorus.—Lairg, *Miller.*

Allium ursinum.—Golspie Burn Glen, *Grant*, sp.

(Scilla verna.—Not recorded.)

Hyacinthus non-scriptus.—Between Kinbrace and Kildonan *Grant.*

Narthecium ossifragum.—Lairg, *Miller.*

(Tofieldia and Alisma.—Not recorded.)

Triglochin maritimum.—Near Little Ferry, Golspie, *Grant*, sp.

Triglochin palustre.—Lairg, *Miller;* near Invershin, *Craig.*

(*To be continued.*)

ON SCOTTISH DESMIDIEÆ.

By John Roy, LL.D.

(*Continued from page* 180.)

42. *S. dejectum*, Breb.—General. Zygospores are not uncommon.
β patens, Nord.—Aberdeen—Alford and Tomachar.

43. *S. Dickiei*, Ralfs.—General. With zygospores, in Aberdeen and Kincardine.

44. *S. dilatatum*, Ehr.—General. The zygospore of this species is rather remarkable. One example of the triangular form was found conjugated near Dinnet in Aberdeen. It is somewhat barrel-shaped, with round ends, and has numerous raised bands, passing longitudinally round it, giving the end view an undulated appearance. Diameter 48 μ. (*Our* Plate IV. fig. 4.)

45. *S. dispar*, Breb.—Not common. Sutherland, Ross, Aberdeen, Kincardine, Forfar, Perth, Dumbarton. With zygospores, in Aberdeen, at Slewdrum.

46. *S. echinatum*, Breb.—Very rare. Aberdeen—near New Pitsligo, and south of Birsemore; Forfar—Canlochan; Perth—Bracklin.

47. *S. elongatum*, Barker (Trans. Dub. Micro. Club, 27th May 1869). *St. terebrans*, Nordst.—"Norges Desmid." 1872. Very rare. Ross—Poolewe; Argyle—Glen Coe.

48. *S. erasum*, Breb., according to Boldt.—Very rare. Ross—near Coul (Mrs. Farquharson).

49. *S. eustephanum*, Ehr.—Must be very rare. Perth—Spital of Glen Shee (Mr. Wm. West).

50. *S. Farquharsonii*, n. sp.—Medium-sized, about as long as broad, almost circular, ends slightly depressed; constriction deep, linear, outer opening small with basal angles acutely rounded; end view triangular, sides slightly concave, angles very broadly rounded; membrane punctate. Length, 54·4 μ; breadth, 48 μ; isthmus, 11 μ; thickness, 38·4 μ. (*Our* Plate IV. fig. 3.)

This somewhat resembles a form figured by Delponte under *S. orbiculare;* but his form, besides being only half the size, wants the depression in the ends—a very characteristic feature. Very rare. Aberdeen—plentiful in the old curling-pond at Haughton, Alford.

51. *S. forficulatum*, Lundell.—Very rare. Perth—near Buchanty, and near Fowlis Wester.

52. *S. franconicum*, Reinsch.—Very rare. Aberdeen—Bishop's Loch and Tomachar.

53. *S. furcatum* (Ehr.) Breb. (including *St. spinosum*, Ralfs.)—General.

54. *S. furcigerum*, Breb.—General. Conjugated in a marsh south of the Ord, near Dinnet, Aberdeen. The zygospore is exactly like that of *S. armigerum* in size and appearance. Unfortunately the specimen was lost.

55. *S. glabrum*, Ehr.—Common.

56. *S. gracile*, Ralfs.—Not common. Sutherland, Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Argyle, Fife.

β *bicorne*, Bulnh.—Rare. Aberdeen—Upper Powlair, Slewdrum, Birsemore Loch, Craigendinnie, Heughhead, west of the Ord, near Loch Dawan, Homehead, Birkhill, Mosston Moor; Kincardine—Scolty Dam and Dalbrake; Perth—Folotry in Fowlis Wester.

γ *tenuissima*, Boldt.—Rare. Inverness—in Skye, and at Brin; Aberdeen—at Haughton, and in Glen Clunie; Kincardine—Crathes and Glen Dye; Perth—Glen Garry.

57. *S. grande*, Bulnh.—Very rare. Perth—near Loch Mharc in the Forest of Athole, where it was found in July 1876, and included in a list of Perthshire species, published in the "Scot. Nat.," April 1877.

58. *S. granulosum*, Kg.—Rare. Ross—near Tain; Aberdeen—marshes south of Birsemore; Kincardine—Cammie, Heughhead, and Dalbrake (with zygospores), in Strachan. Zygospore globular, with numerous slightly bifid spines. Diameter without spines, 28 μ; length of spine, 10 μ. (*Our* Plate III., fig. 6.)

59. *S. Heimerlianum*, Lütkem.

β *spinulosum*, Lütkem.—Rare, or overlooked. Aberdeen—Upper Powlair in Birse; Kincardine—pool by the Spital Burn, Strachan.

60. *S. hexacerum*, Ehr. (*S. tricorne*, Ralfs).—General, but occurs sparingly. Zygospores have been observed at Scotston Moor, near Aberdeen.

β Ralfs.—General, but scarce,

γ *semilunare*, Wittr.—Apparently rare. Aberdeen—Whitestripes (Mr. A. Murray).

61. *S. hirsutum* (Ehr.), Breb.—General, but scarce.

62. *S. horametrum*, n. sp.—Rare.

Medium-sized, a little longer than broad, "hour-glass" shaped, constriction opening rectangularly, sides about

straight, semi-cells widening upwards, angles subacute, ends flatly convex; angles with 3 to 4 rows of crowded, short, simple, acute, stout spines; end view triangular, or quadrangular, sides slightly concave, angles acutely rounded, very spiny, 2 to 3 rows of spines across the angles, and a circle of 15 spines around the centre in the triangular form, and of 20 in the quadrangular. Isthmus about half the thickness of the semicell. Membrane smooth.

L. 57 μ; b. 48 μ; isth. 18 μ; thick. 33 μ.—from a triangular specimen.
„ 65 μ; „ 59 μ; „ 24 μ; „ 42 μ.— „ quadrangular „
(*Our* Plate III. fig. 2.)

Its nearest ally is *S. asperum*, Breb.; but the spines and their arrangement are wholly different.

Aberdeen—Powlair, Slewdrum, Heughhead, Birkhill, Tomachar, Dinnet, Glen Clunie; Kincardine—near Crathes, and pool near Durris Bridge; Forfar—Glen Isla.

63. *S. Hystrix*, Ralfs. — Not common. Sutherland, Inverness, Aberdeen, Forfar, Perth, Argyle, Arran.

64. *S. inconspicuum*, Nordst.—Not common. Sutherland, Ross, Inverness, Moray, Aberdeen, Kincardine, Forfar, Perth, Argyle.

65. *S. inflexum*, Breb.—General.

66. *S. iotanum*, Wolle.—Rare or overlooked. Aberdeen—near Girnoc; Perth—Spital of Glen Shee and Ben Lawers (Mr. W. West).

67. *S. Kjellmanii*, Wille.—General, but very sparingly distributed on the low grounds; plentiful on the higher mountains, as Cairngorm, Ben Muichdhui, Lochnagar, etc., near melting snow. Seems too near *S. punctulatum*, Breb.

68. *S. læve*, Ralfs.—Rare. Sutherland—Loch Inver; Aberdeen—Birsemore Loch, near Loch Dawan, Tomachar; Kincardine—overflow pool in the Dee, near Durris Bridge.

69. *S. lævespinum*, Bisset ("Journ. Roy. Micro. Soc." 1884, Plate V. fig. 5).—Very rare. Arran—Goat Fell (Oct. 1882).

70. *S. lanceolatum*, Archer. — Not common. Ross, Aberdeen, Kincardine, Forfar, Perth. With zygospores, in Aberdeen and Kincardine.

71. *S. leptodermum*, Lundell.—Very rare. Aberdeen—Slewdrum.

72. *S. lunatum*, Ralfs.—Rare. Ross—near Tain; Inverness—near Brin; Aberdeen—near Alford, south of Birsemore, Dalbagie; Perth—Craig-an-Lochan (Mr. W. West).

73. *S. Maamense*, Archer (Trans. Dub. Micro. Club, 17th December 1868. *S. pseudocrenatum*, Lundell, 1870).—Rare. Its distribution is peculiar, being practically confined to a district

extending a few miles west and east of Aboyne, on Deeside, and a distant outlier in Mull.

Aberdeen—Upper Powlair, moor near Church of Birse, Rosehill Loch, Birsemore Loch, three localities near Craigendinnie, Moss of Logie, pool close to north end of Loch Dawan, foot of Culblean, east side; Kincardine—Crathes; Argyle—near Tobermory in Mull.

74. *S. margaritaceum* (Ehr.), Menegh.—General.

75. *S. megacanthum*, Lund.—Somewhat rare. Aberdeen, Kincardine, Perth, Argyle.

76. *S. megalonotum*, forma, Nordst.—Very rare. Kincardine—between Bishop's Dam and Clochnaben.

77. *S. meriani*, Reinsch.—General, but scarce.

78. *S. mesoleium*, Archer (Trans. Dub. Micro. Club, 22nd June 1883).—Not common. Sutherland, Ross, Aberdeen, Kincardine, Perth, Fife.

79. *S. minutissimum*, Aurs.—Very rare. Inverness—on Cairngorm; Aberdeen—Milton Moor, and Tomachar in Cromar; Kincardine—on Kerloch.

80. *S. monticulosum*, Breb.—Not common. Aberdeen, Kincardine, Forfar, Perth, Arran.

β *bifarium*, Nordst.—Rare. Ross—Falls of Connon; Aberdeen—near Ballater.

81. *S. mucronatum*, Ralfs.—General, but scarce.

82. *S. muricatum*, Breb.—Not common. Orkney, Sutherland, Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Argyle, Arran, Kirkcudbright.

var. *acutum*, W. West.—Rare. Perth—Glen Tilt (Mr. W. West).

83. *S. muticum*, Breb.—Not common. Sutherland, Inverness, Aberdeen, Kincardine, Perth, Stirling, Argyle.

84. *S. oligacanthum*, Breb.—Rare. Inverness—near Brin; Aberdeen—near Cambus O'May and Tomachar; Perth—near Loch Clunie.

85. *S. O'Mearii*, Archer.—Not common. Sutherland, Aberdeen, Kincardine, Forfar, Perth, Argyle, Arran.

86. *S. orbiculare* (Ehr.), Ralfs.—General, and often conjugated.

β *extensum*, Nordst.—General, but scarce. With zygospores, in Aberdeen, near Dinnet.

γ *depressum*, Roy and Bisset.—Rare. Perth (or Argyle)—Ben Laoigh (Mr. W. West); Fife—Tent's Moor (Mrs. Farquharson).

87. *S. oxyacanthum*, Archer.—Not common. Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Argyle, Arran.

88. *S. pachyrynchum*, Nordst.—Very rare. Aberdeen—Slewdrum in Birse, and Heughhead near Aboyne.

89. *S. papillosum*, Kirch.—Very rare. Ross—Loch Kinnelan; Aberdeen—Tonley Pond.

90. *S. paradoxum*, Meyen.—General. One crushed zygospore seen on Kerloch in Kincardine: it had been globular, not large, with few long spines, 2-3-fid at the apex.

β *longipes*, Nordst.—Very rare. Caithness—Loch Hemprigs (Mr. James Mitchell); Ross—Poolewe (Rev. D. Campbell); Moray—Dallas; Argyle—Glen Coe (Mr. W. Archer).

γ *parva*, West.—Common.

91. *S. pileolatum*, Breb.—Not common. Ross, Aberdeen, Kincardine, Perth, Argyle. With zygospores, which have been lost, in Kincardine, at Den of Garrol. They were pretty large, globular, with not very numerous stout spines, 2-3-fid at the apex.

92. *S. pilosum* (Näg.) Archer.—General, but scarce. With zygospores, in Kincardine at Cammie, and Argyle in Glen Coe.

93. *S. polymorphum*, Breb.—General, and variable.

94. *S. polytrichum*, Perty.—Not common. Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Argyle, Wigtown.

This species I look upon as identical with *S. Pringsheimii*, Reinsch; and being the older name, it must take the place of Reinsch's. They agree in size and form; and in the arrangement and size of the spines.—*S. saxonicum*, Bulnh., appears to be distinct, having its semi-cells oval rather than elliptical, and its spines differently arranged, much more numerous, and smaller. For the sake of comparison, figures of both species from Deeside specimens are given on *our* Plate III.: fig. 8 is *S. polytrichum*, Perty, and fig. 10 is *S. saxonicum*, Bulnh.

95. *S. proboscidium*, Archer (*S. asperum*, Breb., β *proboscidium*, Breb.)—Not common. Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Fife, Arran.

96. *S. pterosporum*, Lundell.—Not uncommon. With zygospores, in Aberdeen, at Heughhead, near Aboyne.

97. *S. punctulatum*, Breb.—General, but rather scarce.

98. *S. pungens*, Breb.—Not common. Aberdeen, Kincardine, Forfar, Perth.

99. *S. pygmæum*, Breb.—Not common. Ross, Aberdeen, Kincardine, Forfar, Perth.

Forms *majus* and *minus*, Wille.—Probably rare. Aberdeen—Ben Muichdhui, above Loch Etchachan.

Var. *semicirculare*, Wittr.—Rare. Kincardine—near Clochnaben.

Var. *obtusum*, Wille.—Rare. Forfar—in Canlochan.

100. *S. quadrangulare*, Breb.—Very rare. Aberdeen,—at Birsemore Loch, near Dinnet, and Dalbagie.

101. *S. Reinschii*, Roy.—General, but scarce. With zygospores, in Argyle, Glen Coe (Mr. Archer).

102. *S. repandum*, Perty.—Very rare. Aberdeen—Glen Callater.

103. *S. rhabdophorum*, Nordst.—Extremely rare. Aberdeen (or Forfar?)—table-land north-west of Canlochan.

104. *S. rostellum*, n. sp.—Rare.

Small, slightly longer than broad, broadly oval, constriction shallow, opening wide; semi-cell flatly oval, spiny, spines small, the one next the constriction rather larger and directed downwards, more prominent at one angle owing to a peculiar twist in the semi-cell giving it a considerable resemblance to a bird's beak, a number of small spines (about 14) are arranged round the margin of the semi-cell and 2 to 3 rows within the margin; end view quadrangular, with sides concave, spiny, and angles a little produced, one more prominent on account of the twist. Membrane smooth; isthmus broad. Length, 31-33 μ; breadth, 29-31 μ; isth., 13-14 μ.

It seems unnecessary to compare this species with any other (*our* Plate III. fig. 3).

Ross—near Tain and Strathpeffer; Inverness—Skye, at the head of Glen Sligachan; Aberdeen—many localities from Scotston to Girnoc; Kincardine—Rickarton; Perth—Glen Garry; Argyle—Glen Coe.

105. *S. rugulosum*, Breb.—Rare. Ross—near Strathpeffer; Kincardine—on the north side of Cairnmonearn.

106. *S. saxonicum*, Bulnh.—Rare. Aberdeen—near Mill of Maidencraig, Haughton, Tillyfour, old channel of Dee below Aboyne, near Dinnet School, Koynach Moor in Cromar, Castleton, Braemar; Kincardine—near Durris Bridge, Cammie, Dalbrake, Slack of Birnie; Forfar—Lundie Bog, Easter Ogil in Fern (*our* Plate III. fig. 10).

107. *S. saxonicum*, Reinsch.—Very rare. Aberdeen—Powlair in Birse, and Dinnet.

This is probably nothing more than a form of *S. aculeatum*, Ehr., but it is a remarkable one. I have seen few examples.

108. *S. scabrum*, Breb.—Not common. Shetland, Sutherland, Ross, Moray, Aberdeen, Kincardine, Forfar, Perth, Fife, Argyle, Arran. With zygospores, in Aberdeen near Cambus-o'-May. They are globular, sometimes slightly oblong, with short stout spines, 3-4-fid at the apex. About 10 to 13 visible round the margin. Diameter without spines, 32-35 μ; length of spine, 5-6 μ.

109. *S. Sebaldi*, Reinsch.

β ornatum, Nordst.—Rare. Ross—Falls of Rogie; Aberdeen—Brimmond, Slewdrum, old channel of Dee below Aboyne, Powlair, near Dinnet, Tomachar; Kincardine—plentiful in a moraine pool above Cammie; Perth—Durdie Moor; Kirkcudbright—New Galloway.

110. *S. setigerum*, Cleve (*S. Royanum*, Archer).—Extremely rare. Argyle—Glen Coe (Mr. Archer, by whom only this fine species has been found). It is not known to occur elsewhere in the British Islands; and there are very few Continental localities. Glen Coe specimens are figured on *our* Plate III. fig. 9. The specimen in front view has been lying a little obliquely, hence the end margin is too straight: it should be very slightly convex.

111. *S. sexangulare*, Bulnh.—Extremely rare. Inverness—near Brin (Mrs. Farquharson).

All the examples seen were 6-radiate, agreeing exactly with Bulnheim's form. All the Welsh and Irish specimens which have come under my observation were 5-radiate. Mr. Archer was the first to note this handsome form as a distinct species; it having turned up in one of his early visits, if not his first, to Connemara.

112. *S. sexcostatum*, Breb.—Rare. Sutherland—Loch Inver; Aberdeen—Brimmond, Ben-na-Chie, south of Birsemore, near Craigendinnie, Dalbagie, Lochnagar, Glen Callater Tableland; Kincardine—Nigg, near Durris Bridge, Gillan, Curran, Muiryhaugh; Forfar — Canlochan (a five-angled form); Perth—Ben Lawers, Rannoch.

Sub. sp. *productum*, West.—Not common. Sutherland, Ross, Aberdeen, Kincardine, Forfar, Perth, Dumbarton, Argyle, Renfrew.

113. *S. spongiosum*, Breb.—Not common. Sutherland, Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Argyle, Stirling.

114. *S. subscabrum*. Nordst.—Very rare. Kincardine—in a moraine pool in Glen Dye.

115. *S. teliferum*, Ralfs.—General. Occasionally with zygospores.

116. *S. tetracerum*, Kg.—General.

117. *S. tumidum*, Breb.—Not common. Sutherland, Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth.

118. *S. turgescens*, De Not.—Not common. Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth, Wigtown.

119. *S. Ungeri*, Reinsch.—Very rare. Inverness—Loch Ruthven; Aberdeen—old channel of Dee below Aboyne; Kincardine—Kerloch.

120. *S. vestitum*, Ralfs.—Not common. Ross, Inverness, Aberdeen, Kincardine, Perth.

XANTHIDIUM, Ehr.

1. *X. aculeatum*, Ehr.—Not common. Sutherland, Aberdeen, Kincardine, Forfar, Perth, Dumbarton.

2. *X. antilopœum* (Breb.), Kg.—Common. Of the two forms, the smaller, with slightly curved spines, is the more common. This form has been found conjugated in Sutherland at Loch Inver, and in Aberdeen at Logie Coldstone. The zygospore is large, globular, with numerous stout, tapering, slightly bifid spines, of which about 15 appear round the margin. Diameter without spines, 60 μ; length of spine, 18 μ. *Our* Plate III. fig. 13, is from an immature specimen. Forma *supernumeraria*, Nord., occurs in Sutherland near Loch Inver.

   The other form is larger, with stout, almost straight spines. A curious state of this form occurs in Loch Ruthven, Inverness. It has a stout, short, blunt spine on the basal angle, under the lower pair of spines, and with them forming an equilateral triangle.

   Both forms are very constant in their characters, and each probably forms a good species; but not having seen the zygospore of the larger form, it is thought better not to separate them at present.

3. *X. armatum*, Breb.—General. Has been found conjugated in Sutherland at Loch Inver, in Kincardine at Cammie, and in Argyle in Glen Coe.

4. *X. Bigorrianum*, Perty.—Very rare. Aberdeen—Loch Ullachie near Ballater; Kincardine—Cammie.

5. *X. Brebissonii*, Ralfs.—Not common. Aberdeen, Kincardine, Forfar, Perth, Dumbarton.

   β *basidentatum*, Börg.—Very rare. Aberdeen—south west from the Ord, near Dinnet; Fife—Tent's Moor.

6. *X. concinnum*, Archer.

   Var. *Boldtiana*, West.—Very rare. Aberdeen—Loch Ullachie, near Ballater.

7. *X. cristatum*, Breb.—Not common. Sutherland, Ross, Inverness, Aberdeen, Kincardine, Forfar, Perth.

   β *uncinatum*, Breb.—Common. A curious form of this variety occurs in Loch Ruthven, Inverness, in which the central circlet of granules is replaced by a short, stout, blunt spine.

   γ *Delpontii*, n. var. (Delponte, "Spec. Subalp.," Tab. XIV. figs. 1-12).—Extremely rare. Kincardine—Scolty.

Delponte's figures illustrate a form which differs from the typical form of Brebisson, and indeed are nearer var. *β*. It seems better therefore, for the present, to include it as a tolerably distinct variety.

8. *X. fasciculatum*, Ehr.—Not common. Sutherland, Ross, Aberdeen, Kincardine, Forfar, Perth, Argyle, Fife.

9. *X. quadricornutum*, n. sp., Roy and Bisset.—Medium-sized, a little longer than broad, constriction deep, opening widely; semi-cells elliptical, slightly reniform at the base, with two spines about the middle of each side; the centre of the semi-cell thickened, densely, and irregularly scrobiculate; end view elliptical, slightly quadrangular, with a spine at each angle, sides thickened. Isthmus narrowed. Membrane smooth.

Length, 47·5-50 *μ*; breadth, 45-47·5 *μ*; isthmus, 14-15 *μ*. (*Our* Plate IV. fig. 5.)

Very rare. Kincardine—in a pool near Durris Bridge.

This species does not come very near any other known to me: the arrangement of the spines and the remarkable centre sufficiently distinguish it.

10. *X. Smithii*, Archer.—Extremely rare. Kincardine—Cammie in Strachan. Now lost by drainage.

ARTHRODESMUS (*Ehr.*), *Archer.*

1. *A. bifidus*, Breb.—Not common. Ross, Inverness, Aberdeen, Kincardine, Perth, Argyle.

(*To be continued.*)

Errata in Last Number.

Plate IV. should be distinguished as "Scottish Desmidieæ, Plate I."
(*Note.*—The references in the text are to this and future special plate numbers.)

On page	171,	under	3. *H. undulata*,	*for*	Plate	IV.	*read* Plate	I.	Fig. 1.
,,	173,	,,	7. *M. fimbriata*,	*for*	,,	IV.	*read* ,,	I.	Fig. 3.
,,	174,	,,	17. *M. verrucosa*,	*for*	,,	IV.	*read* ,,	I.	Fig. 2.
,,	178,	,,	12. *S. armigerum*,	*for*	,,	IV.	*read* ,,	III.	Fig. 12.
,,	178,	,,	16. *S. avicula*,	*for*	,,	IV.	*read* ,,	III.	Fig. 11.
,,	180,	,,	36. *S. cornigerum*,	*for*	,,	IV.	*read* ,,	III.	Fig. 5.

Description of Scottish Desmidieæ, Plate I.—Fig. 1. *Hyalotheca undulata*, Nord. ×600. Fig. 2. *Micrasterias verrucosa*, Bisset: *a*, front; *b*, end; ×200. Fig. 3. *M. fimbriata*, Ralfs, *β spinosa*, Bisset, ×200. Fig. 4. *Closterium pseudodianæ*, Roy, ×400. Fig. 5. *Cosmarium Archerii*, Roy and Bisset: *a*, front; *b*, end; ×400. Fig. 6. *C. alpestre*, R. and B.: *a*, front; *b*, end; ×400. Fig. 7. *C. microsphinctum*, Nord., forma *majus*, ×400. Fig. 8. *C. Davidsonii*, R. and B., ×600. Fig. 9. *C. eductum*, R. and B.: *a*, front; *b*, side; ×600. Fig. 10. *C. Grantii*, R. and B.: *a*, front; *b*, side; *c*, end; ×600. Fig. 11. *C. Gregorii*, R. and B., ×600. Fig. 12. *C. hexalobum*, Nord., *β*, ×600. Fig. 13. *C. trachypleurum*, Lund., var. *minor*, Racib.: *a*, front; *b*, side; *c*, end; ×600. Fig. 14. *C. melanosporum*, Arch.: *a*, front; *b*, zygospore; ×600. Fig. 15. *C. Etchachanense*, R. and B.: *a*, front; *b*, side; *c*, end; ×600.

ZOOLOGICAL NOTES.

The Quail (*Coturnix communis*) **in the Edinburgh District.**—With reference to Mr. Adair's note in the July number of the "Annals" reporting the presence of the Quail on the farm of Remote, some five miles east of Dalkeith, it may be worth while putting on record the following further occurrences this year in the district around Edinburgh, as indicating a visitation in more than usual numbers: a circumstance which it is natural to associate with the unusually fine spring and early summer.

On 22nd July (shortly after sunset), and almost daily during the following week, I heard the well-known call in a field of barley adjoining the village of Roslin. The field was immediately opposite the house in which I was staying; and it was very pleasant to sit during the evening near the partly open window listening to the liquid notes: now so distinct as to suggest the bird being but a few yards off, now almost inaudible, as if quite at the other side of the field. Mr. Eagle Clarke tells me that during the same week he and Mr. Adair heard one calling in a field of oats on the farm of Morton Mains, a few miles south of Edinburgh; and that on several occasions during the last few days of July he heard others on different parts of Comiston farm, only a few hundred yards beyond the city boundary at Morningside. To the neighbouring farm of Oxgangs, they used to come annually about twenty years ago; but I am not aware that they have been noticed there since. Again, just before daybreak on the mornings of the 12th and 14th of August, I heard one calling in the heart of the town of Leven in Fife: it must have come into one of the larger gardens to feed. Mention should also be made of a nest containing eggs within a few days of hatching, which was discovered in June last in a hayfield adjoining the village of Tranent in East Lothian, as stated in the newspapers at the time.

It must not be supposed that I record these occurrences because the Quail is a very rare bird in the Forth district (it occurs annually—in some localities with great regularity), but merely because they seem to point to its presence this summer in more than usual numbers.—Wm. Evans, Edinburgh.

Quails (*Coturnix communis*) **in Barra.**—About the middle of June, I heard the notes of the Quail in a field of corn on the minister's glebe in this island. Since that time, and up to the beginning of September, I heard the notes frequently about the same locality; and one day I marked out at least four or five different birds, but although I walked over the fields I failed to see or put any of them up. The Rev. J. W. M'Donald, who accompanied me on several occasions, was, however, more fortunate, as he saw

and put up one in the early part of the month of August. From the time the birds have been in the island, I think they must have nested. I don't think there is any record of the Quail having been seen or heard in Barra before this year.—JOHN MACRURY, Barra.

The Swordfish (*Xiphius gladius*, L.) **in the Firth of Forth.**—A specimen of this fish, which is of rather rare occurrence on the British coasts, was caught in the salmon-nets at Bo'ness, Firth of Forth, on the 17th July, and has been acquired for the Kelvingrove Museum, Glasgow. The measurements were:

Total length, 8 feet 2 inches. Tip of sword to front of lower jaw, 2 feet 5 inches.

In the stomach were otoliths of young haddock and whiting, a few vertebræ, and several specimens of a Nematoid.—J. M'NAUGHT CAMPBELL, Kelvingrove Museum, Glasgow.

Bonito (*Thynnus pelamys*) **and Fox Shark** (*Alopecias vulpes*) **in the Solway Firth.**—Mr. M'Kie, honorary curator of the Kirkcudbright Museum, has kindly furnished me with particulars of the capture of this very rare fish in the salmon-nets at the mouth of the Dee. The fish is being mounted for the museum, which contains a collection of fish well mounted and beautifully shown. This is only the third record of the Bonito in local waters, so far as I am aware. One was caught at the Bowes Scaur on 25th July 1831. Another one was captured on 22nd July 1842, by a haaver, near to Caerlaverock Castle, and was sold in Dumfries. Since then I am not aware of any other instances of the capture of this beautiful species in or near the Solway. Mr. M'Kie also tells me of another interesting addition to his fish collection in a fine specimen of the Thresher, captured last month in Wigtown Bay. This is by no means so rare a species in our waters as the Bonito.—R. SERVICE, Maxwelltown.

Note on a Parti-coloured Plaice (*Pleuronectes platessa*).—The question as to the cause of the presence or absence of particular colours in fishes and other marine creatures is one of great interest. It might be the subject of the most important investigations, and has already occupied the attention of such a skilled and careful observer as Cunningham of Plymouth Laboratory. That all fish are largely influenced by the ground on which they may happen to dwell is well known. Flat-fish more especially seem to take the prevailing colour of the sea-bottom they affect, without losing their characteristic appearance otherwise. The White or Gray Conger of the deep sea, and the Black Conger of the tangle area, are cases in point. Every Highland loch with a silver strand or sandy bottom at one end and a peaty bottom elsewhere, carries Trout with characters derived evidently from such bottoms. It has come consequently to be an accepted opinion that colour in fish is due to the influence of light as reflected from coloured surroundings.

Thus the experiments of Stoddart with Trout kept in white basins, which rapidly lost their colouring, was considered of a crucial character. And yet Gold Carp do not necessarily lose richness of colouring in any ordinary dishes. Similarly flat-fish whose under surface is removed from the influence of light have no pigment on this under surface; and by experiment this under surface has been pigmented by reflecting light thereon. Yet we have such creatures as the Palmipes Starfish with a band of rich colouring on the under surface, although living in deep water and on muddy ground. So that other elements may enter into the question. Apart from these experimental and natural observations, there are some which are evidently wholly abnormal. These are perhaps still more important than what we have previously alluded to. Thus we find flat-fish such as Plaice with a partial coloration on the under surface. Some have been taken, as one fisherman described it, as if two young Plaice had been stuck together to make one fish—fully coloured on the under surface as well as on the upper. Through the kindness of Mr. Colin Leitch of Ardrishaig, we have been favoured with a very remarkable specimen of such a Plaice. The lower half and a portion of the upper half towards the dorsal fin were as well coloured as the upper surface, with the distinctive orange spots well shown. The remaining fourth, including the under surface of the head, was quite normal. Here was a fish that had apparently reverted to the coloration of a prior condition, when the fish swam on its edge with eyes on both sides, as indicated in the early development of the flat-fishes. But the *structure* had not reverted, and when the head was approached, it and its immediate neighbourhood retained the normal appearance of a present-day Plaice. If the normal development of the young Plaice were delayed so as to keep it on its edge with eyes on both sides a few days longer than usual, the pigment cells might obtain such a start as to continue developing in spite of the untoward conditions of an ordinary flat-fish existence. Has a Plaice ever developed completely so as to be taken absolutely double-sided: that is to say, not only pigmented on both sides, but with an eye on each side, as in the early stages? We have not met such a specimen, but partial retrogression, at least in colouring, is not uncommon, and the above specimen at the tail half was as completely coloured on the one side as the other.—W. Anderson Smith, Ledaig.

Psodos coracina, *Esp.* (= P. trepidaria, *Tr.*), at a low elevation.—This little mountain moth is, I believe, usually regarded as only occurring in this country at an altitude of 2000 feet and upwards —see Buchanan White's "Lepidoptera Scotica" (Scot. Nat., vol. iv. p. 32). It may be worth mentioning therefore, that in June of the present year I took two specimens at Inverdruie Saw Mill, and a third by the Spey close to Aviemore Bridge, only some 700 feet

above sea level. A few days before I captured one at about 1000 feet elevation by the roadside leading to Loch Morlich. On Cairngorm and Braeriach it was abundant at the usual altitude.—WILLIAM EVANS, Edinburgh.

Rare Beetles in Inverness-shire.—It may interest some of the readers of the "Annals" to know that I found the bright red beetle *Eros aurora*, Herbst., in considerable abundance in the forest of Rothiemurchus towards the end of May last (1893). Besides a single example at Loch-an-Eilean and another at the Doon, I found numbers resting or crawling on the branches of a dead bush of broom at Inverdruie. From twenty to thirty might have been captured on each of several successive days. The spot was thickly covered with decayed sawdust. According to Sharp's "Coleoptera Scotica" and Fowler's "British Coleoptera," this species has not hitherto been taken in Moray; the only British localities given for it being Rannoch, etc. Another interesting capture was *Pachyta sexmaculata*, L., of which I obtained a single specimen on the sand-hills at the upper end of Loch Morlich in the forest of Glenmore. On referring to the authors above mentioned, I find only one previous record, and that for the same district, namely two specimens captured at Aviemore in 1877. Another good beetle taken among shingle by the margin of Loch Gamnha was *Meloe violaceus*, Marsh.—WILLIAM EVANS, Edinburgh.

Lepidepecreum carinatum, *Spence Bate* and *Westwood*, in the Firth of Forth.—This curious Amphipod has recently been obtained in the Firth of Forth for the first time. The genus and species were instituted by Spence Bate and Westwood in 1868, and are described at page 509 of the second volume of their work on the "British Sessile-eyed Crustacea," from a female specimen sent to them by the late Thomas Edward of Banff. Mr. Spence Bate had previously ("Cat. Amph. Crust. Brit. Mus." 1862) described a male specimen sent to him from Shetland by Mr. George Barlee as *Anonyx longicornis;* and it is therefore the opinion of some British Carcinologists that the name of the species should be *Lepidepecreum longicorne*, Sp. Bate: but Professor G. O. Sars ("Crustacea of Norway," vol. i. p. 115) thinks that the "last-named specific appellation must be cancelled as only referring to a masculine character, although it is of somewhat older date than the name subsequently assigned to the female." The species does not appear to be a very common one. The Scotch records for it are Shetland (as *Anonyx longicornis*, Sp. Bate); Moray Firth (Thomas Edward: "I have it also from that locality"); and Firth of Clyde (David Robertson).—THOMAS SCOTT, Edinburgh.

Metopa nasuta, *Boeck*, from the Moray Firth.—This small Amphipod (scarcely 3 mm. in length) has been taken in the Moray

Firth among *Filograna implexa*. It was obtained by carefully washing the *Filograna*, and appeared to be moderately common. There is no previous record of this species for the East of Scotland; but Mr. David Robertson has obtained it in the Clyde off Fairland Point, Cumbrae.—THOMAS SCOTT, Edinburgh.

Cumacea from the Moray Firth.—The following interesting species of *Cumacea* have lately been obtained in the Moray Firth, viz., *Petalomera declivis*, G. O. Sars; *Endorellopsis deformis*, Kroyer; and *Campylaspis rubicunda*, Lilljeborg. The Firth of Forth is the only other Scotch locality where these species have been obtained hitherto; and they have not (so far as I know) been previously recorded for the Moray Firth. They have occurred in considerable numbers in both localities.—THOMAS SCOTT, Edinburgh.

BOTANICAL NOTES AND NEWS.

First Records of Scottish Plants. — In the continuation ("Journ. Bot.," August and September) of "First Records of British Flowering Plants," by William A. Clarke, F.L.S., the following are noted from Scotland.

Linnæa borealis, L.—"Found by Professor James Beattie, for the first time in Britain, in an old fir wood at Mearns, near Aberdeen, and exhibited at the Linnean Society, 2nd June 1795. 'Linn. Trans.,' iii. 333." (NOTE.—The locality was Inglesmaldie, near Fettercairn.)

Erigeron alpinum, L.—"Found by James Dickson, in 1789, on Ben Lawers. Dickson, 'Crypt. Fasc.,' ii. 29, and 'Linn. Trans.,' ii. 288."

Gnaphalium Norvegicum, Gunn., "1777.—As a variety *sylvaticum*, occurring upon the Highland mountains. Lightfoot, 'Fl. Scot.,' 472."

G. supinum, L., "1777.—Upon the tops of the Highland mountains. Mr. Stuart. Lightfoot, 'Fl. Scot.,' 471."

Arctium intermedium, Lange, 1856.—"Near Berwick-on-Tweed, etc. Babington in 'Ann. Nat. Hist.,' ser. 2, xvii. 375."

Crepis succisæfolia, Tausch, "1794.—In 'Sylvis Scotiæ australis,' 1789. James Dickson in 'Trans. Linn.,' ii. 288 (*Hieracium molle*)."

Lactuca alpina, Benth., "1810.—Discovered on the Aberdeenshire mountain of Lochnagore by Mr. G. Don, September 1881. 'E. B.,' 2425."

Rosa resinoides, *Crepin*, **in Mid-Perth.**—I have to record the occurrence of the above rose near Lawers.—G. C. DRUCE.

Juniperus intermedia, *Schur*, **in Scotland.**—Among gatherings of *Juniperus* from the island of Scarp, Outer Hebrides, sent by Mr. Duncan, I found three that were evidently not exactly *nana* or

communis. On comparing them with specimens from Transylvania and the Austrian Tyrol at Kew, it seemed to me they agreed with Schur's plant.

But I should rather place it as a variety of *communis*, as Nyman has done, than as a hybrid, as Wettstein does; as it fruits freely.

It might be searched for when the two plants grow together, if an hybrid. The references are:

Juniperus intermedia, Schur, in "Verh. siebund naturf. Verein," 2, p. 169 (1851).

Juniperus communis, L., var. *intermedia*. Nyman, in "Consp. Fl. Europ.," 3, p. 676 (1881).

Juniperus communis × *nana*. Wettstein, in "Sitzb. Wien. Akad. math. nat.," cl. xcvi. p. 332 (1887).

Intermediate in habit and characters between *communis* and *nana*, though perhaps nearer the former; fruiting freely on both the Austrian Tyrolese and the Hebridean specimens.—ARTHUR BENNETT.

Algæ Britannicæ rariores exsiccatæ, fasc. vi., issued by E. M. Holmes, F.L.S.—This excellent series of new, rare, and critical British Algæ must prove of much value to all algologists, but especially to isolated students of these plants. Of the twenty-five in the fasciculus now issued, the following are from Scotland: *Ascocyclus orbicularis*, Magn., on leaves of *Zostera*, from Fintry Bay, Cumbrae; *Ascophyllum Mackaii*, var. *Robertsoni*, Batt., from Loch Ranza, Arran; *Chordaria divaricata*, C. Ag., from Fairlie, Ayrshire; *Dermocarpa violacea*, Crn., on *Fucus vesiculosus*, from Berwick-on-Tweed; *Lithothamnion corallioides*, Crn., from Lamlash Bay, Arran; *L. rosaceum*, Batt., M. S., from Berwick-on-Tweed; *Mesoglœa lanosa*, Crn., from Lamlash Bay; *Monostroma Blyttii*, Wittr., from Kame's Bay, Cumbrae; *Pylaiella varia*, Kjellm., from Invergordon, Ross-shire (*see* "Ann. Scot. Nat. Hist.," vol. ii. p. 101); *Streblonema Areschougii*, Batt., on *Himanthalia lorea*, from Cumbrae.

Monstrosity (Flower on Fruit) in Hydrocotyle vulgaris.—Being on the outlook for the flower of White-rot on 10th August I found one plant, which bore only fruit. As there were several unopened buds on the plant, it was taken home and put into a shallow vessel in water where some sun-dew was growing in Sphagnum. The pennywort put out new leaves from the buds, and also a single flower from the tip of one of the fruits in the region of the style of the former flower. The new flower was fully developed on the 15th; but the stamens did not appear to be well supplied with pollen.

To-day (18th), the flower has quite withered away.—A. MACDONALD, Durris.

Rare Fungi. *Lactarius violascens*, Fr.—This, so far as I am aware, is new to Britain. It has been discovered on Deeside by

Mr. James Renny, who informs me that he has gathered it in Savoy and Switzerland. The milk soon assumes a violet tint on exposure to the air, and is a very distinctive feature.

Strobilomyces strobilaceus, Berk.—This has been forwarded to me from Eastwood, Dunkeld, by Mr. Charles M'Intosh. The specimen was small, but perfectly developed. Until recent years it was found only in Herefordshire. In 1889 a few good specimens were gathered in Drummond Wood, near Crieff, during the visit of the Cryptogamic Society. Mr. M'Intosh has been fortunate in adding another Scottish station for this very remarkable plant.—JOHN STEVENSON.

Parka decipiens.—Notes on specimens from the collections of James Reid, Esq. of Allan House, Blairgowrie, Scotland. By Sir William Dawson, LL.D., F.R.S., and Professor Penhallow, B.Sc. "Trans. Roy. Soc. Canada," Section IV., 1891, pp. 3-16, with a plate.

Part I. Historical and Geological. By Sir William Dawson.

This part gives an account of the various views that have been held regarding the nature of *Parka decipiens* since its discovery by Fleming in 1831. This is followed by a description; but as to the mode of occurrence and the individual appearance of the specimens sent him by Mr. Reid,—who, in addition to those of his own collecting, forwarded to Sir William Dawson additional specimens collected by Mr. W. Graham, Rescobie,—after reviewing the evidence in favour of each of the rival claims for the animal and vegetable affinities of *Parka*, and referring to the plant remains with which it is usually associated, Dawson sums up as follows: "Putting the parts together in accordance with these facts, we may suppose *Parka decipiens* to be the fruit of an aquatic plant having strong rugose but not woody stems or rhizomes, producing numerous branches; those which were fertile, and perhaps nearer the base, supporting clusters of *Parka*, those which were barren producing long grass-like floating leaves like those of *Zostera*. The affinities of such a plant would be with modern rhizocarps, though a peculiar and exaggerated form." Dawson further states: "It seems possible that the plant formerly described by the author as *Cordaites angustifolia*, from the *Erian* of Gaspé, may be allied to *Parka*, though only its leaves and stems are known." He also thinks that such organisms as *Sporocystis* and *Lepidocystis* of Lesquereux may be allies of *Parka*.

Part II. Microscopical and Botanical Results. By D. P. Penhallow, B.Sc.

In the first paragraph of this part of the subject, we have the key-note to the general results of Professor Penhallow's investigations summed up in the following sentence: "After careful examination and comparison, the conclusion was reached that *Parka* was an aquatic rhizocarp, probably allied to *Pilularia*.

Preliminary to his investigation, Professor Penhallow classified his material as follows:

1. Rugose stems in which the organic matter has been wholly replaced by red oxide of iron.
2. Rugose stems showing apparently leaves attached.
3. Fragments of linear leaves (*Cordaites angustifolia?*).
4. Linear leaves or branches.
5. Oval impressions showing distinct reticulations "devoid of *Parka* discs, but showing a reticulated and somewhat radiating structure, evidently composed of elongated parenchymatous cells."
6. "Discoid impressions of bodies represented by a somewhat carbonaceous residue, but showing no structure. Apparently solid, spore-like spherules flattened by pressure."
7. Fragments of *Parka*.

Detailed descriptions of the various organisms are given; but the point of greatest interest centres in *Parka decipiens*, the examples of which, owing to differences in point of size, are treated by Professor Penhallow in three distinct groups.

In group A they measure 6 to 11 mm. in diameter.
In group B they measure about 13 × 20 mm.
In group C, the most perfect specimen measured, 3·5 × 5·3 cm.

Professor Penhallow believes that in these masses "we must recognise sporocarps containing globular sporangia (*Parka* discs)."

The discs appear, according to this writer, to be invested by a thick carbonaceous layer, which, when examined as an opaque object, shows a reticulation of the surface. Internal to this the disc consisted "of a distinct tissue, composed of rather thin walled cells, thus giving direct proof that they were not simple spores, but of the nature of sporangia.

"In one or two cases they also appear to contain certain rounded bodies similar to spines, at least distinct from the other parts of the structure, but so involved as to leave their identity somewhat in doubt." Certain isolated minute bodies were also observed, which are regarded as microspores. He also figures and describes some cellular structures which he believes to be *prothalli*.

From the examination of the material at his disposal, Professor Penhallow comes to the conclusion "that *Parka* is an aquatic rhizocarp allied to *Pilularia*."

He therefore defines the genus *Parka* as follows:

Genus Parka, Flem.

"Aquatic plants with creeping stems, linear leaves, and sessile sporocarps having two kinds of sporangia. Sporangia, 2 mm. in diameter; macrospores, 40 μ; microspores, 15 μ.

"*Parka decipiens*, Flem.—Stems rugose, about 4 cm. in diameter, showing stumps of branches about 11 cm. distant. Leaves linear, 1 cm. broad, with somewhat rounded terminations. Sporocarps oval, 3·5 × 5·5 cm., bearing more or less conspicuous impressions of the contained sporangia.

"*α. media*, n. var.—Sporocarps oval, nearly entire, 13 × 20 mm. broad. Impressions of sporangia distinct; usually carbonised.

"This var. shows no conspicuous leaves or stems.

"*β. minor*, n. var.—Stems 4 mm. broad. Leaves linear, 1·5 to 2 mm. broad, sometimes finely veined. Sporocarps oval, 6 to 11 mm. broad. Impressions of the sporangia distinct, often carbonised."

The paper, which shows that a great deal of care and labour has been bestowed on its preparation, must be carefully studied by all interested in the structure and affinities of *Parka;* but, on the showing of the writers themselves, there is scarcely enough of conclusive evidence—the most of their conclusions are really in the form of probable explanations or suggestions—to admit of the genus *Parka* being so fully and rigidly defined as has been done by Professor Penhallow; as we have no evidence placed beyond reasonable doubt that the stems and leaves (?) with which *Parka* is associated are really referable to it. The mere fact of their association on the same slabs cannot be accepted as proving any original organic connection between them. Their association may give ground for the assumption of their being different parts of the same organism; but, in absence of any certain knowledge of their organic union, one is scarcely justified in characterising a genus on merely supposed relationships. The evidence on which it is accepted that *Parka* possessed *macrospores* and *microspores* is far too slender to justify the important conclusions drawn from it—R. KIDSTON.

CURRENT LITERATURE.

The Titles and Purport of Papers and Notes relating to Scottish Natural History which have appeared during the Quarter—July-October 1893.

The Editors desire assistance to enable them to make this Section as complete as possible. Contributions on the lines indicated will be most acceptable and will bear the initials of the Contributor. The Editors will have access to the sources of information undermentioned.]

ZOOLOGY.

A CATALOGUE OF LOCAL LISTS OF BRITISH MAMMALS, REPTILES, AND FISHES, ARRANGED UNDER COUNTIES. By Miller Christy, F.L.S. *Zoologist* (3), vol. xvii. No. 199 (July 1893).—Lists relating to Scottish Reptiles [and Amphibia], pp. 249-251. Lists relating to Scottish Fishes, pp. 260-262.

Distribution of the Alpine Hare in South-west Scotland. R. Service. *Zoologist* (3), vol. xvii. pp. 265-266 (July 1893).

The Vole Plague in Scotland. *Zoologist* (3), vol. xvii. p. 353 (September 1893). Notes that the Voles have almost entirely disappeared from the affected area.

Variation in the Colour of Field Voles. R. Service. *Zoologist* (3), vol. xvii. p. 266.—Observations based on Scottish specimens.

Large Rat. R. Leckie Ewing. *The Field*, 5th August 1893, p. 208.—One killed on the banks of the river Devon, Perthshire, weighed 2 lb.

A Visit to Sule Skerry, Orkney. J. B. S. *The Field*, 2nd September 1893, pp. 358-359.—Contains an account of the bird life.

Notes on the Nesting of some Shetland Birds. By Ernest W. H. Blagg, M.B.O.U. *The Ibis* (6), vol. v. pp. 350-358 (July 1893).

Grasshopper Warbler in Argyllshire. Allan Gordon Cameron. *The Field*, 29th July 1893, p. 198.—Observed this summer, for the first time, in the neighbourhood of Loch Crevan, North Argyll, in May and June.

Quail in South-west Scotland. R. Service. *Zoologist* (3), vol. xvii. pp. 306-307 (August 1893).—Records, in addition to general information, the finding of two nests in June in Dumfriesshire.

Local Abundance of Quail. G. and B. *The Field*, 1st July 1893, p. 3.—Several heard in a field near Edinburgh.

Quail in Perthshire. Arthur H. Crake. *The Field*, 9th September 1893, p. 399.—One shot at Auchingarrich, 4th September.

Green Sandpiper in South-west Scotland. R. Service. *Zoologist* (3), vol. xvii. p. 305 (August 1893).—Winter records.

A further Description of Paleospondylus Gunni, Traquair. By R. H. Traquair, M.D., LL.D., F.R.S. *Proc. Roy. Phys. Soc. Edin.*, vol. xii. part i. (1892-93), pp. 76-94.

Lepidoptera in Elginshire and Aberdeenshire. A. Horne. *Ent. Record*, vol. iv. No. 8 (August 1893), p. 234.—Ten species of Heterocera recorded from Burghead, eight species and one variety from Aberdeen, and Zygæna exulans from Braemar.

The Land and Freshwater Crustacea of the District around Edinburgh. Part II. The Ostracoda and Copepoda.

By Thomas Scott, F.L.S. *Proc. Roy. Phys. Soc. Edin.*, vol. xii. part i. (1892-93), pp. 45-76.—Gives extensive annotated lists of species.

The Glacial Fauna of King Edward, in Banffshire. By Alfred Bell. *Proc. Roy. Phys. Soc. Edin.*, vol. xii. part i. (1892-93), p. 20.—A list of fifty-seven fossils given, principally Mollusca, of which seventeen are new to Scotland.

On a Deposit in Largo Bay. By Alfred Bell. *Proc. Roy. Phys. Soc. Edin.*, vol. xii. part i. (1892-93), p. 22.—Includes a list of thirty-three shells and one Crustacean, and compares the deposit with a similar one at Fillyside.

The Ancient Lake of Elie. By James Bennie and Andrew Scott. *Proc. Roy. Phys. Soc. Edin.*, vol. xii. part i. (1892-93), pp. 148-170.—Contains an account of the fauna and flora.

BOTANY.

First Records of British Flowering Plants. By William A. Clarke, F.L.S. *Journ. Bot.*, August and September.—These instalments extend from *Peucedanum* to *Wahlenbergia*. (See p. 250 of this journal.)

Some Plants observed in East Scotland, July and August 1892. By Edward S. Marshall, M.A., F.L.S. *Journ. Bot.*, August. —Plants are noticed from Selkirkshire, Forfarshire, around Spital of Glenshee, and near Beauly. Numerous new county records are given, as are also the altitudes at which many species were observed.

British Hawkweeds (*concluded*). By Edward F. Linton, M.A., and Wm. R. Linton, M.A. *Journ. Bot.*, July.—In this are described the following "new species": *H. eustales*, from Glen Derry, South Aberdeen, and from two localities in Mid-Perth; *H. orcadense*, W. R. Linton, from Hoy in Orkney. There are also several "varieties" described as new to science, or at least to Scotland.

New or Critical British Algæ. By E. A. L. Batters, B.A., LL.B., F.L.S. *Grevillea*, September.—The following are enumerated (and each is described) from Scotland: *Lithothamnion roseum*, n. sp., from Berwick, Cumbrae, and St. Andrews (C. Howie and Dr. Axford); *Pleurocapsa fuliginosa*, Hauck, from Berwick; *Aphanocapsa marina*, Hansg., from Berwick; *Plectonema terebrans*, Born. and Flah., boring into shells at Cumbrae; *Lyngbya lutea*, Gomont, in shallow puddles at high-water mark at Cumbrae.

On the Occurrence of Arthrostigma gracile, Dawson, in the Lower Old Red Sandstone of Perthshire. By Robert Kidston, F.R.S.E., F.G.S. *Proc. Roy. Phys. Soc. Edin.*, vol. xii. part i. (1892-93), pp. 102-111, Plate III.

REVIEWS.

Short Sketches of the Wild Sports and Natural History of the Highlands. By Charles St. John.—A new edition, with the author's notes, and a memoir by the Rev. M. G. Watkins. (London: John Murray, Albemarle Street, 1893.)

This, the ninth edition of a most popular and classic work, issued by the world-famed publishing firm of Murray, differs from all the preceding in containing the additional notes of the author, marked "C. St. J." These have been printed word for word from an interleaved copy of Jenyns's *Manual of British Vertebrate Animals*. There are also numerous additional annotations by the Rev. M. G. Watkins, which are all that can be desired in illustrating and explaining the text; and these in themselves display a wide and scholarly knowledge of the subjects dealt with. The preface, and a memoir of St. John by the same writer, give additional interest to the present edition, so also the portrait of St. John which forms the frontispiece; this is the only portrait that was ever taken of the author, and is now for the first time introduced, and specially possesses a melancholy interest, as it was taken after the time the writer was struck down by the malady which eventually carried him off at the comparatively early age of forty-seven. The volume contains 79 illustrations by Harrison Weir, C. Whymper, and others, exquisitely engraved on wood by J. W. Whymper. It is a long time since we have seen a book so well and beautifully got up, and so highly finished, and doing credit to all who have been engaged in its production. There are some few works in our language treating of wild nature of which we may safely predict that they will never lose their interest with the reading public, and this is one of them.

Annals of the Andersonian Naturalists' Society. Edited by Robert Turner. (Glasgow: Allan and Ferguson, 1893.)

Naturalists will examine this volume with interest because of the variety of features it presents, and the attractive way in which these are treated. It is the first publication of a society which has been in existence since 1885, and though local—and most properly so—in its character it is above the usual average of publications of the kind. The aim of the society is avowedly to popularise studies in natural science in Glasgow, and it seems already to have done some good in this way. The volume before us is an earnest of this, and contains just the sort of information that field-naturalists desiderate. It deals with botany, zoology, and archæology, and the information given is both interesting and useful. The writers of the various articles possess a practical knowledge of the subjects they deal with, and seem to take a pleasure in them for their own sake. It would be invidious to single out any of the writers, but it is particularly notice-

able from one of the papers how a scientific subject can be handled to make it both attractive and interesting.

The volume is handsomely got up, and is extremely well printed and illustrated. It has been carefully edited and printed, and few if any inaccuracies occur. Botanists may find fault in some places with the nomenclature. On page 2 the generic name *Sarothamnus* is preferred to *Cytisus*, and on page 67 *Caucalis* to *Torilis*. On pages 63 and 77 the lesser club-moss is placed under the genus *Selaginella*, where it ought properly to be; but before doing so it would be advisable to alter its specific name, now no longer intelligible under this genus. A few more such trivial discrepancies occur, and will occur in such publications until some uniform system of botanical nomenclature is introduced and adopted by phytologists.

All the papers are well worthy of being put on record, and we congratulate the society on its advent, and trust that other and equally useful volumes may appear in due course.

Dr. Johnston's Letters.—Selections from the Correspondence of Dr. George Johnston . . . collected and arranged by his daughter, Mrs. Barwell-Carter. Edited by James Hardy, LL.D. Hon. Secretary to the Berwickshire Naturalist's Club. (David Douglas, Edinburgh, 1892.)

A remarkable phenomenon in history is the extraordinary influence exercised on intellectual progress by "borderers," that is, people of mixed race, combining the strong rather than the weak points of the two races which mingle at their point of contact. To naturalists, and especially those whose work in the field is furthered by the active existence of field clubs and out-of-door societies for the investigation of natural phenomena, the name of George Johnston carries with it special veneration as that of the man from whose vigorous brain and bright interest emanated the idea that led to the successful establishment, and no less successful prolonged career of the first, and in many respects still one of the best organisations of its kind. Dr. Johnston was pre-eminently a Borderer, a native of Berwick, that bit of English land which lies on the Scottish side of the Tweed; and his memory is cherished with equal pride by Scot and by Southron.

The volume before us is remarkably interesting, and gives us an excellent notion as to the kind of man Johnston was. No one can rise from its perusal without an added feeling of regard for the man and his versatile, many-sided nature, the genial character which made for him such hosts of friends, the scientific acumen that enabled him to enrich natural history with a series of works that were really required. The volume, however, does not merely reveal Dr. Johnston himself, but also many of his contemporaries; and while the English will take pride in the names of Alder and Selby, the Scot will evince no less interest in those of Landsborough and

Hepburn, Hardy and Baird, Fleming and Jardine, who also ranked among the favoured correspondents and valued friends of the subject of this memoir.

All naturalists are deeply indebted to Mrs. Barwell-Carter for this tribute of filial affection, and to Dr. Hardy for the care with which the editorial supervision has been done.

THE GLASGOW CATALOGUE OF NATIVE AND ESTABLISHED PLANTS; BEING A CONTRIBUTION TO THE TOPOGRAPHICAL BOTANY OF THE WESTERN AND CENTRAL COUNTIES OF SCOTLAND. (Glasgow: Peter Ewing, The Frond, Uddingston, 1892.)

Mr. Ewing, in this useful catalogue, has unfortunately adopted an alphabetical arrangement. Many years ago Mr. H. C. Watson rightly inveighed against such lists; and to be dragged from *Anthyllis* to *Apium* and thence to *Arum* is most irritating. In the interest of Scottish Topographical Botany, I have waded through the whole list, but with many fits of impatience. It does not seem necessary here to go into the numerous omissions (these I have personally communicated to Mr. Ewing) of comital distribution, but actual omissions of species occur under *Arabis alpina* (104), *Euphrasia gracilis* (105), *Festuca fallax* (110), *Hieracium nitidum* (97), *H. strictum*, Fr. (75), *Kobresia caricina* (98), and *Linnæa borealis* (105). *Lycopodium* "*complanatum*" is an erroneous record for *Lycopodium alpinum* var. *decipiens*, Syme, but Mr. Ewing is not answerable for this. *Nitella batrachosperma* (110), *Orobanche cruenta*, Bert. (98), *Ranunculus petiolaris* (97, 98, 104), *Rubus Maasii* (110), *R. calvatus* (105), *Urtica urens* (110), *Veronica saxatilis* (97), may be named. The botanists of Wester Scotland cannot do better than send Mr. Ewing any additions; as every one who has worked at comital distribution knows how difficult it is to include all reliable records, leaving out of question the numerous ones recorded on data often very doubtful, and sometimes absolutely misleading and untruthful!

It should be explained that the numbers used by Mr. Ewing are those of the comital areas of Mr. H. C. Watson's "Topographical Botany," Ed. 2; and, being symbols only, great care is needed that they are accurately stated.—ARTHUR BENNETT.

NATURALIST'S MAP OF SCOTLAND. By J. A. Harvie-Brown and J. G. Bartholomew. Large folding sheet in cloth case. 1893. With four pages of Explanatory Note. Price 2s. 6d. on paper, 3s. 6d. on cloth.

Naturalists generally, and not merely those of Scotland, are laid under considerable obligation by the publication of this map; and its authors (if we may so term them) are to be deservedly congratulated on having attained a maximum of usefulness with a mimimum sacrifice of clearness and legibility.

They are to be congratulated on having included everything with a general application that could be reasonably expected, and

in not having attempted to show specific features. In other words, they have been careful to avoid showing what are, strictly speaking, results to accrue from investigation, whether past or future, while giving the physical features which regulate those results. A brief statement of what is done will be useful. Carefully and appropriately selected colours show us at a glance the cultivated lands (pale green), the patches of woodland (deep green), the moorlands, hill pastures, and other uncultivated lands (purplish-pink; heather-colour), and deer-forests (bluish patches on the heather tracts). Blue is used to colour the freshwater lochs and rivers as far up as it is possible to have sport with salmon and sea-trout: this is the nearest approach to giving distribution that is attempted, but essentially all that is done is to show the inland waters which migratory fish are capable of passing up without physical impediment.

Levels are shown by shading; the lines being taken at 1000 and 2000 feet. We might suggest, however, that it would have been preferable to show H. C. Watson's divisions at 900 and 1800 feet instead, and so have fitted in with botanical and conchological investigations. The 1000's are merely arbitrary; the 900's are based on climatological considerations. Red bounder-lines, which are really the water-shed lines (or, as Mr. Harvie-Brown puts it, sky-lines) showing the drainage areas or river-basins, are given, and it will be a source of gratification to Dr. Buchanan White to see that the faunal divisions he proposed so long ago as 1873 still hold good, and seem to be universally accepted.

The requirements of marine zoologists are also well catered for. The varying depths of the sea are distinguished by shades of blue at intervals of every ten fathoms; and the area between high and low tide is coloured yellow. The principal (why not all?) lighthouses are marked by prominent red stars; and a useful feature is given by a dotted blue line to show the limits within which beam-trawl-fishing is prohibited. The scale of the map is 10 miles to the inch; and it is exceptionally clearly printed; for, notwithstanding the extent and variety of information shown, the place-names can be easily read everywhere, and the physical features readily made out.

The map is accompanied by four pages of explanatory notes, setting forth the leading principles which have actuated the authors; but these are not as clearly and intelligibly set forth as we could like: in fact, we are totally unable to discover what is meant by the words "the first of these" and "the latter" used at p. 3 in reference to cultivated and uncultivated lands.

Taken altogether, this map will be found most useful; and, so far as we can judge, not being on the field, it is extremely well done. It would be difficult to find authors more capable of dealing with such a task; and they are to be congratulated on a good piece of work well done.—W. D. R.

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