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I. An Unusually Coloured *Raia clavata*, Linnæus.

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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—$1\frac{1}{4}$ 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. Bain, 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 cælestis*).—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 phœopus*).—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

Photograph R&R Clark, imp

Raia Batavia, 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 ¼ to ¾ 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 surface 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, ¼ to ¾ 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, *m. 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 *Koehleriancæ* 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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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 phæopus*).—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."

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. clatior*, 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 *clatior*. 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) Ederi 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.]

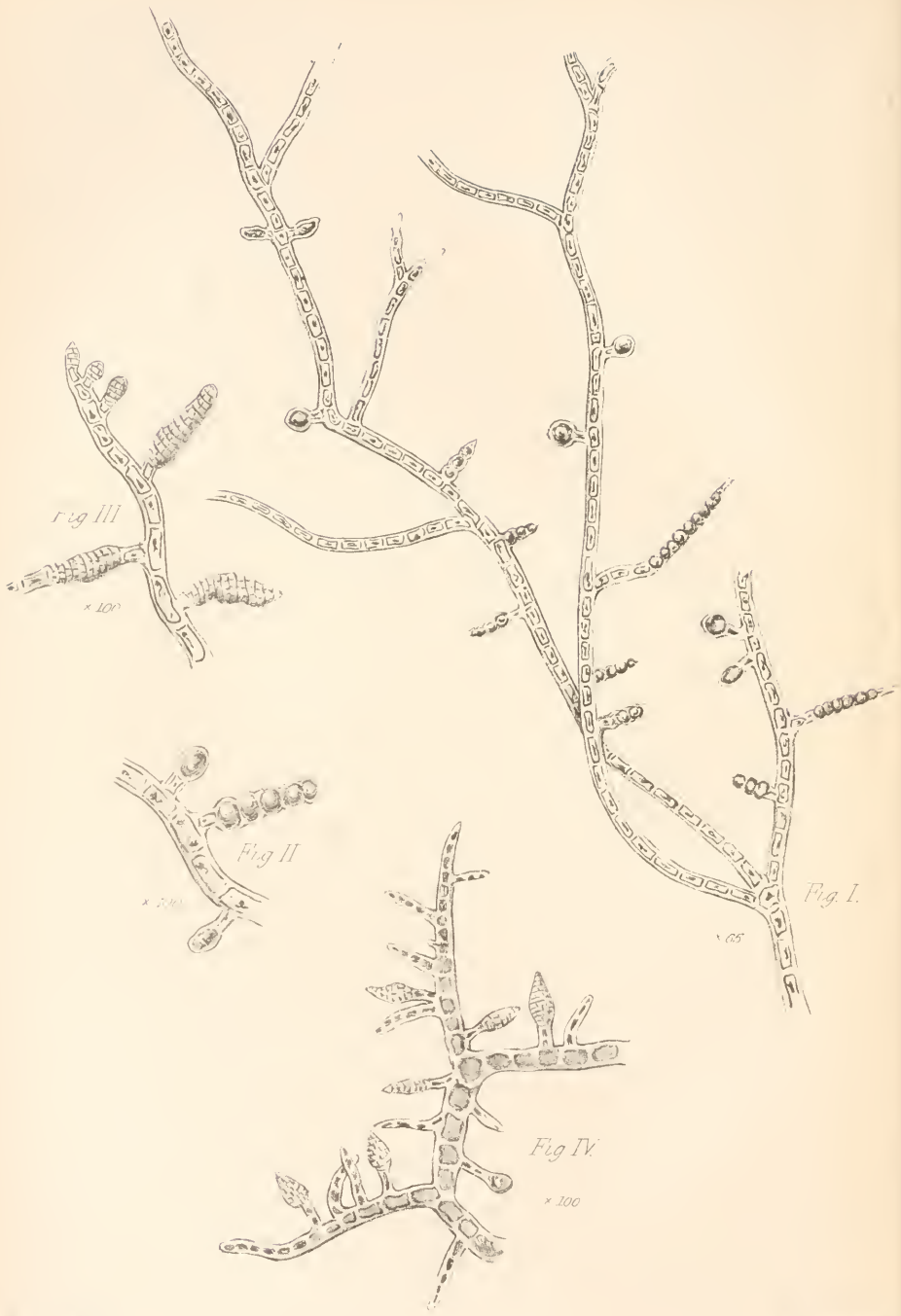
(*Fide Rev. E. S. Marshall*, except where specified.)

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.



Figs I-III SYLAIELLA 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 *α*, 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. multicorne*, 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.

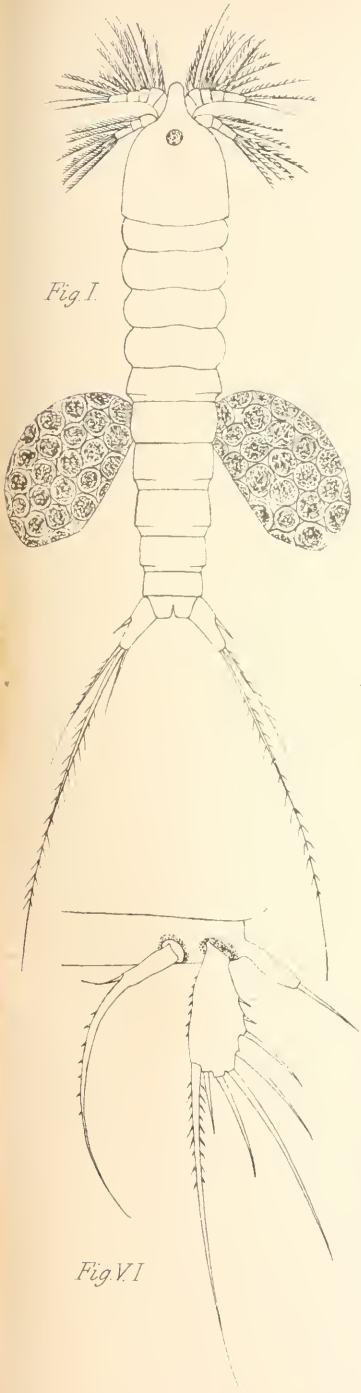


Fig I.

Fig V.

Fig II.

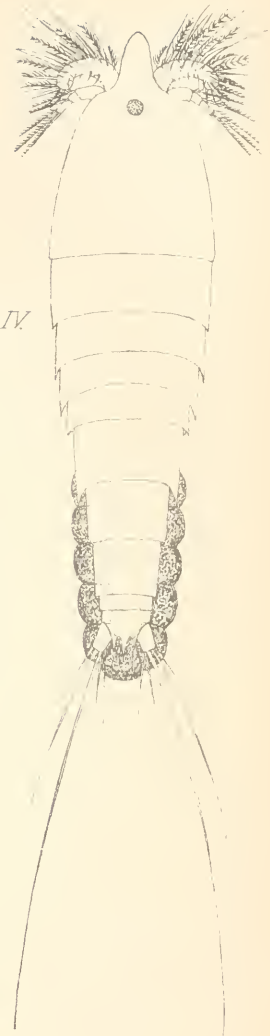


Fig IV.

Fig VI

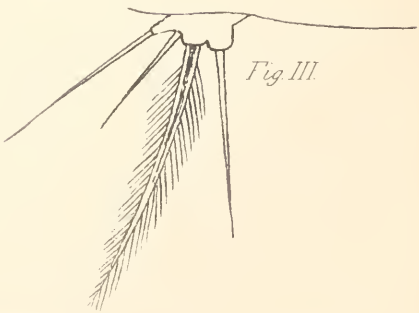


Fig III.

Figs I. III. CANUELLA PERPLEXA [illegible] CONOTIPEDIA COMMUNIS. Texas

Andrew Scott del ad Nat

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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.

. . . . . .

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.

. . . . . .

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 Lighthouse, 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. *lincata*, **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.

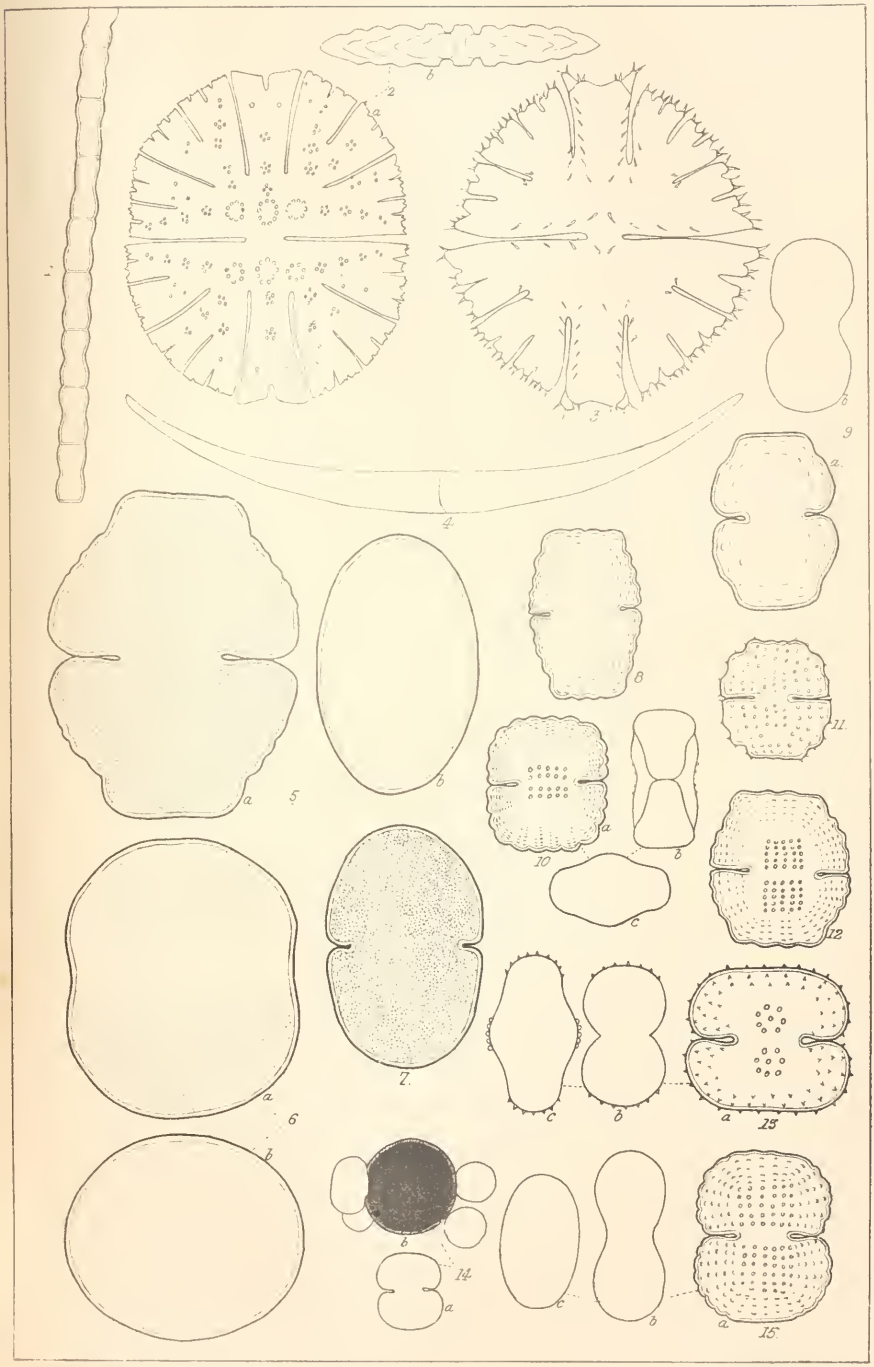
DESMIDIEÆ (Kg.), De Bary.

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. lævе*, 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. cuncatum*, 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. depsydra*, Nordst.—Extremely rare. Aberdeen—at Achnerran, in Logie-Coldstone.

30. *S. Clevei* (*St. lævе*, 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 7½ 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 *Necæra;* 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.

The Annals
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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. arcnarius*, 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).

Megaloceræa 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. diademata, 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 Inversbin, *Marshall* and *Hanbury*.

Rubus plicatus, Rubus leucostachys, and Rubus mucronatus.—Between Rosehall and Inversbin, *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.—Inversbin
,, *var.* Borreri, *f.*—Inversbin
} *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.—Inversbin, *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 Inversbin, *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.—Inversbin, 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 (*Xiphias 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; *Endorcllopsis 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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