





PROCEEDINGS
OF THE
NATURAL HISTORY SOCIETY
OF GLASGOW.

V O L. V.

1880-1883.



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PROCEEDINGS
OF THE
NATURAL HISTORY SOCIETY OF GLASGOW.
SESSION 1880-81.

THE TWENTY-NINTH ANNUAL GENERAL MEETING,
ANDERSON'S COLLEGE BUILDINGS,

OCTOBER 5TH, 1880.

Professor John Young, M.D., F.G.S., President, in the chair.

The Treasurer submitted his Annual Financial Statement, duly audited by Messrs. James Lumsden and George E. Paterson, the balance in Bank and in the hands of the Treasurer being £56 19s. 3d. He called attention to the gradual decrease of the Society's funds, and suggested that means should be adopted by increasing the membership, or otherwise, to obtain a larger revenue in order to meet the expense of an annual publication of the Proceedings, and a larger prospective outlay on the Library.

The Secretary read the Report of the Council on the business of last session, which gave a favourable account of the progress of the Society and of its prospects in the future. The usual eight monthly meetings were held, and were all well attended, the interest being maintained until the close. Full reports appeared regularly in the *North British Daily Mail*, and so brought the Proceedings under the notice of the absent members and the general public. The number of life and ordinary members on the roll at last annual meeting was 174; 11 new entrants were received during the session, and these, with the addition of the members of the Field Naturalists' Society, after allowing for deaths and withdrawals, make up the number to 230, being an increase of 56 since last Report. The obituary of the year records the death of two

honorary members, viz.—Professor Schimper, of Strasbourg, who was distinguished for his attainments in Geology, Botany, and other branches of Natural History; and Mr. Robert Hislop, of Polmont, who, although not personally known to many of the present members, was at one time, in the early history of the Society, recognised as a regular attendant upon, and a worthy partaker in, the business of the meetings. His speciality was Entomology, particularly Coleoptera, upon which order he was accounted an authority.

There is also to be recorded the sudden death of Mr. Alexander Bannatyne Stewart, one of the life members, whose sudden removal has been deeply lamented not only by the members, but by the public of Glasgow and the West of Scotland generally. He was especially distinguished for his liberality, and for the support he gave to all institutions having for their object the benefit and improvement of his fellow-citizens.

The Council has concluded arrangements at a moderate rent with the Committee representing the two Societies which are the proprietors of the handsome new suite of rooms, at 207 Bath Street, where accommodation will be provided for holding the monthly meetings, and for the library. For the successful issue of the negotiations connected with this change in the Society's local habitation, the members are entirely indebted to Mr. Archibald Robertson, who has throughout shown an appreciation of the wants of the Society, and an interest in its prosperity, which deserve their warmest thanks. In leaving the time-honoured institution where so many agreeable and useful evenings have been spent, it is natural to cast a retrospective glance and think of the many respected members whose loss we have to mourn, and who in their day carried on with energy and prosperity the business of the Society. May their activity and success be an incentive to those who have taken their places in making this new departure a notable point in the promotion of the interests and work of the Natural History Society of Glasgow.

The Librarian reported that all the books were in good condition, that the use of the volumes had been largely taken advantage of by the members, and that considerable additions had been made by donation, purchase and exchange. The number of corresponding Societies has increased, and the last part of the *Proceedings* has been sent to 23 British, 34 Continental, and 13 American Societies; and

also to the Mitchell Library, to the Paisley Free Library, to the British Museum, and to the Kelvingrove (City) Museum.

A Report was read by the Secretary for the Summer Session; nine meetings having been held. Particulars were given of the subjects which engaged attention, the chief being Cryptogamic Botany, in view of the meeting to be held in Glasgow during autumn. There had been 10 excursions to different interesting localities, and the more notable specimens obtained were enumerated.

The Reports were all unanimously approved of and adopted.

The following gentlemen were appointed office-bearers for the session—

President—Professor John Young, M.D., F.G.S.; Vice-Presidents—John A. Harvie Brown, F.L.S., M.B.O.U., W. J. Milligan, and John Kirsop; Secretaries—Robert Mason and John M. Campbell; Treasurer—Robert J. Bennett; Librarian—Francis G. Binnie; Members of Council—Arthur Pratt, Peter Cameron, James S. Dixon, James Allan, James B. Murdoch, A. S. Wilson, M.A., B.Sc., John Young, F.G.S., Thomas King, and Robert Turner.

Edward R. Alston, F.L.S., F.G.S., &c., London, Thomas Davidson, F.R.S., F.G.S., &c., Brighton, Dr. L. de Koninck, Liège, Belgium, Rev. John Stevenson, Glamis, Forfarshire, John O. Westwood, M.A., F.L.S., &c., Professor of Zoology, Oxford, and Professor Gustav Mayr, Vienna, were elected Honorary Members.

Colonel J. S. Stirling, Rev. W. Williams, F.G.S., W. J. Sterland, James R. Low, M.A., David Forsyth, M.A., and Robert Brydall were elected Ordinary Members.

SPECIMENS EXHIBITED.

Mr. Peter Ewing exhibited a fine series of mounted marine algae from the South of England, for the Cryptogamic exhibition held lately in the City, which he had received from Mr. E. N. Holmes, F.L.S.

Mr. Thomas King showed a specimen of a fungus which he had obtained at the recent exhibition in the Coal Exchange. He noticed it beginning to expand, and having planted it, found the growth to be nearly two inches in a single day. He had identified it as *Cynophalus caninus*.

Mr. James Mahony sent for exhibition a specimen of the Otter-Pike, or Sting-fish, *Trachinus vipera* (Cuv. and Val.), which he characterised as a most diabolical little fish. It strikes very accu-

rately with the black coloured spines of the dorsal fin, and the men who go out to fish with hand nets in the shallow sand are in constant terror of them, a sting from one being enough to render a person *hors de combat* for three weeks. When received on the hand, the arm swells enormously to the shoulder, and a feverish state is induced which prevents all work.

There were also exhibited specimens of a small crustacean, *Mysis chamaleon* (J. V. Thompson), a common estuarian species often found far up rivers. When the river Leannan was low last summer they existed in countless millions. Yarrell says in his "British Fishes" that this species occasionally inhabits fresh water.

PAPERS READ.

I.—*On a simple Method of mounting Objects for microscopic Examination.*

By Mr. Peter Cameron.

Most entomologists who have had occasion to mount dissections of insect structure for microscopical examination must have felt the inconvenience accruing from the ordinary method, inasmuch as it necessitates the formation of two distinct collections—the dissection being kept in one place, and the insect from which the dissection was made in another. When it is added that, as a rule, a Coddington lens is amply sufficient to determine the structure of the various organs used in classification, or in the determination of species,—*e.g.*, the mouth organs, legs, anal appendages &c., it is obvious that a method of mounting dissections which enables the dissection to be placed alongside the insect, is one worthy of attention. Such a method I purpose bringing under the notice of the members of our Society this evening.

Some years ago I commenced mounting the larger dissections by gumming them on slips of cardboard, but this I found to be attended with certain disadvantages—it could only be used with large objects, and they became sooner or later obscured with dust, while also only the under side could be seen. The last objection was the most serious, but it was overcome in this way—by punching a round or square hole in a slip of cardboard, then gumming a cover glass on the lower side, the object being gummed on the upper side of the cover glass. This process was further improved by fixing a cover glass over the object, which was thus made dust proof. For mounting

objects dry, this method does admirably, but it is not sufficient for small dissections which require to be clearly defined, and are besides apt to be obscured by the gum. The next development of the cardboard method was the employment of balsam, and that the latter preserving medium can be used with success, will, I think, be admitted by every one who examines the objects I exhibit in illustration of my remarks.

I will now proceed to describe the process. In the first place, very fine cardboard must be obtained, and cut into pieces, say 9 lines by 6. A hole $2\frac{1}{2}$ to 3 lines across is punched at one end in the centre, and a line and a half to 2 lines from the edge. Next a cover glass is cleaned, and is fastened to the lower side of the card by means of balsam, so as to cover the hole, care being taken to use plenty of it. These two processes—the punching of the holes and the fastening of the cover glass—are best done wholesale, so that the prepared cards may be always at hand when wanted. Supposing then that the object to be examined is ready to be mounted, the next procedure is to fill up the cell in the card with balsam, to near the top, say within a fourth of the top. The balsam is then made as level as possible, and the object or objects arranged on it. Place this aside in some place where no dust can get near for a day or two, and then finish the business by filling up the cell with balsam till it overflows, and pressing a cover glass over it. Next place in a flat position for two or three days, when all superfluous balsam may be removed, the glasses cleaned, the nature of the object noted, by means of a crowquill, on the lower end of the card and lastly, a pin being stuck through it when it is ready for the cabinet. I should explain that the object of not putting the top glass on at once, but leaving the objects to harden in the balsam for a time, is, that in this way they are not apt to be shifted out of position when the top glass is applied, or in the endeavours to get rid of large air bubbles. In the same way the reason of leaving the cards flat for two or three days is to allow the balsam to harden, as the objects flow down if the card is allowed to hang horizontally before this takes place. One thing, however, is necessary for success, and that is, that properly prepared balsam be used. This is done by dissolving Canada balsam in benzine till it becomes of the consistency of cream. With this there is no trouble with air bubbles, in fact it is scarcely necessary to drive them out, as the bubbles disappear of themselves in a day or two.

The process described above I have hitherto only used with balsam, but certain experiments which I have made lead me to believe that glycerine and gelatine can likewise be employed, and the employment of the latter especially will be an advantage considering how transparent balsam renders colourless objects. These two would make the cardboard admirably adapted for mounting Acarides and other minute Arthropods. That it is well adapted for Acarides is shown by the card in the box where we have *Tegeocranus latus* represented in three stages—the larva and pupa in balsam, and the mature insect gummed outside.

That objects mounted in this way are readily observed by means of a lens is clear to any one, but it might be objected that high powers cannot be employed for their examination. Such, however, is not the case. For examination under the compound microscope, all that is necessary to do is to place an ordinary glass slide on the stage, then put the card on its upper edge, letting it hang by means of the pin, the lower side of which hangs down. Should the nature of the stage not admit of this, then it is a simple matter to remove the pin out of the card.

Thus there is no advantage, which the ordinary way of mounting on glass slides possesses, which is not obtained by the use of cardboard, while the utility of having the dissection placed alongside the insect, (especially if it be one of use in classification), is sufficient to recommend it to the attention of entomologists. Nor must it be forgotten that cardboard is very much cheaper than glass slides, which cost something like 6/- or 7/- per gross, which is almost saved for the cost of the extra cover glass, and the cardboard will not cost anything like that.

I may also mention that I have been making some experiments on the lines indicated by Schlectendal, (*Ent. Nachr.*), in the way of preserving larvae by the roasting process. After many failures I have succeeded in preserving larvae under 1 inch in length very fairly. The darker colours keep very well, but the lighter greens fade sooner or later; yet, as one or two green larvae have retained their colour, it is possible that with greater experience I may find out the method most favourable to effect this. So far as my experience goes at present, two things are necessary before properly preserved larvae can be obtained—they must be full fed—either ready for pupating, or before they have moulted for the last time when they have the two skins on—and their stomachs must be perfectly empty.

As for the method of roasting I have adopted, it is very simple. I take an ordinary tin canister, place the larvae to be mounted in an open pill-box, which is then placed in the canister, and the whole kept over the gas for one or two minutes, according to the size of the larvae. The larvae have to be tested at the expiration of 30 or 40 seconds to see how the hardening proceeds, and if they are not sufficiently hard then, great care must be taken with the further roasting. A little experience, however, will soon give one an idea of the exact time required for the various sizes of larvae.

For the cabinet the larvae are best kept on cardboard, through which a short pin is passed, on the head of which the larva is stuck, care being taken not to cause the pin to project through its upper side. With a little care very interesting and instructive preparations may be made by drying a specimen of the leaf on which the larvae fed, showing its manner of eating, &c., and the pupa or cocoon being preserved, so that in this way the life history of the species may be very effectually illustrated.

The same method of roasting preserves *Aphidae* admirably. These are first killed and mounted on cardboard before being held over the flame. Care, however, is necessary in manipulating them, as they shrivel up on the application of a too intense heat.

II.—*On the Shell Mounds of the North of Ireland.*

By Mr. James A. Mahony, Corresponding Member.

The British and Irish coasts are marked by “links” and sand dunes which occupy well-defined regions, and possess a fauna and flora peculiar to themselves. Of such are the Western shores of many of the Hebridean islands and the coasts of Morayshire, Fife-shire, and Ayrshire, in Scotland; a considerable tract of the Eastern coast of England; with many parts of Donegal, Sligo, and Mayo, in Ireland. Their general characteristics are well described by Page, who says:—“The superficial or blown portion of these sandy tracts is chiefly composed of fine sand and comminuted shells, with occasional bands of decomposed vegetation or soil. Many of them would seem to indicate a gradual uprise of the land from the waters of the ocean. The organic remains of the drift portion are partly terrestrial and partly marine, (the shells of the *Helix* occurring with

those of the Cockle and Mussel; the bones of marine birds and fishes with those of land animals, and seaweeds along with terrestrial plants), but in the deeper strata the remains are chiefly marine, and, from the incohering nature of the deposits, are by no means well preserved."

It is on such sandy tracts, above high-water mark, that I have found numerous examples of the kitchen-midden, so numerous, indeed, that I did not attempt to catalogue them. In county Donegal they are to be seen abundantly on the Fannet shore, which stretches from the mouth of Lough Swilly to the entrance of Mulroy Bay, and on the sandy strands of Mulroy Bay itself.

In general appearance they are very similar. About 10 to 20 feet above high-water mark, a rounded eminence is seen rising 6 or 7 feet above the dry sand. On the summit you find an accumulation of rough unhewn stones of the district, and all about the mound is white with bleached shells and bones, the remains of many a frugal meal. The stones are evidently the ruins of the rude huts built on the spot, but in no single case could I find a trace of their plan, whether circular, square, or oblong. They must have been small, however, for they occupy a limited space on the mound, often not more than about 20 feet square altogether. There occasionally occur long slabs of stone, which seemingly served for door lintels, but no fragments of wood have been seen. The shells are all of edible kinds. The first in order of quantity is the Cockle, *Cardium edule*; and next follow successively the Limpet, *Patella vulgata*; the Periwinkle, *Littorina littoralis*; the Oyster, *Ostrea edulis*; and the Mussel, *Mytilus edulis*; the last being very rare. There are also, but equally rare with the last, a few odd valves here and there of *Cardium echiniatum*. Another notable character of the general characteristics of the Donegal Shell Mounds is that the bones of animals are very abundant, and form perhaps one-tenth of the whole bulk of organic remains, as compared with the shells. These bones consist of ribs and teeth of the cow and sheep, and some long bones of the deer; all the larger bones being split longitudinally for the marrow. At Dundoan, Rossgull, I found a boar's tusk.

On none of the bones did I find any trace of carving or ornamentation, such as I described in my paper on a Shell Mound in South Uist.* In almost all the heaps a few fragments of *burnt* bones were

* *Proceedings*, vol. ii., p. 24.

found, and more rarely, small portions which seem to have had their bony structure replaced by gradual infiltration of carbonate of lime.

All the small stones found bore evidence of contact with fire. It would be difficult to get one entire; they are mostly fractured, and in some cases altered in colour by heat.

An early mode of cooking was to surround the meat with hot pebbles, and this may account for so many burnt stones. Nothing in the shape of stone implements was obtained, but almost all the mounds contained chipped fragments of a crystalline limestone found *in situ* near Carrigart.

The above general description applies to the following shell mounds, as far as I have examined them, in county Donegal.

IN FANNETT.

At Cooladerry, - - - - -	1
At Portacharman, - - - - -	2
At Ballyhernan, - - - - -	1
At the Old Town of Ballywhorisky, - - - - -	4
At Port-na-luing, - - - - -	2

IN ROSSGULL.

Near Carrigart, - - - - -	2
Near Larginreagh, - - - - -	2
At Dundoan, - - - - -	2
At Melmore, - - - - -	3

IN DOAGH.

On Dunfanaghy strand, in an island surrounded by water only at spring tides, - - - - -	3
In Innisbofin island, - - - - -	5 or 6
(but all at the sandy end of the island called "The Toberglassan.")	

So much for the Donegal Shell Mounds. One other to which I would call your attention is situated about half-a-mile from Ballintoy, in county Antrim. It, too, is only a few yards above high-water mark, it is also on a sandy shore, and the shell and bone remains are very similar to those already described, only that there are more examples of the bones of the deer to be met with. Over and above these remains, however, there are also, in exceeding plenty, flint flakes and pottery. The former are so numerous as to suggest that this was a flint implement factory. I have found here nothing more finished than some flint scrapers, used, I believe, for preparing

deer and other skins. The edges of these scrapers are beautifully chipped, each stroke leaving the characteristic conchoidal fracture of flint. Here I found a number of stone hammers, which may have been used for dressing the flint scrapers, &c. These hammers are just natural stones which seem to have been selected for their handiness in shape and weight, and they are to be recognised only by the abraded and pitted end, caused by continual hammering.

My visit to this Ballintoy mound was only a few days after a storm of wind and rain, which rendered the time favourable, and laid bare a great deal of pottery. The largest fragments I saw were 5 inches long by 3 inches deep; but two of these were found together, and the broken edges fit so well, that they may be taken as belonging to one crock or utensil which would measure 14 inches in diameter at the mouth, and 16 or 17 inches in depth.

I have examined the pottery microscopically and find it consists of Lias clay—a bed of which exists in the vicinity—with an intermixture of small angular pebbles, seemingly of pounded basalt, to give it consistency.

This pot was probably used for cooking purposes, and as it narrowed from the lip, and then swelled out, this “neck” would afford a suitable hold for the cord by which I believe these fictile vessels were moved from place to place. The pottery has evidently been made by hand, as none of the fragments (of which a few hundreds have been obtained here) show marks of the lathe or wheel. The inner lip of the above mentioned crock shows the trace of the last hand smoothing, after receiving which it was ornamented with three rows of angular marks, seemingly made with a smaller instrument than that used for the decoration of the outside, but of the same three-cornered shape.

The bit of pottery now exhibited is of better ware and formed part of a smaller vessel than the crock; the ornamentation seems to have been made by the impress of a rough cord.

The late Mr. Herdman, of Ballintoy, showed me a small cup made of the finest clay, and of a yellow colour, which he found here. It was only 2 inches in height, without ornamentation, and his theory was that it was a playful imitation of the large ware, and made by one of the children of the old world potter. Mr. Herdman gathered fully a hundredweight of bones, shells, stone hammers, flint scrapers, and flakes from this mound, but never found any iron or bronze remains.

If it be a fair inference from the situation of this Ballintoy mound, so resembling that of the numerous Donegal mounds in the similarity of its shells and split bones, and in the character of the rough stones which formed the hut of the dwellers, that it was synchronous with them, then I think I am justified in claiming for them all a high antiquity. The Donegal mounds have no flints or pottery—it may be from the absence of the raw material—but whatever their age may be, the pottery and flint of the Ballintoy example afford a clue to their place in time.

Much of the pottery found in Crannogs has been referred to the 9th and 10th centuries,* and it is much less archaic in taste and ornament than that of Ballintoy. It is possible, however, that old fashions and forms remained among the coast dwellers, when their inland brethren were advancing in the arts. The flint implements by themselves would popularly be ascribed to a prehistoric age, but it is a question whether the Antrim men of even the middle ages did not make copies of iron arrow heads and knives out of their abundant and suitable flint, from motives of thrift and economy. Be that as it may, I think I am safe in saying that this mound cannot be more recent than the 10th or 11th century, and may be very much older.

III.—*Remarks on a few Hauls with the Dredge, in Portree Bay, Skye.*

By Mr. David Robertson, F.L.S., F.G.S.

Although the marine fauna of the British seas is generally much alike, yet some species appear to be mostly confined to particular districts, but not always according to theory, as they are often found to far overlap what is believed to be their natural boundaries, not continuously, but in leaps over large intermediate tracts. Many notable cases of this kind are found amongst the mollusca, such as the isolated habitat of northern shells on the East coast of England, *Saricava (Panopœa) norvegica*, *Fusus norvegicus*, *Fusus turtoni*, &c.

During the month of August, 1879, the writer took a number of

* “*Journal of Royal Historical and Archaeological Association of Ireland.*” vol. i., Jan., 1871, p. 367.

hauls with the dredge in Portree Bay, Skye, at a depth of from 14 to 18 fathoms, the chief object being the investigation of the Microzoa. The gathering of Foraminifera was very rich, numbering above 100 species, and mostly all being in fine condition. Many of the rarer forms were in considerable abundance, such as *Bigenerina digitata*, *Operculina ammonoides*, *Nonionina umbilicatula*, *Quinqueloculina tenuis*, *Gaudryina filiformis*, &c., but at present I will only notice such as are new to Britain.

Reophax difflugiformis, Brady. Mr. H. B. Brady, in his paper on the Reticularian Rhizopoda of the "Challenger" Expedition, (*Quarterly Microscopic Journal*, vol. xix., N.S., pl. 5, fig., 3), notes its occurrence at 5 different stations, one in the North Atlantic, two in the South Atlantic, and two in the South Pacific. In one of these the depth is 1900 fathoms, while in the other four it varies from 2200 to 2740 fathoms.

R. nodulosa, var.?, Brady. In the same paper, Mr. Brady says that the distribution of this species is very wide, and the finest specimens have been found at stations in the South Atlantic, and in the North and South Pacific Oceans at depths from 1400 to 2000 fathoms. I have it also from the Clyde district.

Lituola (Reophax) glomerata, Brady. In his paper on the Reticularian Rhizopoda of the North Polar Expedition (*Ann. and Mag. of Natural History*, June, 1878), Mr. Brady records this species from nine different stations between lat. 78°20' N., and lat. 81°41' N., and in depths from 20 to 220 fathoms.

Dentalina brevis, D'Orb.

Robertina arctica, D'Orb., I believe to be the same species as that discovered last summer by Mr. Joseph Wright, of Belfast, at Killybegs, and recorded as *Bulimina arctica*, new to Britain; but Mr. H. B. Brady now refers it to his M.S. name, *B. subteres*, Brady.

Dentalina consobrina, D'Orb., and *Bolivina dilatata*, Reus., and another from the same place of no less interest, which Mr. H. B. Brady figures and describes in his paper already referred to.

Hyperammmina elongata is, as Mr. Brady remarks, one of the many arenaceous types brought home in 1869 by naturalists, in the first cruise of the "Porcupine," but he was not aware that it had hitherto received a name.

From the many species found in Portree Bay, within a distance of 200 or 300 yards, common with those found in the dredgings of the "Challenger" and Polar Expeditions, although taken at

stations and depths greatly dissimilar, we may reasonably infer that there must be some similarity of conditions between these stations, so widely different both bathymetrically and geographically. The gathering from Portree Bay was greatly more diversified and numerous than that taken during the same month in Stornoway Bay, both places having fresh water flowing into them, and, as far as I could judge, in about the same volume. The material of both bottoms is much alike; sandy, shelly mud, more or less crowded with dead shells; with this difference at Stornoway, the depths dredged are from 5 to 9 fathoms, and at Portree, from 14 to 18 fathoms, but differences of moderate depths seem to be of little importance in controlling the habits of the foraminiferal fauna. If a solution is ever to be found, most likely it will be from the obscure and variable character of the sea bottom.

Mr. Robertson's remarks were illustrated by a fine series of mounted slides of Foraminifera, which the members had an opportunity of examining under the microscope at the close of the meeting.

THE SOCIETY'S ROOMS, 207 BATH STREET,

OCTOBER 26th, 1880.

Mr. John Kirsop, Vice-President, in the Chair.

Mr. W. E. Koch, M.A., F.G.S., was elected an ordinary member.

PAPERS READ.

I.—*Some Apiarian Notes for 1880.*

By Mr. Robert J. Bennett.

Since 1861, Bee culture has perhaps never had such an unfavourable beginning as this year. In my concluding remarks in 1879, I mentioned that that had been the worst season for 20 years, and I advised those who had stocks left to feed them till every hive was at least 30 lbs. weight. Those who did not take the precaution of doing so were left bee-less. During January we had several fine days, of which the bees availed themselves to take a cleansing flight.

Till the middle of February the bees were often on the wing and breeding had commenced in most of the hives. As in former years,

I began stimulative feeding to aid them in promoting and bringing out the young brood, which so soon has to take the place of the aged and worn-out bees.

March, generally the most trying month for bees, was very favourable till about the middle, and it was very pleasing to see them coming back to their hives laden with pollen. About the 20th a sharp frost set in, which greatly retarded breeding.

Till the 18th, April was bleak and cold, with little sunshine. On the 9th I examined stocks, and found that most of them contained eggs, larvae, and young bees, and that the latter (unless the weather became milder) would soon diminish the stores, particularly those of the Ligurians. To prevent any sudden collapse I increased the stimulative feeding. The bees have rarely wintered better in my apiary, but my man said, "I have no notion of thae foreign yellow boys, (alluding to the Ligurians), they are just a parcel of thieves and robbers. They are getting honey some gate and I ken it's no mine." To this I answered, "Feed them well, and they will not need to go to their neighbours' hives."

Here I would direct attention to the gross ignorance that prevails, notwithstanding all that has been written about bees and their feeding in spring. It is well known by every bee-master that the most trying time for his stocks is during the months of March, April, and May, when the hives are in a manner being repopulated, but instead of strengthening and keeping every stock strong by feeding, the bees are allowed to shift for themselves, the result being that thousands (especially of the weak stocks) perish from want during the spring, after having safely got through the winter.

Why will our Government so long stand idle, while those of France and Germany pay experts to teach apiculture in their rural schools? By this means the young are there awakened to the fact that a great source of national wealth evaporates daily (honey being merely a secretion) for want of bees to collect it. Who will gainsay the fact that half a million of money has this season been lost to Scotland alone by reason of its inhabitants not having a knowledge of apiculture and bees to collect the sweets from a thousand hills!

May opened well, and my hives soon became crowded with bees, but to guard against any lack of food, I kept on feeding till the end of the month. On the 27th Mr. Jones, of America, arrived in London from Cyprus and the Holy Land, where he and a friend, Mr. Benton, had gone for a few months, entirely at their own risk

and expense, to procure *Queen Bees!* He remained in London a few days, to allow the bees he had brought with him to get a cleansing flight before shipping them for New York. His charge for a Cyprian Queen bee was 30/, and for one from the Holy Land, £3 3/. I wrote for two, which however only arrived last month, but they are doing very well and I hope to be able to show a pure swarm in my observatory hive next season.

Our great swarming month, June, was well advanced before swarming commenced, owing to the extreme cold at its beginning; but towards the end bee-keepers had their reward, and swarming set in all over the country.

Bees continued to swarm till nearly the end of July, in some cases three and even four times, showing how quickly Nature reproduces herself, as but a few months before 60 per cent. of the entire bees in the country had perished through the neglect, or, what is perhaps worse, the ignorance of their owners. Towards the end of the month, being in London, I visited the British Beekeepers' Show, which certainly has made great advances during the last three years. There were several observatory hives that contained bees from Cyprian queens. Their colour is lighter than Ligurians and they are said to be more active in flight. Bee furniture was there in endless variety, and both flower and clover honey as nearly perfect as could be. Certainly both visitors and exhibitors got their eyes opened to what is really wanted by the public. Could we in Scotland only be able to arouse the clergy and influence country proprietors, there would certainly be a great future for honey producers.

Swarming over, the bees began to enter their supers and gladden the hearts of their proprietors. Until August, in Argyllshire, not a super had been entered. Towards the end of the month, noticing that not a single stock of Ligurians had entered their supers, I at once examined, and, alas! on opening the first one discovered that awful curse of bee-keepers, "foul brood," to be rampant. On hearing this, my man, who is rather a character, said, "I never liked thae foreign gentry. Gie *me* the blacks and *ye* can work awa' with thae robbers, and we'll see wha gets the best boxes," meaning the supers. Strange to say, the whole four Ligurian hives were the same, while the black bees had entirely escaped. In searching for the cause of this I traced it back to the month of May, when my Ligurian stocks were stealing my neighbour's honey, especially from two stocks which had died and ought to have been removed by their careless owner.

Here I would say to all who complain of their hives being robbed, as bee-keepers often do, that it is the owner of the robbers who should complain, as they generally bring more disease in the putrid honey than can be eradicated in many months even by the most skilful. In this case I had to take my four strongest stocks, and literally bury everything but the bees, at a time when they should have been in splendid condition for entering their supers.

Supers were rapidly filling in September, and one "Stewarton" hive by the end of the month had reached the enormous weight of 165 lbs. The harvest was the finest I have ever seen, and those who kept their bees strong reaped the benefit. My bees have now paid all their outlay and original cost, and all my stocks are (and I trust all in the country are) put into winter quarters with more stores in the hives than they have had for many winters past.

Early in October we put on winter blankets (quilts), and closed the entrances to winter size. Up till the middle of the month the weather was so mild that the bees were busy, and on the 14th one would have thought it was June, the air around the apiary being filled with their joyous hum, and the workers being busy carrying in pollen, especially the Ligurians, whose hives were completely filled with brood as if to make up for lost time. The hives were all clean and sweet at present, and I trust I have got rid of foul brood, though it is always difficult to detect the first few hundreds of larvae which die in a crowded hive, so that sometimes three-fourths of the cells may hold putrid larvae before the fact is discovered, as happened with me in August last.

If all goes well, we should have early swarming in 1881. Let us hope that this is the beginning of a series of fine years, and that bee-farming will be carried on through the length and breadth of the land, so that as our own home honey is really the finest in the market, we may be able to supply the demand and thus defy foreign competition.

II.—*On Mimicry, or Protective Resemblance among Animals.*

By Mr. A. S. Wilson, M.A., B.Sc.

In this paper Mr. Wilson gave a sketch of the researches of Bates, Wallace, and Wiseman into the phenomena of mimicry and pro-

tective coloration in animals, and more especially in insects. He described also how flowers had acquired their forms, colours, nectars, and odours for the purpose of attracting insects, and of thus securing the benefits of cross-fertilization. Also, on the other hand, how many insects had their bodies, and particularly their mouth organs and legs, modified in the most suitable manner for obtaining the nectars and pollens offered by the plants, in exchange for the benefits received by them from the visits of the insects. The paper was illustrated by a series of coloured diagrams.

III.—*Note on Astrorhiza limicola, and on Amphidotus cordatus, Penn.* By Mr. David Robertson, F.L.S., F.G.S.

There is an arenaceous Rhizopod, *Astrorhiza limicola* (Sandahl), belonging to a class not admitted into our lists till lately. From Siddall and Brady's *Catalogue of British Recent Foraminifera*, 1879, it appears that this species is only known as British from the Dogger Bank. For the credit of our Society it may be well to record its frequent occurrence in the Frith of Clyde. I have dredged it round Cumbrae on many occasions, and at one place abundantly; also moderately often off St. Ninians on the west side of Bute. I gave Dr. Carpenter specimens of it at the Meeting of the British Association in 1876.

The common Heart Urchin, *Amphidotus cordatus*, Penn., found so commonly lying dead along our sandy shores, denuded of its spines, has a feature in its habits that I do not know has been noticed hitherto. They burrow from about 4 to 6 inches into the sand, and when dug up and put into a vessel with sand covered with sea-water, the animal is seen at once to commence to throw the sand to the sides, by the under, or plastron spines. By the time that it gets down into the sand, level with the under edges of the test, the spines of the body get into motion, forming into 4 or 5, sometimes 6 or 7 ridges of spines, which stretch from back to front along the sides of the test, progressing upwards in wave-like fashion, and following each other in regular succession, till they reach the superior avenue or summit. Each wave as it emerges from the sides of the animal, brings up a roll of sand to the surface, which falls outwards, and this action is continued till the animal is completely covered.

When newly dug out of the sand, they often work rapidly down into it, apparently by the ventral spines, without calling into aid the formation of the lateral ridges of spines.

THE SOCIETY'S ROOMS, 207 BATH STREET,

NOVEMBER 30th, 1880.

Mr. John A. Harvie-Brown, F.Z.S., Vice-President, in the Chair.

Professor John Cleland, M.D., F.R.S., and Mr. Andrew Bain, were elected ordinary members.

SPECIMENS EXHIBITED.

Mr. James Allan showed a fine collection of Ferns and other plants which he had received from Kentucky, U.S., and on which he made a few remarks.

Mr. John Young, F.G.S., exhibited a curious comb-like organism from the black-band ironstone shales of the Airdrie coalfield, and stated that he knew of some three or four specimens obtained from the same beds, but hitherto it was not known to what class of animals they belonged. Recently he had discovered that similar organisms had been figured and described by Professor Fritsch, of Prague, in his monograph of the fauna of the gas-coal and limestone of the Permian formation of Bohemia. Professor Fritsch calls them *Kammlplatten*—i.e., comb-plates—and refers them to the genus *Ophiderpeton* of Huxley, a serpent-like amphibian, first found in the Kilkenny coalfield in Ireland, and afterwards in the coal-measures of the north of England, but which hitherto had not been identified from Scotland. These *Kammlplatten* are stated to have been placed upon the body of the animal, near the cloaca, in imbricated series. They are about three-fourths of an inch in length, and rather less than quarter of an inch in breadth. The serrated, comb-like part of the plate has a curved handle-like process giving it a club-like form. Should the present identification of these plates with *Ophiderpeton* be confirmed by the discovery of other parts of the skeleton, this will be a new addition to the list of amphibian forms from the Lanarkshire coalfield, in which five other genera have already been noted.

Note.—Since the above remarks were communicated to the Society, Dr. Traquair and Mr. Thomas Stock, of the Museum of Science and Art, Edinburgh, have each recorded the occurrence of *Kammlplatten* in the eastern coalfield of Scotland.

The Secretary showed a collection of rock specimens from Arran, forwarded by Mr. James Napier, F.R.S.E., reading some accompanying notes in reference to their occurrence and composition, also some specimens from a sandstone quarry at Fallside, near Bothwell, and drawings of a split granite boulder at the shore near Corrie, called the *Sugarloaf* from its shape. Mr. John Young explained the character of the various specimens, on which other members made some remarks.

The Chairman exhibited specimens of the Glossy Ibis, *Ibis falcinellus*, Lin., and the Esquimeaux Curlew, *Numenius borealis*, Först., lately obtained in Aberdeenshire, and made some remarks regarding them in reference to migration.

PAPERS READ.

I.—*Notes on the Lyre-bird* (*Menura superba*) *Davies, of Australia.*

By Mr. C. W. Arnott Stewart. Communicated by Mr. John A. Harvie-Brown, F.R.S.E., V.P.

Supposing that the habits of the Australian Lyre-bird were well known, I did not pay the attention I might have done to what I heard, especially in connection with the nest, so that about this part of the subject I am not very certain. The egg I sent you was, I believe, laid in the Spring of the year 1878, that is about September or October. It is one of two that I found in the possession of a Mrs. Jefferson, of Fernshaw, in Victoria. The other egg was darker and not so well marked, and more rounded at the narrow end than this one, but, being slightly cracked, and Mrs. Jefferson not wishing to part with both, I chose the more perfect one.

This egg, she told me, was found on the side of a hill, not far from the little town; the nest was built not more than three feet above the ground, and, I believe, in the fork formed by two branches of a fallen tree. It was made of twigs, with an arch of the same material over it, resembling the broad handle of a basket. She had sent two of such nests, one to the museum at Hobart Town, Tasmania, the other to that of Melbourne, with full particulars of how they were to be set up; but, greatly to her disgust, no heed had been taken of her descriptions, and the handle-like covering had been allowed to sink down and fall out of place. Mrs. Jefferson told me that the Lyre-bird only laid two eggs in the year, and that the second was not laid till after the first had been

hatched. Whether the same nest is used for the hatching of both eggs I cannot say, but think it must be so, for she would not otherwise have known the number of eggs laid by the one bird. The nests too, it seems, are difficult to find, and are not plentiful.

I could not help admiring Mrs. Jefferson for the interest she seemed to take in natural history, such being very uncommon among Australians. She had succeeded in getting some of the young Lyre-birds, old enough to feed themselves, and had tried to tame them, keeping them, I think, in an enclosure fenced with wire netting, but they only lived for about a fortnight.

When staying in Wahaffa, the principal mining town of central Gippsland, I was told that Lyre-birds were at times seen on the hills, and, though not common, they could hardly be said to be scarce. The hills immediately surrounding the town are bare, all timber having been cut down for mining purposes, and for fuel, but those beyond the town are wooded. I did not see any of the birds myself, being in the place only a day and a half. I also spent several days on a station about fifteen miles south of this. It was a wild place, being situated in a great forest, only a few spots at large intervals having been cleared of trees by settlers. The people I stayed with had been a very short time on the place, and only a few trees had been felled round the homestead. There was a creek running close by, and in the scrub, composed of young trees and bushes, which grew thickly on its banks, I heard several times late in the afternoon the peculiar whistle of the Lyre-bird. In company with one of my friends I set out early one afternoon to some densely wooded patches in the forest, some two miles from the house. The country here is high, but not very hilly, or in other words, deep valleys are not common. We first went through what very much resembled an English copse, and here found a large number of places where the ground had been scratched up, often at the roots of trees. Mounds, too, resembling mole heaps, but larger, neater, and smoother in appearance, were not wanting. They were pointed out to me as the work of the Lyre-bird, the large and regular mounds being their dancing beds, on which they dance and twirl, showing themselves off to the females. When amusing themselves in this manner the male bird mocks all the other birds in the bush, and so perfectly does it imitate their voices and cries, that only by its introducing its own whistle now and then, does a person, out of sight, know the originator of the sounds.

I heard a settler here describe how astonished he was to hear what he supposed to be so many different birds congregated in the same spot, and how on taking up his gun and following up the sounds, he had come on a Lyre-bird.

A young fellow in Fernshaw, who had often hunted them, described how he had crawled up to within range of a Lyre-bird when dancing on its mounds. Two hen birds were present watching and admiring his caperings; he had his tail feathers spread out, and brought so far forward that they almost rested on his head; in this way the prettiest part of the tail, which, unlike that of the peacock, is the underside, was exposed to full view. So interesting was the sight that the spectator never thought of firing. The bird now and then ceased mocking; suddenly one of the females discovered that danger was near, and gave a warning cry, when instantly the male lowered and closed his tail, the act of doing so, as my informant said, seeming to shoot him in amongst the bushes and undergrowth.

Now to return to my original story. Not meeting any birds in the copse-wood, we tried another close by, but with no better luck; we then dived into a densely wooded gully, composed chiefly of trees of small growth, from which many rope-like creepers hung down. Tree-ferns were numerous, and here and there a tall gum-tree rose through the smaller vegetation, towering far above, while in places, large logs, partly covered with moss, lay rotting on the ground; the moisture in the air and under foot seemed congenial to mosquitos and leeches, as we found several of the latter on our boots. A little dog with us knew how to "bail up" the Lyre-birds, and very soon his barking told that he had found a "pheasant," as they are sometimes called. As we hurried up my companion passed immediately under the tree in which the bird was sitting, its attention being taken up by the barking of the dog, but, before he could fire, it had hopped on to another tree and then soared down the valley, where it was lost to us, nor did we find another that day, as they were not whistling, so we had to return home with an empty bag.

When riding one evening along the ranges from Marisville, a town about sixty miles N.E. of Melbourne, to my surprise I saw all of a sudden come from the wooded hill that rose on my right, a brown flat mass with a long tail, the end of which resembled that of a fish. So like was it in general appearance to a Turbot, that for an

instant I was quite taken aback at the idea of a fish shooting through the air and out of a forest. Directly after I saw it was a male Lyre-bird, its tail closed and its wings spread, but without a movement in either. I watched it, after dashing past directly in front of my face, soar down the hill-side, which here was free of tall scrub, and finally disappear in the bushes at the bottom of the valley. The two big feathers in the tail, the lyre feathers, which curl round at the ends, were what gave it the resemblance to the tail of a fish.

The next morning I returned to Fernshaw, where I had previously spent two or three days. The coach left Marisville at the early hour of four; the air was fresh, almost cold, and the road lay through forest, which, as we approached our destination, became more dense. It was then, about six o'clock, that we noticed three or four Lyre-birds cross the road immediately in front of us, and disappear in the valley on our right. Fernshaw, which is situated about forty miles north of Melbourne, is closely surrounded by mountains. In the deep, well-watered gullies the vegetation is very dense. Tree-ferns grow in large numbers, and to a great height, sometimes reaching forty feet, while other trees, the sassafras, the myrtle, and here and there a giant gum-tree, add variety to the forest. The rough-surfaced wire-grass twines round the clumps of the young trees, matting itself round their stems, till they become invisible; sword-grass hangs temptingly on the hillside, as though inviting you to take hold and help yourself up, but woe to your hands, if you do so, for its edges are sharp as knives. Under foot lies decaying vegetable matter, and every now and then you come on the slowly-rotting trunk of a fallen gum-tree, often of great size. As you leave the valleys and ascend the hills the bush becomes less dense, being chiefly composed of gum-trees, whose height surpasses those of California, reaching often 400, and, in one case I know of, 500 feet. These forests are the home of the Lyre-birds, which, during the middle of the day, seem to take up their quarters in the dark, wooded gullies, while it is in the evening and early morning that they are to be found in any numbers on the mountain sides. They appear to have a liking for the paths and roads, where they like, it seems, to scratch for worms. I once came on one busy in this way at the foot of a tree, and another time I saw two scratching alongside a log. The two specimens I obtained I shot on a path leading up the Black Spur, a hill at the north end of Fernshaw, and

they were both shot about five in the morning. The specimen I now have with me, a young cock, was shot as he was fluttering, trying to balance himself on one of the branches of a small tree into which he had hopped on catching sight of me.* Being a young bird, its tail is not perfect; only two of the feathers are skeletons.

They are very shy birds and exceedingly quick, so it is no easy matter to shoot them in the bush, where there is so much cover and the ground difficult to get over, especially without making a noise. As the bird can only soar down-hill, it is the custom when stalking them, if it may be so termed, to start at the bottom and work upwards. One afternoon I set out with young Jefferson, the hotel-keeper's son, a boy of twelve, for a very pretty waterfall, about two miles distant, romantically situated in a wild, wooded valley, to which there was no path, and as there was some chance of coming on a Lyre-bird, I took my gun with me. We first passed through bush, thinned by what must have been a large fire, judging from the number of trees with blackened stems. All bushes and young trees had been cleared away, and the large gums and tree-ferns were the only ones that remained. These last, though little affected by fire, wither and die when they are deprived of shelter and exposed to the sun, so only a few of these, now miserable-looking specimens, remained. Passing on we turned to the right, and were following the spur of a hill, when suddenly to our joy we heard a Lyre-bird in the gully below. Listening, to make sure that the bird was not travelling, for in that case it would have been useless to follow, and finding that the sound continued to come from the same spot, and that the bird had now commenced to mock,† we felt sure that he must be dancing, and so began to descend. Having reached the bottom of the gully, we advanced slowly and cautiously in the direction from which the sound came. We crawled in among fern-trees and over logs, moving on while the bird mocked, and remaining perfectly still when it ceased. It was an exciting time, a time of hopes and fears, for, judging from the note, this was a full-grown bird. We had come to within a few yards of it, when I thought that as my companion knew more about stalking these birds than I did, I had better give him my gun; so while I remained concealed

* They only use their wings when sailing down-hill, in which case they generally hop into a tree before starting.

† One sound that it repeated often very much resembled that made by a pair of castinets.

he walked on from tree to tree. He soon stopped and beckoned, so I moved up to where he stood, and he then whispered that he had seen its tail above the small ferns and bushes, but had not liked to fire. Just then one of the birds, either the male or female, poked its head out of some bushes, but as we kept perfectly still it did not notice us. Directly after, the male ran out with his tail folded, and passed along on a sort of pathway, running straight in front of us. My companion tried to fire, but somehow could not do it; in despair I snatched the gun from him, and fired just as the tail of the bird disappeared over a rise in the ground, and a splendid specimen was lost. We afterwards heard another bird, and saw it pass along the hillside below us, travelling at a quick pace, hopping over logs and impediments, and every now and then giving its peculiar whistle, but it was out of range.

Before leaving Melbourne I was told that these birds were fast dying out, but this does not appear to be the case, judging from the numbers I saw and heard. The tail of the male bird is of some value, fetching 7s. 6d., consequently a good number of birds are destroyed; but they are now protected by law during the breeding season. Dogs are sometimes employed for hunting them, and are trained to keep the bird in the tree into which it has hopped, by continually barking at it.

Later on, when on a visit to a valley in the Blue Mountains of New South Wales, known as the "Weather Board," I saw a Lyre-bird run across a little gully, and I heard several when in the Limestone Ranges, about twelve miles from the town of Oberon, S.E. of Bathurst. I was afterwards told that the Lyre-bird of New South Wales is rather different from that found in Victoria, but whether this is true or not I cannot say, nor, if true, do I know where the difference exists.

II.—*On the occurrence of the White-beaked Dolphin, Lagenorhynchus albirostris, Gray, near the Bell Rock, September, 1880.* By Mr. J. M. Campbell.

Although it is to be expected that many of the rarer Cetacea frequent our coasts, the as yet imperfect knowledge of their habits, the difficulty of capture, and the nature of the element in which

they live, all militate against the rapid accumulation of facts relating to their occurrence.

The species which is the subject of this paper, although recorded as British so long ago as 1846, has not yet been added to our list of Scottish fauna. Mr. Alston in his paper "On the Mammalia of Scotland," read to this Society in April last year, referring to this species, says, "The White-beaked Dolphin is another species whose appearance in Scottish waters is to be expected, as it seems frequently to visit the Faroes, and the east coast of England (*Cunningham, P.Z.S.*, 1876, p. 686), but as yet its actual occurrence does not seem to have been recorded."

This species was first figured and described by Brightwell in the "*Annals and Magazine of Natural History*" (vol. xvii. p. 21), in 1846, under the name of *Delphinus tursio*, Fabr., from a female taken by herring fishermen off Great Yarmouth, in October, 1845, the skin and skeleton of which are now in the British Museum. There is, however, a skull of one which was killed at Hartlepool in 1834, in the museum of Cambridge University, the species not having been recognised at the time. Gray, after an examination of Brightwell's specimen, described it as a new species under the name *Lagenorhynchus albirostris*.

On the 29th December, 1862, a full-grown male was found stranded on "Little Hilbre," one of two closely contiguous islands at the mouth of the Dee, in Wales, and is described in the "*Annals and Magazine of Natural History*" for 1863, p. 268, by Thomas J. Moore, of the Liverpool Museum, to whom it had been sent. In 1866 one was shot on the coast of Cromer, Norfolk, by H. M. Upcher of Sherringham Hall, the skull being preserved in the British Museum. In 1867, according to Bell, a young male, whose skeleton is in the University of Cambridge, was killed on the English coast. Dr. Murie, in his "Notes on the White-beaked Bottlenose" ("*Linn. Soc. Jour.*," vol. xi. p. 141), in 1870, describes the anatomy of a full-grown male, captured a few years before on the south coast of England, part of the viscera of which is preserved in the College of Surgeons, and the skeleton in the British Museum. In September, 1875, Dr. Cunningham obtained a young female, caught off Great Grimsby, which he figured and described in the *Zoological Soc. Proceedings* for 1876, the skeleton of which is in the Edinburgh University Museum. The same volume also contains a paper by Mr. Clark on a young male caught on 26th March, 1876, off Lowestoft.

In the *Zoologist* for 1878, Mr. A. G. More, Museum of Science and Art, Dublin, says in reference to this species: "We have long had in the Museum here a coloured cast of a Dolphin captured some fifteen years ago in the vicinity of Dublin Bay, which lately, by comparing a coloured sketch taken from the fresh animal with the excellent figure given in the *Proceedings of Zoological Soc.* for 1876, p. 679, pl. 64, I was able to identify as *D. albirostris*, J. E. Gray." The last recorded specimen was a young female captured by some Yarmouth fishermen on 25th August, 1879, which Mr. Thomas Southwell of Norwich has described in the "*Zoologist*" of that year, the skull of which is in the Norwich Museum.

These are, so far as I have been able to learn, all the British specimens which have been recorded. On the Continent it has been taken at Ostend, Keil, Bergen, Gullholmen, and Skanör.

The individual which I now describe—a young male—was taken by some fishermen near the Bell Rock, on the 7th September last, and came into the hands of Mr. Walker, a fish merchant in Glasgow, who presented it to the Kelvingrove Museum on the 9th, in good condition.

The following are a few measurements taken at the time:—

	Ft.	In.		Ft.	In.
Total Length	5	8	Greatest breadth of pec-		
Length of muzzle	0	1½	toral	0	4¾
Length to eye	0	8¾	Breadth of caudal	0	3¼
Length to blow-hole	0	10	Height of dorsal	0	7½
Length to ears	0	11½	Circumference of thickest		
Length to pectoral limbs	1	1½	part	3	3¼
Length to dorsal	2	5½	Width of orbit	0	0¾
Length of pectoral	1	1	Width of blow-hole	0	1½
Skull:—					
Length, entire	1	0¾	Width of middle of beak	0	2¾
Length of nose from front			Width of lower jaw at		
of blow-hole	0	7¾	condyles	0	5¾
Width at orbit	0	5¾	Length of lower jaw along		
Width in front of notches			one side, from condyles		
(base of beak)	0	3¼	to symphysis	0	10

In shape and colour it resembled more closely the Lowestoft specimen described by Mr. Clark; the body tapering gradually from the dorsal fin, and, like the female described by Mr. Southwell, it did not exhibit the humped appearance described by Dr. Cunning-

ham. The beaked shape of the head was very marked, the upper lip projecting $1\frac{1}{2}$ inches beyond the head, which had a gradually-rounded outline. On each side of the upper lip were four black bristles, which projected but slightly through the skin.

The general colour above was a beautiful purplish-black, the entire beak from the furrow dividing it from the head, and the ventral surface till within 21 inches from the cleft of the tail, was of a satiny-white, slightly yellowish on the under surface. Above the pectoral fins and behind the eye was a greyish-white spot, thickly splashed or streaked with brown; a similar linear-shaped spot ran in an oblique direction from slightly before the dorsal fin, in the direction of the vent, and a larger one, which measured about 13 inches long and about 3 inches wide, ran along the side behind the dorsal.

The ear-opening was very small, and could be detected with difficulty, barely admitting an ordinary pin.

The number of teeth in the upper jaws was 23 on each side, and in the lower jaws 24 and 25; but some of them were barely through the gum, one or two at the front being mere denticles. They were sharp, conical, and curved inwards, and had a slight longitudinal groove on their anterior and posterior surfaces. They seemed to be quite free and movable. The lower jaw projected slightly beyond the upper.

Owing to insufficient facilities for maceration, a few of the teeth were lost; and, for a like reason, I have been unable with certainty to note the number of vertebrae, some of the smaller being merely cartilage. Previous to maceration, I had counted 90 vertebrae. The first two cervical vertebrae were ankylosed, the remainder free.

I have not any doubt that this individual is a young *Delphinus albirostris*, or, more properly, *Lagenorhynchus albirostris*, Gray.

I may remark that the figure given by Brightwell, and copied by Bell in his "British Quadrupeds," is very far from correct, that of Mr. Clark, as I have already said, approaching nearer to the one now described.

Some interesting anatomical peculiarities have been noted by Mr. Clark and Drs. Murie and Cunningham in their respective papers.

THE SOCIETY'S ROOMS, 207 BATH STREET,

DECEMBER 28th, 1880.

Mr. John Kirsop, Vice-President, in the Chair.

Messrs. John Pesque, Wm. R. Baxter, Colin A. M'Vean, Duncan M'Kinlay, Archd. Muir, John Scott, David Glen, jun., James Ballantyne, John Stewart, Duncan Thomson, and Wm. Cassels, were elected ordinary members.

SPECIMENS EXHIBITED.

Mr James J. King exhibited *Limnophilus subcentralis* (Brauer) from Aviemore in Inverness-shire, and *Molanna palpata* (M'Lach.), from Strath-Glass in the same county, two species of Trichoptera new to the British Lists, and showed by diagrams the points which distinguished these from other species.

Mr John M. Campbell exhibited a skin of the Nutria or Coypu, *Myopotamus coypus*, Mol., from Chili, and remarked that although the skins of the Nutria have for many years been a recognised article of commerce, the animal itself has been very little known. Mr. Ernest Gibson, of Buenos Ayres, one of the Society's corresponding members, has already given, in vol. iii. of the *Proceedings*, p. 344, an interesting account of the habits and economy of this animal; but as his paper was not accompanied by any specimen, some doubts were at the time expressed as to the identity of the species, and it was thought desirable to bring up the present specimen for exhibition. The Nutria is a true rodent, and in habits and structure bears no little resemblance to the beaver; but the tail, which in the beaver is broad and paddle-shaped, is in this species long and round. It is well known in Chili, Buenos Ayres, and several other districts of South America, on both sides of the Andes, and probably also in North America. In the British Museum there are skulls of the species so marked, though they may not unlikely be those of beavers.

Mr Campbell also showed a specimen of the Indian Flying Gurnard, *Dactylopterus orientalis* (Lin.), from the Gulf of Aden, remarking that two kinds of fish are capable of flight owing to the enlargement of the pectoral fins. One genus, *Exocoetus*, comprises the more familiar Flying Fishes; the other, *Dactylopterus*, of which the specimen shown is a young individual, is a genus of gurnards

distinguished by a nearly square-shaped head, covered by bony plates, the scapula and angle of the preoperculum being produced into long spines, the body covered with strongly keeled scales, two dorsal fins, the second little less than the first, and the pectorals (the flight organs) much enlarged. There are granular teeth in the jaws and none in the palate. They are natives of the Mediterranean, Atlantic, and Indian Seas. The genus comprises four species, and this one grows to a length of 20 inches.

Mr John Young, F.G.S., exhibited a specimen of a sand-burrowing macrurous crustacean, *Callinassa turneriana* (White) from Old Calabar, on the West Coast of Africa, and measuring about 10 inches in length. It was presented to the Hunterian Museum along with a collection of shells, &c., from West Africa, by Mr Alexander Henderson, of Glasgow, who says it is found specially at the Cameroons, its occurrence being only periodical, once, it is said, in four or seven years. With the natives of the Cameroons it forms part of the dowry of a woman at marriage, and should divorce be necessary, the shrimps must also be returned; but not being always obtainable, there is room enough for a good African quarrel among the natives. They say that it always comes down stream, but that the salt water kills it, and certainly myriads are to be seen floating dead in the brackish water where the shipping lie. It is edible, although the natives think it not worth cooking, as "nothing live inside," they say.

Mr Peter Cameron exhibited a number of galls, amongst them one on the stem of *Triticum repens*, very like that of a species of *Aular*, except that the latter is found on the root of the plant. Also a *Cecidomyia* gall on the root of a *Juncus*, and one on the flower-head of a compositaceous plant, perhaps a gall of *Cecidomyia artimesiae*. He also showed a collection of Hymenoptera from the Sandwich Islands, which he had received from the Rev. T. Blackburn. Most of the species are peculiar to the Islands, and belong to the genera *Odynerus*, *Crabro*, and *Prosopis*. Three of the Ants are British, *Solenopsis geminata*, *Pheidole posilla* (the House Ant of Madeira, now common in bakehouses, &c., in this country), and *Ponera contracta*, the latter being rare in Britain. The peculiarity of the insect fauna of the Oceanic Islands was commented on at length, and their study was recommended, as before long most of the species will be exterminated by man's agency, or by the introduced species.

Professor John Cleland, M.D., F.R.S., Glasgow University, gave a long and interesting address on a collection of Human Skulls from India. He dwelt upon the form and arrangement of the different parts of the crania, and pointed out the characteristics of the several specimens exhibited. At the close the chairman proposed a special vote of thanks to Professor Cleland, which was cordially agreed to.

THE SOCIETY'S ROOMS, 207 BATH STREET,

JANUARY 25th, 1881.

Mr John A. Harvie-Brown, F.R.S.E., &c., Vice-President, in the Chair.

Messrs. John Neilson, yr. of Drimsynie, Robert M'Lellan and T. J. Henderson, were elected ordinary members.

PAPERS READ.

I.—*Remarks on the genus Synocladia and other allied forms, with description of a new species.* By Mr. John Young, F.G.S.

The genus *Synocladia* was established by Prof. King of Galway, in 1849, for the reception of a Permian species of polyzoa which previously had been named *Retepora virgulacea* by Phillips, in 1829, and afterwards *Fenestella virgulacea* by the same author, in 1844. Prof. King in erecting this polyzoon into a new genus, pointed out wherein it differed from the typical *Fenestella* and other allied forms of palaeozoic polyzoa, and gives the following *diagnosis* at p. 39 of his Monograph of Permian Fossils:—"A funnel-shaped, multi-foliaceous *Synocladia*, springing from a small root. *Foliations* more or less folded and convoluted. *Stems* somewhat strong, often dividing. *Cellules* in from three to five furrows. *Dividing ridges* with the (?) gemmuliferous vesicles alternating with the cellule-apertures. *Branches or connecting processes* in general angulated midway between two adjoining stems; furnished, for the most part, with two rows of cellules; and occasionally becoming modified into stems or ribs."

Prof. King further states, that this beautiful coral, as the polyzoa were then termed, is often found attaining a large size, and that he is not aware of the existence of any other species but the one under

description, which does not appear to have been noticed in the Permian strata of either Germany or Russia. Since Prof. King described this genus, one or two closely allied forms of Carboniferous polyzoa have been referred to it by Mr. Robert Etheridge, jun., in the Explanation to sheet 23 of the Geological Survey of Scotland, p. 102. 1st, *Synocladia biserialis* of Swallow; 2nd, *Septopora cestriensis* of Prout, both American species, which are thought by Mr. Meek to be identical; and 3rd, a Scottish species, *Synocladia carbonaria*, R. Etheridge, jun., which he believes to be so closely related to the American form, as to be only a variety of it. In his diagnosis of this species, Mr. Etheridge points out that the cell-apertures are arranged in two alternating rows, both on the stems and branches, instead of from three to five rows, as in King's Permian species, and further, that supplementary cell-apertures are scattered irregularly amongst the primary cell-apertures, either singly, or grouped in twos and threes; and that scattered over the surface of the reverse face of the frond, are open wart-like projections. These characters have not been noticed on *S. virgulacea* of King, so that I am somewhat doubtful of the correct identification of the Carboniferous forms with the Permian genus.

In the *Proceedings* of this Society, vol. iii., p. 355, Dr. Young and I briefly described another form from our Carboniferous limestone shales under the name of *Synocladia* (?) *Scotica*; querying the reference to *Synocladia* as doubtful, preferring to leave it there in the meantime, until there is an extended examination of the whole group. In this species the cell-apertures are further apart than in *S. carbonaria*, Etheridge, jun., and the small intermediate cells are seen to be more regular, and more in line with the main cells than in that species. I now bring under the notice of the Society another species which I also doubtfully refer to *Synocladia* (?) the following brief diagnosis pointing out some of its most distinguishing characters.

Synocladia (?) *fenestelliformis*, sp. nov. A flattened foliaceous polyzoarium, of a somewhat circular form, springing from a small root-like base, from which proceed downwards, in some specimens, non-poriferous roots similar in character to those observed in some species of the *Fenestella*. Celluliferous face. *Fenestrules* somewhat variable in size, twice as long as broad, quadrangular in form, excepting at the bifurcation of the interstices, where they are triangular. *Interstices* straight, carinated, bifurcating at intervals, of the same thickness throughout the whole expansion of the frond,

and nearly their own diameter apart. The keel of the interstices bears a single row of closely-set tubercules, as numerous as the cell apertures. *Dissepiments* thin, slightly keeled, half the thickness of the interstices, and crossing them at nearly right angles, excepting at those portions of the frond where the interstices become much branched; they then cross obliquely, giving an angulated form to the fenestrules in those parts. *Cells* round, with a slightly raised lip on their lower or outer margin, about their own diameter apart, four to five in number on each side of the length of a fenestrule, twenty to twenty-five in five fenestrules. Cells confined to the interstices, excepting at those portions of the frond where the interstices become much branched, and they there encroach on the dissepiments.

Supplementary cells of the same size also occur irregularly amongst the fenestrules, and are placed on a lower level of the interstice than the former, where they alternate with the other cells. These supplementary cells are very irregular in number, some fenestrules show none, others show from one to four, while on other interstices or stems, they are so regular as to show a double row of cells on each side of the keel, somewhat like that of the Permian *Synocladia*. Where these supplementary cells occur in ones and twos, they are seen to project inwards upon the open space of the fenestrules with crater-like mouths extending beyond the level of the upper row, and thus giving the celluliferous face a somewhat rough and ragged appearance in unworn specimens. *Small secondary pores or foramina* occur scattered somewhat irregularly amongst the larger cells, and are about four times less in diameter. One is to be seen generally between each of the larger cells, sometimes two, the one being placed above or alongside the other; while between other cells often none of the small pores are to be observed.

Reverse, or non-celluliferous face. *Fenestrules* oblong, oval in form, caused by the junction of the expanded ends of the dissepiments with that of the interstices. Surface ornamented by numerous closely-set granular tubercules. The worn surface shows longitudinal striation of the interstices. *Small pores or foramina*. These are of the same size and character as those seen on the celluliferous face, and are scattered about in no regular order, although they seem to be rather more abundant on the lower portion of the fronds than on the upper.

The form under description is readily distinguished from the other

species of *Synocladia* (?) formerly referred to, (1st), by the character of its interstices, they being all of a uniform thickness throughout the extent of the frond, as in *Fenestella*, which it also much resembles, in having its fenestrules more regular. In the other Scottish species of *Synocladia* (?) the fronds have a plumose form of growth, with branched interstices of varying thickness, and arched or curved dissepiments, which produce great irregularity in the form of their fenestrules. (2nd), The new species also differs in having no cells upon the dissepiments, excepting at rare intervals where the interstices become much branched. It is also distinguished by the irregular supplementary cells of the normal size, placed on lower levels of the interstices than the ordinary rows of cells which border each side of the keel, but agreeing in all other generic characters with the Carboniferous *Synocladia* (?) in having, on both faces of the frond, the small irregular pores or foramina by which they are distinguished.

Synocladia (?) *fenestelliformis* is found in fronds varying in size from one to nearly three inches in diameter, but is not an abundant form in any of the localities where it has been met with. It occurs at Newfield, High Blantyre, along with *S.* (?) *carbonaria*, Etheridge, jun., from which locality I exhibit fronds of both species, removed from the shale by the Asphalt process, so as to show the celluliferous face. It is also found in the lower limestone shales at Corrieburn on the Campsie Fells, and in the upper limestone at Gillfoot, Carluke, where *S.* (?) *Scotica*, Y. and Y., also occurs. I have also to record this latter rare form from the shales of Craigenglen, Campsie, a new locality for the species.

In looking over Prof. King's descriptions of other fenestrated forms of polyzoa in his Permian monograph already referred to, I was much interested in finding a description of a form which agrees far more closely with the character of the celluliferous and reverse faces of our Carboniferous *Synocladia* (?) than that which exists in his descriptions of the type specimens of *S. virgulacea* from the Permian formation. This is a polyzoon formerly known under various names, but which Prof. King erected into a new genus, in 1849, under the name of *Thamniscus dubius*, retaining Schlotheim's specific name for the organism. In this genus, Prof. King points out, at page 44 of his monograph, the occurrence, on casts of the fronds of *Thamniscus*, of small hemispherical bodies, amongst the cells of the poriferous face, which he concludes to be the homologues

of the gemmuliferous vesicles, often seen overlying the cell apertures of recent polyzoa, and, in plate v., fig. 11, he illustrates the position of these small vesicles or pores in their relation to the cells. He also, in fig. 8 of the same plate, illustrates what he terms the foramina or small pores, on a portion of the non-celluliferous or reverse face of the frond, but he omits to say anything about these small pores on this face, in his description of the species in the text. There cannot, I think, however, be the least doubt, although previously overlooked, that in the occurrence of these small pores or vesicles amongst the ordinary cells of the poriferous face, and likewise in the foramina or pores on the reverse face, we have here a good character in this genus, that more closely allies our Carboniferous *Synocladia* (?) with the Permian *Thamniscus* than it does with the typical Permian species of *Synocladia*, in which these characters are absent. *Thamniscus*, however, as pointed out by Prof. King, differs from *Synocladia* in its manner of branching, and in not having the branches or interstices connected by dissepiments, except in doubtful or very rare instances. The Carboniferous forms of *Synocladia* (?) in being fenestrated are likely to be yet ranked in a different genus from that of *Thamniscus*, although, from the characters I have here pointed out, it will be seen that they have had a close zoological relationship. While discussing this subject, I may also refer to another Carboniferous polyzoon which Dr. Young and I figured and described in the *Annals and Magazine of Natural History* for May, 1875, and which we referred doubtfully to *Thamniscus* (?). I am now, however, satisfied that what we then described as *T.* (?) *Rankini*, must now be placed in a different genus from *Thamniscus*, as a recent examination of many well-preserved specimens shows that it has none of the small pores or foramina on either face of the polyzoarium, which, Prof. King says, is one of the distinguishing characters of his genus. *T.* (?) *Rankini* has many external characters which closely relate it to the recent *Hornera*, but this is a genus which has not yet been admitted into the group of Carboniferous polyzoa, although it would seem to be a natural and proper resting-place for this form. There is also another Carboniferous polyzoon from our strata, not yet described, and also very closely allied to *Hornera*, so that when the time for revision arrives, we shall be necessitated either to admit *Hornera* amongst the Carboniferous genera, or to establish a new genus for these forms.

It will be seen from the foregoing remarks, that there is at present

a very doubtful relationship between the Permian *Synocladia* and those Carboniferous forms placed in the same genus. On the other hand, the Permian *Thamniscus* presents us with several external characters, in its foramina amongst the cells of the poriferous face, as well as in having scattered foramina all over the reverse face—according to Prof. King—which relate it very closely, in the arrangement of its cell structure, to that of the Carboniferous forms doubtfully placed with *Synocladia*. It would, therefore, be very desirable that there should be a careful examination of well-preserved specimens of the Permian and Carboniferous forms, for the sake of ascertaining correctly, in what respects the Permian *Synocladia* and *Thamniscus* differ or agree with the Carboniferous forms. I sincerely hope that some palaeontologist interested in the group, who is able to examine well-preserved specimens from both formations, will be induced to take the question in hand, and clear up those doubtful points in their relationship.

II.—*On the structure of an Orange.* By Mr. Thomas King.

After some introductory remarks, the writer said that Goethe's theory of morphology—that in a flowering plant there were only two kinds of organs, viz., stem and leaves, modified in many ways—was now generally regarded as a sound one. That the sepals and petals of a blossom are leaves is plain enough. The stamens are not ordinarily leaf-like, but they are also foliar organs, as is shown in the cultivated rose, where they are transformed into petals. The pistil is also a foliar organ, as is seen in a monstrous state of the cherry tree—the pistils, which in ordinary circumstances would have developed into cherries, merely become leaves. The pistil is composed of one or more leaves, each of which is called a carpel. Some are formed of a single carpel, as in the pea; others of several, as in the lily; and we are generally able to tell the number of carpels in any pistil from the number of styles surmounting the ovary, or from the cavities it contains. The axis, or stem, on which the foliar organs of the flowers grow was next considered. The extremity of the axis is called the tones, or receptacle; it is an axial root or foliar organ. In most flowers it presents a rounded or flattened appearance; while in others, such as the rose hip, which is the extremity of the flower stalk, it is hollowed out into a cup, which

is not a fruit in the sense of being a ripened ovary, but a receptacle for the seed, like bodies growing on its inner walls, each of which ends in a style and stigma. The structure of fruits such as the strawberry, fig, plum, &c., was next described, and various points connected with them brought under notice; and, applying what had been discussed to the orange, Mr King was of opinion that the "liths" of which it is composed, which can be separated from one another without injury, are evidently carpels enclosing the seeds, and that the outer rind does not belong to the carpels at all, but is an axial formation—a prolongation upwards of the receptacle, forming, as in the case of the rose hip, a large cavity filled with carpels.

The paper was illustrated by a number of diagrams.

III.—*On the Natural History of the Cetacea.* By Mr. Thomas Southwell, F.Z.S., Norwich. Communicated by Mr. John A. Harvie-Brown, F.R.S.E., &c., V.P.

It was stated that the author had given particular attention to the study of this order of mammals. The various families were described at length—the habits, structure, and distribution of the different species being minutely dwelt upon.

The paper was illustrated by plates of the various species of whales, and by coloured maps showing the range of their distribution. Mr. John M. Campbell, who read the paper, had provided a series of specimens, consisting of skulls of the porpoise and dolphin, the ear-bones of various species, the straight, slender, and spirally-twisted teeth of the narwhal, measuring five or six feet in length, the teeth of the cachelot or sperm whale, and some of the economic products of the fisheries.

IV.—*Meteorological Notes and Remarks on the state of Vegetation in the Public Parks of Glasgow during the year 1880.* By Mr. D. M'Lellan, Superintendent of Parks.

It is a common saying, that one extreme is usually followed by another; and, when we contrast the weather of the last year with that of the previous one, the force of the remark is apparent. About a year ago my notes showed a very gloomy retrospect for the

year 1879 ; but 1880 has been directly the reverse of its predecessor, as will be observed in going over the statistics of the several months.

During January the weather was moderate, with a comparatively low rainfall of 2·58 inches. There were 20 days on which no rain fell. The average temperature was 35°. On 14 mornings the thermometer was at or below the freezing point, registering a total of 94 degrees of frost. The prevailing winds were west and south-west. Out of doors, the only plant in flower was the Christmas rose, which should have bloomed during the previous month.

February may be termed a dripping month, with a rather high temperature for the season of the year. Rain fell on 18 days, giving a total rainfall of 2·096 inches. The average temperature was 40°. The thermometer was below the freezing point only on 5 mornings, showing 9 degrees of frost. The prevailing winds were south and south-west. During the month the following plants were in flower in the various parks, viz. :—*Daphne mezereum*, *Hepatica alba*, *Erica carnea*, *Rhododendron praecox*, snowdrops, and crocus of sorts.

The first eight days of March were wet ; but the remainder of the month was dry and favourable for seed sowing, the proverbial dust being plentiful. The dry days numbered 23, and the total rainfall of the month was 2·024 inches. The temperature averaged 39°, and fell below the freezing point on 12 mornings, 40 degrees of frost being registered. The prevalent winds were from the north and the north-east. The following plants were observed in flower in the different Parks :—*Blue hepatica*, *Rhododendron noblium*, and *Empress Eugenie*, *Scilla sibirica*, and *Narcissus bulbocodium*.

April proved to be rather a wet month, there being only thirteen dry days ; but the temperature was high, the average being 44°. On three mornings the thermometer was at or below the freezing point, only 7° of frost being registered. On the 6th of the month there were showers of large hailstones. The prevailing winds were south and south-west. The following is a list of the plants in bloom in the course of the month :—*hyacinths*, *Ribes sanguineum*, *Berberis dulcis*, *Pulmonaria officinalis*, *Mahonia aquifolia*, *Vinea alba*, elders of sorts, tulips of sorts, violas, daisies, and forget-me-not.

May was ushered in with fine dry weather, which continued until about the end of the month. The total number of dry days was 21. The amount of the rainfall was 1·06 inches. The temperature

averaged 48°, and on three mornings it fell below the freezing point, registering in all 4° of frost. The quarters of the prevalent winds were the west and the south-west. Among the plants in flower during the month were the following:—*Viburnum lantana*, double cherry, bird cherry, yellow azalea, *Trollius europaeus*, hawthorn, laburnum, lilacs of sorts, and broom. During the previous year all these plants were a month later than this of flowering.

June may be characterised as a fine, genial, growing month, with sunshine and showers alternately, and consequently vegetation made very rapid progress. The average temperature was 55°; and during the month there was a total rainfall of 2·01 inches, the number of dry days being 17. The prevailing winds during 13 days were from the north and north-east, and for 17 days from the west and south-west. The foliage on both trees and shrubs was very perfect, the only exception being the horse chestnuts, which received a blight in May, rendering many of them almost leafless. This was specially the case in Kelvingrove Park; and, as it is almost now a yearly occurrence, it evidently proceeds from some atmospheric influence.

July followed with weather much the same as the previous month; but with an increase of temperature and nearly double the rainfall—viz., 4·18 inches. The temperature averaged 58°, the number of dry days was 18, and the prevalent winds were from the north and north-east. As a result of the high temperature, combined with the moisture, vegetation of all kinds made rapid strides—geraniums, calceolarias, stocks, and annuals of sorts all showing in beautiful flower.

August proved to be the warmest and driest month of the year, and following upon the fine growing weather of the two previous months, was all that could be desired by the farmer and the gardener. There were 28 dry days during the month, and the rainfall only reached a total of ·76 of an inch. The temperature averaged 60°. For the first half of the month the wind prevailed from the south and the south-west, and for the last half from the north and north-east. It was found necessary, during the very dry weather, to water several trees and shrubs. In all the Parks and also in George Square flowers of all kinds were in the greatest perfection.

September was a most favourable month for harvest operations, crops in many instances being cut and secured without a shower to injure them. The dry days numbered 19, and the total amount of

rainfall was 3·14 inches. The temperature averaged 56° ; and the quarters of the prevailing winds were the west and south-west.

October was a remarkably dry month for the season of the year, there being 24 dry days on which no rain fell. The total amount of the rainfall was only ·84 of an inch. The average temperature was 42° , and the thermometer was at or below the freezing point on 15 mornings, registering in all 52 degrees of frost. The prevailing winds were from the south and the south-west.

November was certainly the coldest and most variable month of the season. Rain fell heavily on 10 days, and snow or sleet on 9, giving a total of 5·52 inches of moisture. The average temperature was 37° , and the thermometer was at or below the freezing point on 12 mornings, showing 159 degrees of frost. Winds prevailing from the north and the north-west. Snow lay on the ground from the 14th till the 24th.

December was upon the whole a seasonable month, the rain-fall being moderate, but the temperature variable. About 4 inches of snow fell on the 15th, and remained on the ground for 3 days. The dry days numbered 18, and 3·6 inches of rain fell. The average temperature was 36° , the thermometer falling below the freezing point on 17 mornings, registering in all 96 degrees of frost. The prevalent winds were from the west and south-west. The following plants were in flower during the month:—daisies, wall-flower, marsh marigold, *Jasminum nudiflorum*, and the Christmas rose. The river Kelvin was higher in flood on the 24th than it has been during the last four years.

The highest day temperature during 1880 was upon September 4th, when the thermometer registered 82° in the shade, and the lowest temperature was reached on November 20th, when the thermometer went down to 10° , or 22° of frost. On 87 days the thermometer was at or below the freezing point, registering a total of 461° of frost, as against 664 degrees in 1879, and 609 degrees during 1878.

It will be observed from the foregoing notes for each month that the year 1880 has been so favourable in every respect, that it will be a memorable one for this generation. It is worthy of remark that, although the rain-fall was in excess of the previous year by 1·16 inches, we were favoured with it at the most seasonable times for the benefit of the growing crops. Another marked feature of the year was the uniform high average maximum temperature

during May, June, July, and August—namely, $64\cdot1^{\circ}$, while for the same period of 1879 it was as low as $59\cdot3^{\circ}$.

The weather was especially propitious during the seed-time—March and April—and, combined with a high, moist temperature during the growing season, gave flowers and crops of all kinds the benefit of a good start. The result was, as we all know, a most magnificent display of flowers in all our public parks, the like of which has never been equalled, and an abundant harvest, which has to some extent compensated our farming community for the heavy losses sustained during the previous year.

It is to be noticed that many plants, termed sub-tropical, which are every year planted out in the parks and gardens of Paris and London, succeeded this summer very well in all our parks and squares. Among these may be mentioned *Musa ensetii*, or banana, *Coleus*, *alternantheras*, palms, *Eucalyptus globulus*, and the castor-oil plant. The tobacco plant, propagated from seed, also attained perfection, reaching a height of about six feet. While we have thus been fortunate in the North, our Southern friends could not present such a show of flowers in almost any part of England. They were nearly a failure in very many cases from the unprecedented down-pours of rain and hail during July and August; and agricultural crops also suffered severely from the same cause.

Trees and shrubs with us flowered very sparingly during spring months, especially the hawthorn, mountain ash, laburnum, and lilac. Consequently there has been an almost entire absence of haws, rowans, and holly-berries during this season. This want has been severely felt by many of our birds, who depend so much upon them for winter food, and at all the Parks we have been feeding them during the past month. The reason of such a scarcity of flowers and fruit on our trees is not far to seek—the season of 1879 being so unpropitious for the growth of trees and shrubs, they only made weak sickly growths, and, owing to the wet cold autumn, neither the wood nor flower-buds were properly ripened. Accordingly, buds which should have contained the rudiments of flower and fruit remained simply wood-buds; and, in addition, a large number of the young unripened shoots were frosted down during the winter.

In looking forward it is pleasant to note that the beneficial effects of 1880 will, to a certain extent, be carried forward to 1881. There is an abundant promise of a good bloom upon all sorts of

trees and shrubs—especially upon rhododendrons—and, as the wood was well ripened, and the buds matured during the autumn and the fall of the year, there is every expectation that the severe winter we are now experiencing will not, to any great extent, injure vegetation generally.

Subjoined is the meteorological chart for the last three years, as kept at the Queen's Park :—

Copy of Meteorological Record kept at Queen's Park, Glasgow.

Rain gauge above the sea level, 143·95.

MONTH.	1878.				1879.				1880.			
	Rain-fall.	THERMO-METER.		Dry Days	Rain-fall.	THERMO-METER.		Dry Days	Rain-fall.	THERMO-METER.		Dry Days
		Average.				Average.				Average.		
		Max.	Min.			Max.	Min.			Max.	Min.	
January,	4·65	41	31	14	1·00	34	24	25	2·58	38	32	20
February,	1·41	44	35	17	·94	36	29	17	2·96	45	36	11
March,	1·85	49	32	21	2·75	40	32	16	2·24	46	33	23
April,	2·25	53	38	19	1·49	45	34	21	3·11	51	37	13
May,	2·73	60	42	14	1·44	54	38	22	1·06	57	40	21
June,	2·30	68	45	18	5·91	60	45	9	2·10	65	46	17
July,	·39	71	48	27	3·37	61	49	15	4·18	66	49	18
August,	2·53	67	50	13	4·58	64	49	13	·76	69	51	28
September, ...	4·61	63	47	10	3·37	57	44	10	3·14	64	48	19
October,	1·26	65	43	20	2·08	52	38	21	·84	50	34	24
November, ...	1·30	41	30	23	1·52	44	33	24	5·52	42	31	12
December, ...	·90	33	28	29	2·48	36	29	22	3·60	40	33	18
	26·18	53	39	225	30·93	48	37	215	32·09	53	39	224

V.—*Third Report on Scottish Ornithology—October 1st, 1880, to April, 1881.** Compiled by Mr. John A. Harvie-Brown, F.R.S.E., &c., V.P.

In pursuance of the plan of work as regards Migration of Birds, I am glad to say that our labours are now recognised by the British Association.

* For previous Reports see *Proceedings*, vol. iv., part ii., pp. 123, 291. The present Report, though read at the meeting of January, 1881, has been brought up to the following April, so as to include the whole winter. I would direct attention to Mr. R. Warren's account of Ornithology in Mayo and Sligo for 1880 (*Zool.*, April, 1881).

At the Swansea meeting in August, 1880, Prof. A. Newton read a paper "On the Migration of Birds, and Messrs. Harvie-Brown and Cordeaux's method of obtaining systematic observations of the same at Lighthouses and Lightships," and in it "urged the Association to lend its countenance to the renewed attempts" which we were making, "and to encourage, with its approval, these gentlemen and their fellow-workers, the men of the Lighthouses and Lightships." As a result of this, official notice reached us in due course that the General Committee of the Association had appointed Prof. Newton, Mr. J. Cordeaux, and myself, "a Committee for the purpose of obtaining (with the consent of the Master and Brethren of the Trinity House, and of the Commissioners of Northern Lights) observations on the Migration of Birds at Lighthouses and Lightships, and of reporting upon the same at York in 1881, and that Mr. Cordeaux be the Secretary."

I may add here that the schedules for 1880-81 were duly issued and additional stations secured in Faroe and Iceland through the Scottish Meteorological Society. An abstract of the Second Report of the Committee was read at the York meeting of the British Association in September, 1881, and the Report has since been printed *in extenso*.

I may here reiterate that this Report and former Reports on Ornithology are closely related to the Migration Reports, and are indeed intended to supplement the latter. It would therefore be of great advantage if they could be issued simultaneously, as otherwise they lose half their value.

JOURNAL OF THE WINTER OF 1880-81.

On 2nd October snow lay on the hills round Callander, and on 4th keen frost at night. Trees, which began to yellow even in September, threw their leaves fast in October, and hard frosts set in at night. From about 15th October regular night frosts continued in Stirlingshire. Ice formed on rivers and pools, and by 20th remained all day, even with bright sky overhead. Severe snow-storms reported from various parts, nearly 5 inches lying at Dava, the highest point of the Highland Railway, between the Spey Valley and Forres, and also between Inverness and Thurso. "The cold is still intense and the thermometer very low"—[*Edin. Courant*, 21. x. 80]. Snow also fell in London, and a correspondent of *The Times*, writing on "Early Snow," says, that during

48 years there is only one instance of a heavy fall at an earlier date than the present, and that in 1829, when, on October 7th, there was "a considerable fall between 1 and 3 P.M."—[*Edin. Courant*, 23. x. 80].

Heavy fogs impeded the navigation on the Clyde. At Kirkwall a severe gale on 20th, with sleet and rain. The weather in Stirlingshire up to 25th, clear, cold, and bright; but in Firth of Forth heavy storms of rain and wind, and gales along east coast. On 25th some rain, but on 26th again night frosts and cold north-east wind, which on night of 27th changed to high east wind, with sleet and rain, which lasted till 29th, when it was again cold and clear. This gale from N. and N.E. seemed general over the country, as noticed in papers of 29th. In Firth of Forth traffic suspended on 28th, and trains impeded. No such hurricane experienced in Stirlingshire for 5 years. Bye-roads in Fife often impassable from water. The Muckle Binn, west of Denny, covered by 12 inches of snow. Hailstones of extraordinary size fell in North of Scotland. At Auchterarder 2 inches of snow. Hills round Selkirk and southwards white for two days, also Grampians and Sidlaw Hills, and similar reports generally.

While great floods occurred in England, our Scottish rivers were hardly affected, as in Greenock, Stirling, and Alloa water was shut off from public works owing to its scarcity. In Dumfriesshire 60 sheep snowed up and buried in one mass—[J. Dickson, of Saughton Mains, *ex ore*]. On 29th wind continued almost due north, and weather bright and clear. From 30th westerly winds, clear and fine, till 4th November, when thaw and rain on 5th and 6th set in, with high gale on night of 6th, succeeded again by fine mild, clear weather. From 9th to 14th mild open weather, with high winds and rain, which flooded the rivers heavily. Snow began to fall in Stirlingshire early on 14th, lying though the ground was so wet, and continuing till the afternoon, when keen frost set in, which lasted until 16th, when north-east wind, with snow and rain, rose to a gale, doing much damage on east coast at St. Andrews and on Firth of Forth. Rain melted most of the snow, but on 17th the ground was again white. Thereafter keen frost till 23rd, when another fall of snow, followed by thaw till 24th, and this snow-storm seemed general over the country. High south-west winds succeeded for several days, and generally unsettled weather, with occasional fine days without frost.

On 16. xii. 80 *The Scotsman* said—After several weeks of comparatively mild weather for the season it has again assumed a wintry aspect. The slight frost on Tuesday was succeeded by a fall of snow which lay generally over Scotland to a depth of from 3 to 6 inches. This was succeeded by frost on the 20th. In the Aberfeldy district the snow reached a depth of about 30 inches. There were blocks on the Highland Railway at Dalwhinnie, and on the Peebles branch of the North British Railway. On the west coast the snow on the 19th was accompanied by a fierce gale. Mild weather succeeded up to 22nd or 23rd.

From the Outer Hebrides my correspondents report that there was very disagreeable weather most of the winter: very little frost or snow, but tremendous gales of wind, with rain; the lochs only once frozen over, and then only for two or three days.

Over Scotland frost set in again on 24th Dec., and with north and east winds continued for some time. Snow-storms of much severity, with drifts of great depth, occurred over the North. Blocks took place on the Highland line in Caithness, on the Great Northern in Aberdeenshire, and on the Caledonian, near Stonehaven. About 1000 men at work on the Great Northern on the 26th clearing the main line and Alford branch drifts of 6 to 9 feet; in the North and in Glenalmond and Glenqueich, 15 to 20 feet were noted—[*Scotsman*, 23. xii. 80].

Up to 11th January, 1881, frost continued almost unchecked, and ice reached a thickness of 3 to 4 inches on still ponds and lochs. On that night a general snow-fall with keen frost, and on forenoon of 12th 3 inches fell, followed by high winds and snow from E. and N.E. Frost again on 13th, clear and calm. At this date traffic on canals became difficult, the Forth and Clyde canal being almost closed.—[*Edin. Courant*, 13. i. 81.] Papers full of accounts of railway blocks, suspended traffic, and gales with snow-drifts, all over Scotland. The great drifts were caused by the extreme dryness of the snow. Frost on 12th “intense”—[*Edin. Courant*, 13. i. 81]; on night of 13th the thermometer registered 3° below zero. Rivers frozen completely over, except at streams. At Inverness and Galashiels temperature extremely low—3° to 5°. Frost general.

In the Outer Hebrides the season continued unusually mild and open—[*Inverness Courier*, &c.]. At Inverness on night of 13th Jan. frost intense. At 5 P.M. 23° of frost was registered at Inverness, and

by 9 P.M. zero; unequalled, it is said, in that locality in 25 years experience. Zero was reached at Lochloy, Nairnshire, and, indeed, generally over North of Scotland. At Inverness, on December 2nd and 3rd, 1879, there were 18° of frost; while at Galashiels on these days there were 37° , and at East Linton (both localities in South of Scotland), there were 34° . A well at Essich, Invernessshire, not known to have been frozen during 50 years, was covered with ice on Thursday 13th. At Abernethy no such continuance of frost for 20 years—[*Inverness Courier*, 15. i. 81]. A fresh fall of snow on 19th January. On night of 16th 34° of frost at Dunipace. Ice on Larbert pond 8 inches thick on 17th.

At Annual Meeting of Meteorological Society in Edinburgh, 25th February, 1881, it was stated that the lowest temp. recorded by closed thermometer was at Stobo Castle— 15° , and the next lowest— 13° , on 17th January. On the same date, however, it showed 19° at Sumburgh Head, and 17° at Stornoway. The month of January, 1881, was the coldest for 120 years, but in January of 1767 the temperature fell $1\frac{1}{2}^{\circ}$ lower at Butt of Lewis and north of Caithness. All accounts from papers show the unexampled severity of the present season—[20. i. 81]. Heavier snow-falls have occurred, as in 1878-9, but such intense frost has probably not been equalled for 20 years, nor even then did the severity continue for more than a fortnight.

Several cases of frost-bite occurred near Inverness. Caledonian Canal obstructed with ice up to Dochgarroch Locks. Ice reported more than a foot thick on the Beauuly, also 2 feet thick on still water near Dingwall. Alcaig Ferry frozen, a rare occurrence. Snow obstructions not bad, but 14-inch fall near Dingwall; and greater inland. Sheep suffering severely. Birds frozen to death, or starved. Rooks, sea-gulls, &c., feeding on the streets in Golspie.

Each snow-storm since October, of which there were five, has increased the rigour of winter. Wild-fowl abundant at all open reaches or streams on Spey. Water ouzel nowhere at all affected by the cold, singing lustily, as I heard it at Dunipace [18. i. 81]. North end of Loch Awe frozen over, and all the rivers, also a large portion of the Pass of Brander, which has not been frozen for a number of years past.

On Loch Tay-side small birds reported to be suffering greatly, many falling dead from their perches in the more exposed places;

and wild fowl on the loch being unusually plentiful, especially goosanders, scaup, golden-eye, tufted ducks, wigeon, and razorbills. Rabbits dead in their holes, and mere bags of bones. Wild duck and herons beginning to suffer much, streams being all frozen up.

This great frost continued with hardly a check till 30th January, except on 22nd and 23rd, when thaw set in, clearing away river ice. A report from Thurso speaks of the tameness of gulls, which alighted on the window-sills of the houses; the birds fed there regularly were starlings, robins, finches, and blackbirds. Within the last few days woodpigeons have come to Mr. Tait's garden inside the town, feeding on greens and turnip-tops. Redwings, thrushes, &c., are said to have perished in great numbers during the frost at and around North Berwick, and woodpigeons are "becoming very tame." Roads there all blocked up level with the hedges.

The birds have suffered terribly during the last few weeks of intense cold. At one farm-house at Cawdor near Forres, after the snow and drift of Wednesday night, a strange sight was witnessed in a cleared space not 10 yards square. There were barn-door fowls, tame and wild pigeons, crows, partridges, blackbirds, water-hens, and smaller birds, picking up such particles of grain as they could get. The greatest harmony seemed to prevail amongst the different species, some of the larger being so reduced and weary that they might have been easily caught. *The Ross-shire Journal* says that the Cromarty Firth abounds in flocks of wild fowl, principally ducks, but also many geese—[*Inverness Courier*, 29. i. 81].

Deer coming down in numbers from the hills, and white hares caught in gardens in Inverness. Immense flocks of larks feeding around Edinburgh. Many people reported frozen to death. Houses buried in snow-drifts in Lewis [18. i. 81]. Water-hens which had died were brought to Mr. Sim, Aberdeen, but he found them usually in good condition. Woodcock, snipe, and partridge seem to have suffered most in Aberdeenshire. A correspondent of the *Northern Chronicle* at Loch Maree [26. i. 81] says:—"Coming along to-day I saw rather an unusual sight—two grouse perched on a birch tree. They seemed quite tame, and remained as we drove past. I saw also at the mouth of Glen Grudie, quite close to the road, a splendid herd of deer, consisting of 50 hinds, with a fine stag at their head. They appeared to have been hand-fed, and were apparently as tame as park deer. The loch, true to its tradition,

has refused to be subjected to the keen frost. The hills are almost black, the wind of Tuesday last having blown the snow away. From Lochmaddy the same paper reports that the storm had been very severe. In a number of places groups of sheep were buried under the snow, and men had to be kept constantly among the stock to prevent loss by smothering. Groups of bernicle geese, woodcock, grouse, and snipe, were seen busily picking up a scanty morsel, only a few yards from the houses, and at the same time a beautiful white swan, and a number of Norwegian* and other wild ducks could be observed feeding quietly in the bay within 60 yards of the houses.

Sheep-stock on the west coast farms between Gairloch and Ardnamurchan have suffered severely. Evergreen leaves shrivelled up in many places, as they were never known to do in former years. When the frost was most severe sea-gulls were missed from a large portion of the coast. Curlews, crows, thrushes, blackbirds, robins, and various other species lived chiefly on the shore, striving to obtain some food in the ebb. The curlews seemed most successful, wading and driving their bills deep into the sand, evidently getting a good supply of worms in the process. A few crows were seen dead, and small birds were so weak that many of them made no effort to escape when approached. The ice on Loch Queich was 27 inches thick.—[*Scotsman*, 27. i. 81.]

Another great snow-storm occurred on February 7th, causing railway blocks, and is recorded as the fiercest storm of the winter. A rapid wind and rain-thaw on the same afternoon cleared off nearly all the snow. Ice on ponds 15 inches thick, and hardly affected by a week's thaw [8. ii. 81]. Bitterly cold N.E. winds, followed with a few fine bright days; thaw in the sun and frost in the shade. Successive falls of snow, and in Stirlingshire ground again white on 27th. Curling on Larbert pond on 3rd March. Fierce gale and snowstorm on 4th March, accounts of which occupy many columns in papers. This continued all night, and next day resulted in the deepest and most general drifts and railway blocks of this memorable winter. Hill-farmers find matters very serious, and all out-door labour at a standstill.

A short interval of fine weather, warm and genial, lasted till March 21st. The Caithness block only cleared on 18th. Heavy

* Wigeon.

fall of snow on 21st in Edinburgh. Strong south-west gale and driving snow again on 24th in Stirlingshire, with gleams of sunshine, but the snow did not lie on lower grounds. Thereafter keen frost every night up to end of month and into April, reaching sometimes 17° of frost, and often 7° to 12° . No growth of vegetation whatever apparent at end of March.

During this terrible winter all birds that could go left West Ross-shire, such as plover, snipe, &c.; and also, which is unusual, all similar birds left Lewis. A swan, wing-tipped by Mr. O. H. M'Kenzie of Inverewe, was sent alive to Zool. Gardens, London. Thrushes did not disappear from Poolewe as in 1878-9. Only one pair remained to breed in 1879, and they have not yet recovered their numbers. No redwings for two or three years have been seen there. This general scarcity is, it is to be feared, the effect of severe winters. It would be interesting to know if they were scarce in Scandinavia at the nesting seasons of 1879 and 1880.

A summary of the foregoing notes shows that gales and winds continued to prevail from N.E. and E. all autumn and winter, and this during the whole migration season. High seas have run upon the east shores in consequence. Data in Migration report show that vast numbers of birds have been carried far over the Atlantic, up to 1200 miles west from Iceland. Rarities have reached this country hailing from east and west, but probably having travelled by the same routes, *via* Siberia and the East, borne forward by the excessive easterly gales. The great and severe frosts and snows, especially in January, 1881, were too late, perhaps, to affect the migration of birds to any appreciable extent, but not too late to do great injury to our native species, or to drive off species which would otherwise have wintered with us. Many birds died, say from 10 to 20 per cent., or more, according to locality. Ducks got thin by 15th January, while pigeons and pheasants were mere bunches of feathers by the end of that month. Thaw for a week hardly affected ice on still ponds, but carried off river-ice.

It is only necessary to add here that after April, 1881, the whole summer remained cold, wet, and stormy, and up to the end of September the same wretched weather continued. A great migration took place as early as 20th September, with strong S.E. winds, for particulars of which see Migration Report for 1881—[now preparing for press—April, 1882].

MAMMALS.

SQUIRREL.—A great mortality amongst squirrels is recorded in the South of Scotland during the severe winter. [Mr. Cully of Coupland *in lit.* to Mr. J. Hardy.] It is still my opinion that a succession of hard winters would materially reduce our squirrel population, if not extinguish it, and I look upon a former continuance of such seasons at the close of the eighteenth century as *one* of the causes of the decrease of the old indigenous stock. [See First Report, *Proceedings*, vol. iv., p. 142, and my essay on the Squirrel in Scotland, in *Proceedings Roy. Phys. Soc. Edin.*]

RABBIT.—By the end of January rabbits suffered terribly in many districts, and the dead were carted away in great numbers from various places. They died in their holes, and so scarce did they become that the last fall of snow in February showed scarcely any tracks in what were well-stocked coverts a month or six weeks before. In Perthshire Mr. Dewar found by 20th January the rabbits “dead in their holes were nothing but skin and bone,” and similar reports from all over North of Scotland. The fine breeding season of 1880, however, not only made up for the deaths of 1879-80, but may also have assisted in counteracting the severity and loss of 1880-81. [See Second Report, *Proceedings*, vol. iv., pt. ii., p. 291.]

RED DEER.—“When the recent storm was at its height, squad after squad of deer came down Glenshiel, passed on to Glenelg, and—it is said—swam across Kyleakin to Skye.” [*Inr. Comr.*, 22. ii. 81.] At Fannich reports are favourable; indeed it is reported that no deaths occurred. On the other hand, several young deer were found dead by the roadside in the adjoining forest. The north and north-east of Ross-shire seem to be the parts of that county where the deer suffered most.

HARE.—While White Hares are reported to have been very destitute and hard pressed in some districts, and to have come down even into the gardens in the town of Inverness, in other parts really much wilder and more exposed they seem to have suffered but little. White Hares were seen at the edge of the loch—a rare sight in this county (Perthshire)—[Mr. Dewar, 20. i. 81].

BIRDS.

BUZZARD.—*Buteo vulgaris*, Leach.—The Buzzard is not yet extinct in the South of Scotland, but care will be necessary to

protect it in the breeding season. Buzzards are seen nearly every season at Edenchip, head of Loch Earn, in Nov. This indicates probably an extension of the line and migration reported from Loch Tay by Mr. Dewar [*v.* 2nd Report]. Whether they be Common or Rough-legged, the probability is that specimens procured in Forfar, seen on Lochs Tay and Loch Earn, reported again from Boquhan in Stirlingshire, and again from Duntreath near Campsie in the same county, are all individuals of the same migratory flight. The frequency of their occurrence along this line during migration, and comparative scarcity on either side of it, indicates, to my mind, a tolerably distinct course taken year after year by these species. The original starting-point probably is Scandinavia or further N.E., and they may or may not be joined by our home-bred specimens, now, alas! getting much scarcer every year.

ROUGH-LEGGED BUZZARD—*Buteo lagopus* (Gm.).—After the high gales on our E. coast in the end of Oct., Rough-legged Buzzards began to appear as usual at various stations. Two were shot in the Stewartry, one at Blackwood, the other at Southinch, between 26th Oct. and 4th Nov.—[R. Service *in lit.*, 4th Nov.]. One—a female—was obtained at Pencaitland, near Edinburgh, on 8th Nov., and a male at Innerleithen on the 15th Nov., whilst another was obtained at Saltoun Hall, Haddington, on 16th Nov. Common Buzzards accompanied them. Mr. George Sim, also, writing on 26th Jan., reports that R. L. Buzzards have put in an appearance, and he had some sent him the previous week.

RED-LEGGED FALCON.—*Falco vespertinus*, Lin.—One shot at Kinghorn in Fife, on 20th Sept., passed into the possession of Mr. R. Small, Edinburgh, and from him to the Industrial Museum there. It proved, on dissection, to be a young male.

HOBBY.—*Falco subbuteo*, Lin.—NOTE to notice of this species in 2nd Report [Vol. iv., p. 304].—On making further inquiries regarding the alleged migration of Hobbies in the Lews, I received the following statement from Mr. R. Notman, gamekeeper at Eishken Lodge:—"The Hobby Hawk comes to the Lews in autumn, and I think leaves in spring again. I do not know of any one who has seen their nest." Later, in a "List of the Birds of the Lews," sent me by Lady Matheson's gamekeeper at Stornoway—an old and experienced Highland keeper, formerly in the Reay country in Sutherland, the Hobby is included alongside the Merlin, and a note added—"Observed first by Mr. Greenwood, lessee of Castle

shootings, in 1879." This identification therefore rests with Mr. Greenwood, who is since deceased.

SHORT-EARED OWL.—*Asio accipitrinus* (Pallas).—Several were sent in for preservation to the Edinburgh bird-stuffers about the 20th Oct., principally from the Lothians, where they are common usually on migration.

LONG-EARED OWL.—*Asio otus* (Lin.).—Commoner than usual this autumn.

WHITE-TAILED EAGLE.—*Haliaëtus albicilla* (Lin.).—An albino shot at Nesting in Shetland in Oct., 1880, as reported to me by Mr. Garrioch, who has temporarily placed it in the Museum at Lerwick. It was exhibited at Roy. Phys. Soc. meeting, Edin., in Nov., 1880.

SWIFT.—*Cypselus apus* (Lin.).—Mr. R. Service saw a departing flock of Swifts on the evening of the 4th Aug., and he did not observe more than a straggler or two after that. The particularly early arrival of Swifts has been noticed also at Brampton, Cumberland, by Mr. G. Parkin, numbers breeding on the roofs of houses there, and in the cliffs of Gillsland. They arrived this year (1881) on the 4th May.

CUCKOO.—*Cuculus canorus*, Lin.—Reported as scarcer than usual in Islay in the summer of 1880.

SWALLOW.—*Hirundo rustica*, Lin.—Of its latest appearance at various localities I have a number of accounts. They stayed very late this year in some places. From the Stewartry they usually depart about the 24th–27th Sept., but Mr. Service saw them (including also Martins, and Sand Martins) numerously on the 30th Sept., again on the 2nd Oct., and one or two on the 5th, and a friend saw several again on the 10th Oct.

Swallows were reported as very scarce this summer—1880—in Islay, which is difficult to account for. I have also reliable record of the occurrence of the Swallow at Alløa as late as 13th Nov. in 1867.

KINGFISHER.—*Alcedo ispida*, Lin.—Kingfishers have appeared again in the Stewartry by the 4th Nov., which is earlier than they usually come, or than they came even in the autumn of 1878—[see 2nd Report]. Sudden severe frost will naturally so affect their food supply as to force them to migrate earlier; and the same may be said of many species, such as the Little Grebe [*q. v.*] King-fishers frequented the Carron up to 1st Jan.,

1881, when I saw one, but after that they were much scarcer or quite absent.

GRASSHOPPER WARBLER.—*Locustella naevia* (Boddaert).—Amongst new localities for this species is near Perth, where Mr. P. D. Maloch found a pair in the summer of 1880. At Grant's House, Berwickshire, where they breed, can hardly be considered as a new locality, as they have long bred in Berwickshire. It is a well-known bird all over the district, as Mr. Hardy informs me, where the conditions suit, but he rather thinks it is becoming scarcer owing to the flat meadows near the railway, which it once frequented, having been thrown into cultivation.

In 1875 my friend, Mr. D. Bruce, jun., discovered the Grasshopper Warbler near Stirling, May 26th. In June of the same year he again met with it, and *shot one specimen*, about a mile from the spot where he first heard it. In a certain copse he has since then "never failed" to find the birds. In 1876, he noted a considerable increase in their numbers, and covering a larger area. I have very full particulars from Mr. Bruce [*in lit.*, 9. iii. 81].

ROBIN.—*Erithacus rubecula* (Lin.).—Mr. Henderson has never seen a Robin in South Uist, I have however observed them in North Uist, and more commonly in Harris. It appears that the Stonechat is often taken for the Robin by the inhabitants in South Uist.

Robins suffered greatly at Ballachulish, Argyllshire, and many other localities.

COMMON WHITETHROAT.—*Sylvia rufo* (Boddaert).—Mr. R. Warren sends me the following note on the Spring Migration of this species at Ballina, Ireland:—"I was watching most anxiously for the Whitethroats. Not a bird appeared in their usual hedge-rows or was heard until 19th May. The following day I heard them singing in all their usual haunts, as if they had all come together, and had at once spread over the district."

A late Whitethroat was noted by Mr Hardy at Old Cambus, on the 7th September, and again on the 19th.

THE LESSER WHITETHROAT.—*Sylvia curruca* (Lin.).—A specimen of this species was killed at Gourdas, Aberdeenshire, on the 4th Nov., 1880, and another seen at Mill of Tifty, as recorded by Mr. G. Sim, Gourdas, Fyvie, in the *Scottish Naturalist*, Jan., 1881, p. 13. It is perhaps needless to point out at this time, that this is almost undoubtedly a migrant from the E., and not a bird bred, or breeding, in Aberdeenshire.

WHEATEAR.—*Saxicola oenanthe* (Lin.).—An unusually late stay of this species is noticed by me at considerable length in the *Zoologist* for Feb., 1881, p. 54-55, where it is also commented upon by the editor and Mr. J. Cordeaux, and I have added some additional remarks on the species, in my Migration Report for 1880. Some interest appears to me to attach to the subject of this late occurrence on Dec. 9th, 1880.

Saxicola deserti, Rüppell.—This rare bird was obtained on the moor at the edge of Gartmorn Dam, Alloa, Clackmannanshire, by the gamekeeper to Lord Balfour of Burleigh, on 26th Nov., 1880. The birdstuffer at Alloa dissected the specimen and reported it to be a female, but on examination by Mr. J. J. Dalgleish and myself we came to the conclusion that it more nearly agreed with the description of a young male or of a male in winter. But it has often been remarked that the males of this as well as of other species of Wheatear are in a preponderance of eight to each female, whilst other naturalists aver that there is no difference in the plumage of the sexes; and again the dissector may be correct enough if, as is probable, the females assume the dress of the young males in winter. It is further reported that this specimen had been feeding upon minute midge flies. The weather at the time of its capture was extremely mild and warm.

This species has been recorded in Heligoland [Seebohm, *Ibis*, 1877, p. 162] in two instances. Its distribution appears to be Northern Africa (specimens from Algeria being, however, according to Mr. J. H. Gurney, jun., in "Rambles of a Naturalist," more russet-coloured than those from Egypt), Arabia, N. Persia, and into India.

It is interesting to note in this connection the lines of migration as shown by returns from the Light-ship Stations in the English Channel, during the whole autumn migratory season of 1880. All returns show a passage of birds from the French to the English coast, between Aug. 16th and Dec. 8th—being the reverse of what would be expected, and the reverse of what the returns from the Galloper Bank showed in 1879.

This last year we had great and long-continued easterly gales over the Atlantic and N. Europe, more especially during Oct. and Nov., during which time hundreds of thousands of small birds of European origin were seen 450, 500, 900, to 1200 miles W. of the Irish Coast, and Rook, Jackdaw, Robin, Wagtail, and other familiar European species were recognized or captured. The dates of these gales and

records at sea are lumped together principally towards the end of Oct., but one is given on Nov. 17th.

About the end of Nov., Great Gray Shrikes were unusually abundant in Britain, and an unusually large migration of these birds was reported from Heligoland.

About the same time Great Snipe were not uncommon in Britain.

Earlier in Sept. [21. viii. 80], an Esquimaux Curlew* was shot in Kincardineshire, the N. American origin of which seems undeniable, and a few days later [4. viii. 80], a Glossy Ibis was killed at the mouth of the River Ythan, in Aberdeenshire. Both these birds were exhibited to the Glasgow Nat. Hist. Soc. by the kindness of Mr. Geo. Sim.

BOHEMIAN WAXWING.—*Ampelis garrulus*, Lin.—A fine specimen of the Bohemian Waxwing was shot at Howtown, near Alloa, on Thursday, 9th Dec., 1880. It was a male and had been flying about for some days previously. Its stomach was full of "thrips" of the Rose.

GREAT GRAY SHRIKE.—*Lanius excubitor*, Lin.—We have been informed that a number of Butcher Birds or Great Gray Shrikes were seen the other day on the lands of Shirva, near Kilsyth—[*Falkirk Herald*, 13. xi. 80].

A Great Gray Shrike frequented the Avenue and "Crow Hill" at Dunipace, during the 18th, 19th, and 20th Nov., and was very shy and wary. I first saw it late on the 18th, on the avenue, and it was afterwards seen twice on the "Crow Hill" by the keeper. Former occurrences of the Great Gray Shrike here have been recorded by me, but it is noticeable that two which I saw were not very far off from the haunt of the present specimen. The line of three occurrences lies exactly in a direction between E.S.E. and W.N.W.—*the general line of migrations* striking our E. Coast.

Another of this species was killed on Remony, Loch Tay side, by Mr. D. Dewar. It was—as usually found to be the case with the species—frequenting a hedge. Its stomach contained a hedge sparrow, the legs and claws intact. It is a fine adult bird in splendid plumage.

A return migration is indicated by the capture of one at Bath hill wood, West Grange, Perthshire, not far from Alloa, by J. Livingstone, gamekeeper, on 19th March, 1881.

* *i. e.* not *Numenius minor*, Pall., of N. Siberia.

RAVEN.—*Corvus corax*, Lin.—The Raven has not entirely disappeared—or has it reappeared?—in the Stewartry, as I have evidence of its occurrence in 1880. Numbers were to be seen this winter feeding on carcasses of braxy sheep which had floated down the Dee in the Stewartry.

ROOK.—*Corvus frugilegus*, Lin.—Mr. Henderson writes me that two years ago a good many Rooks came over to the Outer Hebrides, especially to S. Uist—driven over no doubt by the severe weather of 1878-79. Last year, 1879-80, he only saw one, but this winter they are more numerous than they were two years ago, and this year they put in an appearance very much earlier, a few arriving in the end of Oct., and these again were strongly reinforced about the end of Nov. [Compare here the returns of the Lighthouses—Monach Lt. House, &c., and also the occurrences of Rooks in Mid-Atlantic, cited in Migration Report for 1880.] Mr. Henderson bears witness to the carnivorous propensities of Rooks at all times, though not to the same extent as when other food is not procurable. He has known them to take young birds from a nest and devour them. He has shot them in the act, and taken them in traps set for vermin, and baited with a piece of rabbit's or other flesh.

It is said that Rooks were introduced into Islay by the late Mr. Walter F. Campbell; now they are numerous all over the district.

At the first indication of a thaw—slight as it was—on the 22nd Jan. 1881, the Rooks made great demonstrations, and kept at home all forenoon and both that day and the next, Sunday 23rd; but on the 24th, when all signs of thaw had disappeared, they went off as usual.

I am obliged to Mr. R. Tait, of Thurso, for the following interesting notes on the newly established Rookery there. In a few trees in his garden, some years ago, Rooks began to build. During the last two years the Rookery became too large, and the birds too predatory, so in 1880 he was obliged to pull down the nests. The birds finally, with the exception of one or two pairs, were driven off, after a persevering struggle on both sides; but then the unused chimneys in the town were taken possession of, and in spite of persecution a good many reared broods in the chimneys. Mr. Tait adds, "There are decent worthies in Thurso who said that I had made a Rookery for my own pleasure, and had dispersed it for their annoyance."

The Rev. A. Stewart puts the deaths amongst Rooks and Black-

birds—the two species which he considers to have suffered most in his district—Ballachulish, Argyllshire,—at about 20 per cent.

The following incident is related to me by Mr. Maclellan of Fannich, on the authority of an acquaintance :—“ One morning in Jan. he saw a Rook go into his hen-house along with the hens, and later on in the day the same bird began to peep in at the dwelling house, and at last got the length of the fireside, which he seemed for some time to enjoy, and, having put his bill under his wing, looked as if he were going to sleep ; but soon he began to stagger as if drunk, and ultimately fell over quite dead.” The poor bird found the reaction too great, as with the Water-hens mentioned in First Report.

STARLING.—*Sturnus vulgaris*, Lin.—Starlings, though very plentiful in autumn, and large flocks roosting on reeds at Lake of Menteith, all went away, and not one was to be seen in that district. In the E. of Stirlingshire they did not leave, but fed all through the storm around Dunipace House, coming freely to crumbs, &c., with other species.

BRAMBLING.—*Fringilla montifringilla*, Lin.—Bramble Finches are reported as abundant in the S. W. of Scotland during several weeks in Jan. and Feb., 1881. Mr. Service adds,—“ Usually they are very scarce.” I can remember what multitudes frequented all the district around Edinburgh during the severe winter of 1860–61—a winter equally famous for the hosts of “ Norwegian Pigeons ” which came over.

I cannot help thinking that the importance of daily Ornithological Journals is much under-estimated by local naturalists. I believe that were these Journals all brought together and compared annually, and the distribution of our autumn and winter migrants every year carefully mapped out, showing the areas of greatest abundance in each year by darker colours, and the areas of scarcity by lighter colours, even if confined to a study of half-a-dozen species, that a great aid would be given thereby to students who are working out the problems of migration, especially if dates and duration of residence were indicated, and character of weather given on the map. But such a map, to be really useful, would require the united efforts of local naturalists throughout the country. A large committee might therefore be formed, and a sub-committee appointed, and paid, possibly, for working out the results.

GOLDFINCH.—*Carduelis elegans*, Stephens.—This bird appeared

unusually plentifully and early in S. W. of Scotland, as I am informed by Mr. R. Service—a flock of forty having been seen at Slogarie a few days prior to the 22nd Oct. Years ago Goldfinches bred regularly upon the high plane trees (sycamores) on our wester avenue here. This winter, in the same spot where I have before known the nest to be, I saw a nest again, after all the leaves had fallen, built in between the highest sprays of one of the trees. It is curious sometimes to observe how these favourite sites are thus reoccupied after many years' absence. I begin to think distribution during the breeding season greatly depends, with many species, upon the directions of the lines of migration, and if birds passing over find an old site unoccupied, they take possession.

SISKIN.—*Carduelis spinus* (Lin.).—This species, not usually common with us, this year appeared. On 27th Sept. I saw a little flock of six or seven frequenting some waste ground along the river-bank, where thistles have lately grown up. Some of these remained about the same place for several weeks. It is remarked that an early migration of Siskins and Redpoles has been caused by early falls of snow in N. of Scotland—[*Field*, 16. x. 80, also *vide* J. Cordeaux *in lit.*]. In Nov. Siskins continued to frequent our alders and marshes, and bird-catchers were busy.

SNOW BUNTING.—*Plectrophanes nivalis* (Lin.).—The Snow Bunting is not a common migrant at Larbert or the neighbourhood, but this winter they appeared along the river Carron above Larbert, and at Dumipace, with the commencement of the frost, in small numbers. They are common winter visitants, however, in other parts, both inland—as on the higher Campsie and Darritch Hills—and on the coast. This season they are unusually abundant in Central Scotland, large flocks being not uncommon. They have been observed also in S.W. Perthshire in flocks in the lower ground, where they have hitherto been not very commonly observed. Generally they appear to be most unusually abundant this winter, and since the end or middle of Nov. especially, warning us of the great severity of winter which dates from the New Year onwards. An unusually early appearance is also noted by Mr. W. Lawrence, in the Fair Isle, as well as unusually large numbers.

From the Aberfoyle district of Perthshire they are reported as common up to 23rd Jan. Mr. C. C. Tunnard saw them on the 20th, but on the 23rd only one, the rest having shifted their ground. Mr. Hardy notes the first appearance in E. Lothian on 18th Oct.

It was during a heavy blast of rain and wind ; only a field's-breadth from the sea-side ; wind N. and tempestuous.

WOODPIGEON.—*Columba palumbus*, Lin.—Pigeons remained very plentifully about Aberfoyle until Christmas, when they all disappeared.

GROUSE.—*Lagopus scoticus* (Lath.). PTARMIGAN.—*L. mutus*, Leach.—Whilst all the district round about “Bonnie Aberfoyle” is covered with snow, we, who live in the lower part of the glen, have been enjoying much milder weather, and the scenery is only varied by a few small patches of snow. In consequence of this, hundreds of Grouse are frequenting the southern slopes of Craigmore and the adjacent hills in packs of from two to three hundred, almost darkening the air as they fly over one's head, and making a rushing noise like what one would expect from the “Flying Scotsman”—[*Stirling Journal*, 25. ii. 81].

From Fannich Forest, Ross-shire, I have the report that Grouse look remarkably well and healthy—[*J. Maclellan in lit.*, 28. ii. 1881].

About Ptarmigan my accounts are all negative up to March, owing to the absolute inaccessibility of their haunts. When spring comes we may hear more.

LAPWING.—*Vanellus cristatus*, Meyer.—In the Stewartry they are in immense flocks, and have been more than usually abundant and early this autumn—1880. In E. Lothian they are reported as unusually scarce. In Ireland they began to assemble on the shores of Co. Wicklow by the 22nd July.

GOLDEN PLOVER.—*Charadrius pluvialis*, Lin.—Considerable numbers have frequented the Solway mud-flats since early in Oct. On the mud-flats of Stirlingshire they usually arrive as early as the end or even the middle of Aug. This year they appeared about the usual time, or rather earlier. Unusual numbers frequented the Outer Hebrides, and Mr. Henderson writes me they were more numerous than in any year since he went there.

DOTTEREL.—*Eudromias morinellus* (Lin.).—Mr. D. Dewar shot a pair, male and female, on the hill of Stron Chorm, above Remony, on 1st Oct. The weather had been a little stormy, and the wind was from N.E. There were three in company at the time. This hardly indicates their line of migration from their Scottish breeding haunts, being a comparatively new locality for their appearing.

GLOSSY IBIS.—*Falcinellus igneus* (Gm.).—Mr. G. Sim reports

the occurrence of a fine male specimen of the Glossy Ibis shot on the mud-flats opposite Newburgh, at the mouth of the Ythan, in Aberdeenshire, on the 4th Oct., 1880, and which was afterwards exhibited to this Society, in Dec., 1880. [See also Sim in "*Scot. Nat.*," Jan. 1881, p. 13.]

ESQUIMAUX CURLEW.—*Numenius borealis* (Först.).—One shot in Forest of Birse, Kincardineshire, on 21. x. 80, and forwarded by Mr. G. Sim for exhibition, was spoken of fully at this society's meeting in Nov. 1880, and exhibited on 29th Dec., 1880. [V. also "*Scot. Nat.*," Jan., 1881, p. 13, where Mr. Sim gives additional particulars.]

GREENSHANK.—*Totanus glottis* (Pall.).—A very considerable extension southwards of the breeding range of this species has been brought to my notice, but I do not feel at liberty to state the district at present. I regret to say that one was shot in June, in this far southern district, in distinct contravention of the Act, and I regret also that an example has not been made of the offender, whoever he may be. In many localities the Act is still a dead letter so far as prosecutions go, although there is no doubt that the general good done is considerable.

Mr. R. Warren reports an autumn migration of Redshanks and Greenshanks as appearing on the shores at Ballina, on the 10th July.

CURLEW.—*Numenius arquata* (Lin.). WHIMBREL.—*N. phaeopus* (Lin.).—Mr. R. Warren heard a Whimbrel on the 22nd July, at Ballina, but whether it had come from the breeding haunts, or had remained about the shores with the Curlews since the spring, he cannot say. Numbers of Curlew remain along shore all summer, never going at all up to the mountain breeding haunts.

GREAT SNIPE.—*Gallinago major* (Gm.).—[V. *Zool.* Nov. 1880.] Mr. Bruce of Slogarie shot a "Double Snipe," about the 8th Oct., as he informed Mr. R. Service on 22nd Oct. I distinctly identified two of the Solitary Snipe on our own ground here, on 7th Oct., but though next day I searched the whole marsh, no signs of them were to be found.

JACK SNIPE.—*Limnocryptes gallinula* (Lin.).—This bird was also scarce this autumn, at least in certain old haunts. Late in Dec. I saw one bird, but did not shoot any this season up to 15. i. 81, after which date, however, I got a few in the ditches.

COMMON SNIPE.—*Gallinago gallinaria* (O. F. Müll.).—Our marsh has failed utterly in Snipe this year, principally owing to the very

dry season, but partly to the deepening of a main drain ; and where, in many seasons Snipe were abundant, this season I think a dozen are all that have been seen. Similar reports of their scarcity reached me from Dumbartonshire, and the cause appeared to be the dryness of the season. In Tiree Snipe were plentiful.

WOODCOCK.—*Scolopax rusticola*, Lin.—Woodcock were well in by the end of Oct. this autumn, considerably earlier than usual, and are stated to be very plentiful in many localities. In the Stewartry Mr. Service considers that more bred than in previous years. There cannot be any doubt about the increase in numbers of breeding birds in Scotland and England during the past twenty years or so. After the thaw in November, Woodcock were very scarce everywhere. Only one was shot in Torwood covers on the 25th Nov., where, last year, 18 were killed in one day. The most I saw shot in one day was four (and about 12 seen) at West Grange.

From Ardnamurchan sad accounts were received of the deaths amongst Woodcock and Blackbirds which succumbed during the last week of the great frost in Jan. The headkeeper found more than 20 dead along the sea-shore and on the road-side. He sent none away after the 20th Jan. as they had become so reduced in condition, but Grouse and Partridges were reported as having stood the storm well.

TURNSTONE.—*Streptilas interpres*, Lin.—Mr. M. Vaughan reports Turnstones unusually abundant in Orkney, and retaining their summer plumage until the end of the third week in Aug.

WILD GOOSE.—*Anser* (sp.?).—Wild Geese arrived at the Solway Firth in the closing days of Sept., and, as Mr. Service informs me, have since increased to extraordinary numbers. Various observers, reporting to Mr. Service, state that never have they been known to arrive so early there before, the beginning of Nov. being the time of their usual first arrival. Nor have they been known before in such large numbers. Mr. Service believes they are Greylag Geese from descriptions, as the Bean Goose is seldom got there. This migration is almost without doubt due to the sudden and intense spasm of cold weather earlier than usual in the season. They are reported as unusually abundant in E. Lothian.

WILD SWAN.—*Cygnus* (sp.?).—Accounts reached me of the appearance of Wild Swans at several localities. On 13th Oct. two were shot on a pond near Dundee. They were seen that morning

passing slowly along to the westward, as far as Broughty Ferry, and were shot by another party a few hours later in the day. One has been placed in the Museum; the Naturalists' Society, Dundee, has the other. I am obliged to Mr. P. Henderson, Naturalist, Dundee, for notice of these Swans.

Mr. Garrioch, Prospect House, Lerwick, sends me notice of five Hoopoes seen passing over Gulbernich, near Lerwick, flying S., low and apparently tired and flagging, on 12th Jan., 1881, a late migration. Wild Swans reported "in flocks" from Lochs Leven, Shiel, Sunart, &c., by Rev. Alex. Stewart. One flock of from 50 to 60 seen on 22nd Jan., 81.

WILD DUCK.—*Anas boschas*, Lin.—Up to Sept. 1st, Wild Duck, which were mostly bred in our marsh, were unusually abundant. I counted between 35 and 40 Mallard, and four or five Teal. After this the great bulk of the birds disappeared, and only a few remained. With the first keen frost no great accessions to their numbers took place, though the increase in Teal was at once remarkable. Between 14th and 24th Nov. only from 2 to 4 Duck appeared to be haunting the 2-mile stretch of river at Dunipace.

Wild-fowl in the Outer Hebrides have been in about the usual numbers during this winter. They are reported scarcer than usual on the Berwickshire coast, along with Curlews, up to 25. xii. 80.

During the second frost and storm, which began about the 20th Dec. and continued till the New Year, large numbers of Duck came in to the river Carron. On the 1st Jan., 1881, I counted close upon 30 along our stretch of river. Amongst these were 2 Golden-eyes, and our keeper reported seeing one "pure white Duck with a dark neck," which same bird he had seen about a mile further north in Aug. From this time onwards between 20 and 30 Duck frequented our stretch of river, haunting the streams after the still reaches were hard frozen.

The keen frost of Jan., 1881, freezing up even our running streams, did not, however, banish them altogether. A few open holes remained, and I got a few each day I went after them until the more determined thaw of the week, commencing with the month of Feb., flooded the river and carried away the ice. They then disappeared for a time.

About the middle of Jan. some Duck began to lose condition, and were quite poor and thin by end of the month at Lake of Menteith, but in better condition here.

Wild-fowl in Islay are reported as unusually scarce. Scarcely a tithe of the Wild Geese have put in an appearance.

TEAL.—*Nettion crecca* (Lin.).—Hitherto scarce in Stirlingshire, this year Teal arrived on the Carron in considerable numbers—one large bunch of 17 being conspicuous—on the advent of the first hard frost, on or about the 4th Nov. Before this only 4 or 5 had been seen, though Mallard were unusually abundant. Most of the Wild Ducks were known to be birds bred in the district. Teal remained scarce all Dec., and we had no accessions during the second storm, as we had of Wild Duck. Soon they disappeared, and not a single Teal was to be seen along the whole stretch of river during the whole time the storm lasted, up to end of Jan. 1881.

WIDGEON.—*Mareca penelope* (Lin.).—On 21st Oct., 1880, I shot a young male Widgeon, on the Carron, and another was along with it. Widgeon do not appear here every season, and can only be considered as occasional visitants in this locality.

GOLDEN-EYE.—*Clangula glaucion* (Lin.). TUFTED DUCK.—*Fuligula cristata* (Leach).—It is always in very hard weather that we are visited by these species along the Carron. Thus in January, 1881, a few were usually about where they could find open water.

PINTAIL.—*Dafila acuta* (Lin.).—Two Pintail Ducks were shot near Loch Boisdale “last week”—[J. Henderson *in lit.*, 16. xii. 80].

GREAT NORTHERN DIVER.—*Colymbus glacialis*, Lin.—A Great Northern Diver was captured [7. xi. 80.], off Buccleuch Square, Newcastleton, by Michael Dagg, carter. The bird was apparently exhausted from want of food. It measured across the wings from tip to tip, 6 ft. 1 in.—[*Kelso Chronicle*.] This bird came into the possession of Mr. J. Edgar, Grocer, Newcastleton, and is being stuffed by the Duke of Northumberland’s gamekeeper. It bit the man savagely who first caught it. It was offered to him by the second party, but was declined with thanks—[Rev. T. Gordon *in lit.* to Mr. Bruce].

LITTLE GREBE.—*Podiceps minor* (Gm.).—This bird arrived earlier than usual, and earlier even than in autumn of 1878, in the districts around Dumfries, viz.:—before the 4th Nov., 1880; but though I walked pretty regularly along the Carron in Stirlingshire, I did not observe any until the 22nd Nov., 1880, when I saw one. Thereafter they were scarcely ever observed, and I cannot account for the

scarcity, as the conditions have been on the whole similar to those of last season.

GLAUCOUS GULL.—*Larus glaucus*, O. F. Müll.—These birds visit our coasts regularly, or nearly so, every winter—more especially our eastern seaboard. I have seen a migratory flight arrive upon the coast at St. Andrews, and follow down the coast line, flying in and out amongst the sand-hills. On the W. coast they are not so abundant. A fine Glaucous Gull, apparently in the plumage of the second year, was shot at Shieldhill, in Dumfriesshire, the last week in Dec. 1880, and was sent to Mr. Hastings for preservation—[R. Service *in lit.*].

GULL.—*Larus* (sp.?).—A correspondent remarked that in previous winters, when the snow was deep and the frost severe, his house was wont to be visited by Sea-gulls in large numbers looking for food, while during all the present winter not a single Sea-gull has been seen. Have they found abundance of food at the sea-shore, or have they migrated to a warmer climate?—[*Inv. Courier*, 15. i. 81].

To this I replied that possibly the long continuing or oft-recurring N.E. and E. gales “washing up” constantly upon our E. coast, may possibly have thrown a larger supply of food upon the beach. Such high gales not being usually the constant attendants upon such severe frost as we have been experiencing, local migration of the gull-population would not be so pronounced in other seasons, and so be less noticed, if, indeed, this be the cause. But before one could state any reason for the phenomenon, he would require to be well acquainted with the situation, &c., of the precise locality. I learned afterwards that my supposition was probably correct, as numbers of frozen Garvies were found on the shore on which large numbers of Gulls were feeding.

In Thurso, Gulls exhibited great fearlessness during the hard weather, swooping down and alighting on the window sills, and gobbling up everything in a few minutes, as I am informed by Mr. R. Tait.

Amongst web-footed birds, the lesser Gulls are reported by Rev. A. Stewart to have “died in scores” at Ballachulish.

Mr. Warren notes the arrival of Sandwich Terns at Ballina as early as the 24th March, 1880.

THE SOCIETY'S ROOMS, 207 BATH STREET,

FEBRUARY 22nd, 1881.

Mr. John Kirsop, V.P., in the Chair.

Mr. Thomas Southwell, F.Z.S., Norwich, was elected a Corresponding Member.

A donation to the society's library was announced of a copy of the "Cobham Journals," containing the meteorological and other observations of Miss Caroline Molesworth, of Cobham, in Surrey, from 1825 to 1850. The volume was presented by Miss Eleanor Ormerod, F.M.S., Dunster Lodge, Isleworth, who has edited the work.

SPECIMENS EXHIBITED.

Mr. James Eggleton exhibited (1) a specimen of the Cape Hyrax, *Hyrax capensis*, Schreb.

Mr. John M. Campbell said that the Hyrax, being so rabbit-like in its appearance, is readily mistaken for a rodent, and in fact was regarded as such until Cuvier pointed out the characters which distinguish it from members of that order. Its osteological structure clearly proves it to belong to the pachydermata, and although comparatively a small animal, it is intermediate between the rhinoceros and tapir. The skull exhibits some peculiarities, the lower jaw being very deep and resembling that of the tapir in its structure; otherwise it approaches nearer to the rhinoceros, the molar teeth being, in fact, those of the rhinoceros in miniature. The fore and hind feet are divided into four and three toes respectively, protected by hoof-like nails, and, like the rhinoceros, are united by the skin to the nails. In the number of its ribs (21 on each side) the hyrax surpasses most quadrupeds, excepting some of the sloths. They are shy and timid creatures, and live in little families, posting a sentinel when they feed, whom the slightest movement causes to signal to its companions, when they at once disappear in their burrows. About 10 species are known to naturalists, the present one being found in South Africa. The species known as the Syrian Hyrax is probably the "Coney" of the Scriptures.

(2) The Secretary Vulture, *Serpentarius secretarius*, Scop., from South Africa, which received its name from the feathers at the back of its head, reminding the Dutch settlers of a pen stuck behind the

ear. No bird has so often been changed in its zoological position, having been placed among the gallinaceous, and also among the wading birds, and although bearing the name of vulture, it is more allied to the true falcons. Sharpe, in his Catalogue of the British Museum birds, places it in that aberrant group of falcons which approach the Turkey buzzards in their habits. It is a useful and valued bird for the services it renders in destroying snakes and other noxious reptiles, and attempts have been made to introduce it into other parts of the globe for this purpose. It is easily tamed, and almost any kind of food seems to agree with it, but its introduction to the poultry yard where young chickens are kept, is not desirable. Its gait is a smart run; on seeing a snake on the ground, it runs up to it with outstretched wings, and quickly stuns it with a blow from its pinions. It has also been seen to bear them to a height, and letting them fall, kill them outright.

(3) An egg of the Box Tortoise, *Testudo carolina*, Lin., obtained from the ovary of a dead specimen.

Mr. Peter Cameron exhibited two cases of British and Foreign Hymenoptera, and of preparations for the microscope, mounted in the manner he had described at a former meeting.

Mr. John Young, F.G.S., exhibited and described some specimens of rocks and minerals from Aberdeenshire, forwarded by Mr. John A. Harvie-Brown, F.R.S.E., V.P., including Asbestos, a variety of Asbestos known as Mountain Leather, Graphite and Serpentine.

The Chairman exhibited a thin section of Flexible Sandstone from India, which vibrated when held in the hand and slightly shaken. Mr. Young explained that this elasticity was due to the presence of Tale, mixed with the coarse grains of which the stone is composed, and which allowed it to vibrate to a certain extent without fracture. The Chairman also showed a flint nodule from Aberdeenshire which bore the impression of a species of *Inoceramus*, a typical genus of chalk fossils. These nodules are found in great abundance at Buchan Ness, and are thought to have been derived from a cretaceous deposit which at one time existed in the district, but which has been entirely removed by denudation.

PAPER READ.

On the Occurrence of the Atlantic Right Whale, Balaena biscayensis (Eschricht), on the East Coast of Scotland. By Mr. Thomas Southwell, F.Z.S., corresponding member.

In collecting material for a book on the Seals and Whales of the British Seas which I have now in the press, a circumstance has come to my knowledge which cannot fail to be of special interest to Scottish naturalists, and which, in recognition of the service the Glasgow Natural History Society is rendering to British naturalists in publishing lists of the Fauna of the northern division of the kingdom, I have much pleasure in communicating to its members.

Until Professors Eschricht and Renihardt of Copenhagen published in 1861 their elaborate researches on the subject* and clearly established the existence of two distinct northern species of *Balaena*, the absence of Right Whales from the temperate waters of the Atlantic, where in former times they had abounded, was attributed to the relentless manner in which they had been pursued by the Basque whale-fishers, together with the disturbed state of our seas arising from increased traffic, more particularly of steam vessels. These causes, it was believed, had either exterminated the Whales in the temperate regions of the North Atlantic, or driven them farther and farther towards the North till they had finally taken up their quarters in the icy seas of the Polar regions. When therefore a Right Whale appeared, or was supposed to have appeared, on our shores, it was always recorded as a straggler from the North; but since Eschricht has shown that a Right Whale exists which is as strictly confined to the waters of the temperate North Atlantic as the Greenland Right Whale is to the polar seas, it has been generally believed that any *Balaena* visiting our shores will be found to belong to the former species which Eschricht has named *Balaena biscayensis*.

I will not trouble you with any description of this species, nor will I attempt to define its range, nor to establish its identity with the Black Whale (*B. cisarctica*, Cope) of the American coast, as these subjects have already been fully discussed by Eschricht and others, but will at once proceed to the object of my communication,—the occurrence of the Atlantic Right Whale on the Scottish coast.

* "Om Nordhvalen," which appeared in the Transactions of the Royal Danish Society of Sciences, a translation of which, edited by Professor Flower, was published by the Ray Society in 1866.

The only previous records bearing upon the subject with which I am acquainted, so far as Scotland is concerned, are not very satisfactory or precise, and although doubtless they may refer to true *Balaena* it is quite as possible that some other whalebone Whale may have given rise to the reports. Sibbald records the occurrence of what he considers was probably a Right Whale at Peterhead, in 1682, and Low in the "Fauna Orcadensis" states that "there have been several instances of late years [he died in 1795] of their driving ashore on our coast;" but in neither instance does the author speak from personal observation, and the records are so vague and unsupported, that although of course they may have been examples of *B. biscayensis*, I still think Mr. Alston was justified in his remark, [*Fauna of Scot.*, Mammals, p. 17] that there was at the time he wrote "no authentic evidence of the occurrence of any Right Whale on our coasts in modern times," although such an occurrence from what has since transpired would seem to be less improbable than was supposed.

Such, therefore, being the state of our knowledge with regard to this species in Scottish waters (and in other parts of the kingdom it was not more satisfactory) it was with no little pleasure I received a letter dated 25th Nov., 1880, from Capt. David Gray of Peterhead, in which he says, "There is not the shadow of a doubt that about the year named in your article [referring to an article on the Greenland Whale which he had been good enough to read for me] two Greenland Whales, an old cow and calf, appeared in the South bay of Peterhead; several boats were sent in chase; they could not, however, get a chance to strike the old whale, but they harpooned the calf." I lost no time in begging Capt. Gray to obtain for me every particular in his power as to the interesting occurrence, and he very kindly took great pains to establish the fact beyond doubt, and I think with perfect success.

Capt. Gray was good enough to obtain for me the independent testimony of two old men, James Webster and John Allan, both of whom are still living at Peterhead, and were witnesses of the events which they relate. The two statements coincide so remarkably, making allowance for the lapse of years, that it is only necessary to give one. "James Webster, 85 years of age, remembers Greenland Whales coming into South Bay of Peterhead; at that time he would have been about 10 years of age [Jno. Allan says "it was in 1806 or 1807, same year as the new parish church

was opened;" this was in 1806, and agrees with Webster's statement that he was 10 years old at the time]. Remembers them being an old Whale and a Sucker. Saw five boats go out after them; as far as he recollects, thinks it was the month of October ["in the summer-time," Allan]. They struck the old Whale, and put three harpoons into her, then they struck the Sucker and killed it; brought the Sucker ashore and flenched it at the South Quay. [Allan says "they killed the young Whale, and flenched her at the South Quay: she, having sunk, it was two or three days after, before they got her in."] After they had three harpoons in the old Whale, she went twice up into the head of the Bay, going so far that she turned the sand up, and then she stove two of the boats, and broke Mackie's, one of the harpooners, legs. [Allan does not remember the name of the injured man, and thinks only one boat was stove.] After this, the Whale took a run, and went out of the Bay, blowing blood. They followed her as fast as they could, they cut two of the boats from her, and left her towing one boat with their Jack blowing, after taking the crew out of her, and in this condition the Whale went out of sight, and they never saw or heard of her again." Allan says that when she went round the South Head, a heavy sea being on at the time, and darkness coming on, the boats cut and let her go, leaving the boat, which was stove, fast to the Whale, the flag still blowing, and that she went out to sea and was never seen again. Capt. Gray adds that "Capt. Wm. Volum, of the 'Enterprise,' and Capt. Alex. Geary, of the 'Hope,' both took part in the chase, and in that year the 'Hope' returned from Greenland on 30th June, and the 'Enterprise' on 30th July; consequently, it must have been some time after the latter date that the Whales came into the Bay; probably Webster is right when he names October.

Shortly afterwards, Capt. Gray informed me of a second instance of the appearance of a Right Whale off Peterhead, and this time he was himself the witness. Whilst taking a walk round the "Heads" one Sunday morning before Church, to the best of his recollection early in October, 1872, he saw what he called a Greenland Whale within half a mile of the rocks off the South Head, its appearance and movements being exactly the same as those with which he is so familiar in the Spitzbergen waters. This instance is of course not so conclusive as the previous one, but it seems impossible for a man of Capt. Gray's great experience to have been mistaken.

I think the appearance on the Scotch coast of a species of Right

Whale in two instances in the present century is beyond doubt, but it may be said that in neither case were they proved to be *B. biscayensis*. I cannot here enter into my reasons for assuming that the Peterhead Whales were of this species but I have elsewhere* gone fully into the subject, and I may add that Capt. Gray, although very sceptical at first, seems fast arriving at the great improbability of the Whales which he goes so far North every season in search of,—and which even there leave him to proceed to still higher latitudes where he is unable to follow them—coming at the very season when they ought to be lost in the polar solitudes, to bathe in the summer-heated waters which surround our Island, and which would be so repugnant to the ice-loving Greenland Whale.

THE SOCIETY'S ROOMS, 207 BATH STREET,

MARCH 29th, 1881.

Mr. John A. Harvie-Brown, F.R.S.E., Vice-President, in the Chair.
Messrs. John Baird, John Hunt, William Gemmell, and John H. Fullarton, B.Sc., were elected ordinary members.

Before proceeding with the ordinary business of the meeting the Chairman adverted to the death of Mr. E. R. Alston, F.L.S., F.Z.S., who, long a member of the Society, had always taken a deep interest in its welfare and progress and had done much to promote its interests. He was sure he had the sympathy of the members in expressing deep regret at the loss the Society and science had sustained by his removal, and he proposed that a notice of their deceased friend should appear in the *Proceedings*. The Meeting cordially sympathised with the remarks of the Chairman, and the Secretary was instructed to insert a notice in the Minutes and to forward an extract from it to Mr. Alston's nearest relatives.

IN MEMORIAM.—E. R. A.—*obit* March 7, 1881.

Edward Richard Alston, the subject of this notice, was born on the 1st day of Dec., 1845, at Stockbriggs, Lesmahagow, Lanarkshire,

* 'Seals and Whales of the British Seas,' pp. 65-67.

being the fifth son of Mr. J. W. Alston of Stockbriggs.* He was never robust, even as a child, and for many years continued in very delicate health, so that he was never sent to a public school, but was entirely educated at home. How well he made use of his early opportunities is abundantly shewn by his subsequent literary and scientific work, although it entirely depended on his own self-teaching and self-study.

In the summer of 1862 he went to Germany with the intention of learning the language under the roof of the Rev. Herr Dubbers, Parish Clergyman of Daudenzell. Soon after his arrival he was taken seriously ill with asthma, a complaint which had troubled him very greatly up to this period of his life, but by the careful and assiduous attention of an old friend he recovered sufficiently in a few weeks to allow of his return home. After this attack he rapidly gained strength and seemed to throw off much of the delicacy of his boyhood. A visit which he paid subsequently to Norway, in 1871, along with his friend, Mr. Harvie-Brown, appeared still further to invigorate him, leaving his health apparently fully established.

About this time Mr. Alston lived in Glasgow and for a few months he attended business in the mercantile house of Mathieson and Alston. During summer and autumn he lived in the family residence at Stockbriggs, and there found many opportunities of studying the habits of animals. For this purpose he kept various tame examples of British Mammals—such as the Hedgehog—and devoted much attention to the fauna of the county of Lanark. Evidences of his early love for natural history pursuits and for literary work are at this time shewn in the pages of *The Field* and *The Zoologist*. A volume of his "Early Letters" to these periodicals has, under date of Jan. 9th, 1858, his first contribution to *The Field*

* Dr. Thos. Alston of Eddlewood, related to the noble family of Hamilton, was great-grand-uncle, twice removed, of this gentleman. Besides other children Dr. T. Alston had a son—Charles—who between 1738 and 1769 was Professor of Medicine and Botany in the University of Edinburgh, and was also King's Botanist, dying in the latter year. A carefully prepared—though now faint and difficult to decipher—MS., contained in a volume of letters to Prof. Chas. Alston, dated 1720-1760, and at present in the Library of Edinburgh University, gives very full material for a family tree dating back for many generations. By this MS. it appears that there were Alstons of a very old family of Cambusbarron in Stirlingshire, and of Cauder in Lanarkshire, and there was one "Hugo de Aldston, dominus de Cauder." The descent of Dr. Chas. Alston from these old families is fully and clearly shewn.

under the *nom de plume* of "Tomtit," and which relates to the much disputed question as to the food of the Water Ouzel. This is followed by various other short notices with such titles as "Game-keeper's Vermin," "Dorsal Fins of Trout," "Fin-rays of Minnows," "Skull of the Albatross." His first communication to *The Zoologist* is dated 1860 [*v. Zool.*, 1st series, p. 6891] "On the attachment of the Creeper to its Nest and Eggs." From 1864 onwards he contributed regularly to *The Zoologist*, then under the editorship of the late Mr. Edward Newman, but all his contributions to it could not be enumerated here. Some of the more important, however, deserve notice. In 1864 appeared some careful observations "On the Food of Quadrupeds," [p. 9358]. In 1865, "Ornithological Notes from Lanarkshire" [pp. 9439, 9653, 9678, 9708, continued through the vol. for 1866.], "Notes on the Wild Cattle of Cadzow" [p. 9559], "Notes on Quadrupeds of Lanarkshire" [p. 9647, continued through the vols. for 1866 and 1867]. Then follow, in 1867, his "History and Habits of the Roe-deer" [x.s., p. 778], and Notes on the Folklore of Zoology [x.s., pp. 881, 921, continued in 1868, x.s., pp. 1091, 1171]. Occasional articles of minor importance occurred during 1869 and 1870, but he appears to have ceased his contributions to *The Zoologist** with the close of 1871.

Thereafter he accumulated notes upon Quadrupeds, and in Jan., 1868, he commenced a quarto note-book bearing the following title, "Quad. Note-Book, being a commonplace book of Notes and Extracts regarding British Quadrupeds, by ye Study and Travaile of Edward Richard Alston, F.Z.S., Member of Nat. Hist. Society of Glasgow, Vol. I., commenced at 205 Bath Street, Glasgow, 23rd June, 1868."

Another note-book, and of even earlier date, is an octavo volume on Quadrupeds, Birds, Reptiles, and Fish, dating from 1858 to 1870, from which many as yet unpublished notes of interest might be culled. A few of these follow. Speaking of the Deers' horns at Schloss Zwingenberg, he says:—"In August, 1862, I visited the beautiful old castle of Zwingenberg, situated on the north bank of the Neckar, just above a small village of the same name. It has been completely restored, and is the property of the Margrave

* To *The Zoologist* a debt is distinctly due by its numerous readers, apart from strictly scientific merits; that it has been the means in many cases of introductions between its correspondents, which rapidly ripening into friendships, have established connections only to be broken by death.

of Baden, by whom it is used as a shooting box. It contains a very valuable collection of deformed Stags' and Roes' horns, as well as others remarkable for size or beauty. I made sketches of the most remarkable forms, which include Stags' horns twisted like cork-screws or Koodoos' horns; Roes' heads with three horns; Roes' heads with 8 to 12 points; a Stag's antlers with 22 points, &c. There is also the skin of a milk-white Roe, shot in the neighbourhood. In one of the rooms is a large series of Rüdinger's beautiful woodcuts of extraordinary Stags, Roes, and other sporting subjects, published at Augsburg in the last century. One of these represents a Stag with 66 points, shot by King Frederick I. of Prussia in the Ampte Fürsten Wald in 1696. I believe the horns of this splendid Stag are still to be seen at the Moritz Burg, near Dresden."—[See article "Cervidae" in *English Cyclopædia*].

Again, speaking of a death of a bullock in Ceylon from the attack of a Panther, he writes:—"The following is an extract from a letter which I received from my brother Charles, dated April 26th, 1863, apropos of a dispute in *The Field* as to the immediate cause of death in animals killed by beasts of prey:—"A few days ago, the cattle-keeper was bringing in the cattle, and was driving a fine cart-bullock (which had strayed a little) past a wild jungly ravine, when out sprang a large "Cheetah" (the true Panther, *Felis pardus*) on to the poor brute's neck: the man very pluckily ran at it, shouting and gesticulating, and drove it off; he then brought the brute down to the shed apparently not much the worse. I was sent for and examined it, and found the impression of the claws on each side of the neck, but no teeth marks, no vein severed, and but a few drops of blood flowing; the claw marks were slightly inflamed, and the beast trembled so that it could hardly stand, and at last it laid down: however, we feared no evil consequences, so it was made to get up, and was placed by itself for the night. *Next morning it was dead.* Verdict, died of the violent shock to its nervous system. I can of course vouch for the whole of the above.—C. H. ALSTON."

Speaking of the increase of Rabbits, he says:—"About 20 years ago (*i.e.*, previous to about 1864), there were no Rabbits here (at Lesmahagow); the first my father ever saw here was found by the keeper lying dead on Todlaw Hill; now they are a perfect plague, although none have ever been turned out in the neighbourhood."

Of the anatomy of the Hedgehog he writes, 22nd July, 1864:—

“To-day I skinned and dissected a Hedgehog, and was much struck by the curious development of the *panniculus carnosus*, or skin-moving muscle, by means of which it rolls itself up. This structure is not mentioned in Prof. Bell's *British Quadrupeds*, and is only cursorily alluded to in the *English Cyclopædia*, and the Rev. J. G. Wood's *Popular Nat. History*.” He then proceeds to describe this muscle, with the assistance of a rough but distinct sketch.

Of the Alpine Hare he writes in 1865:—“Alpine Hare—It seems that a Mr. Hunter over at Glenbuck turned out a number of this species about four years ago, and James Taylor tells me that they have spread a good deal already. This winter, specimens have been shot both at Cumberhead and Skellyhill, but none have been seen at Stockbriggs yet. I suppose this is an addition to the fauna of Lanarkshire, if not to the South of Scotland.”

Of Birds there occur many notes also, some of much interest. “Several years ago a pair of Martins built against a pane of glass in the window of the barn. The nest was unsupported from below, still it seemed to stick quite securely to the glass, through which the old bird might be seen sitting on the eggs.” Also,—“A pair of Martins built in 1857 against a sloping beam in the archway at the stables, and fearing that their nest might not have sufficient support, they constructed a long line of clay pellets along the beam on which the nest was built.” This latter is illustrated by a neat sketch.

On Fish there are also many notes. “In July, 1858, my brother Charles caught a very large minnow in a small pool near here. It was a female, containing spawn, and was $4\frac{3}{4}$ inches in length, weight 1 oz. This specimen is now in the Hunterian Museum, Glasgow.” Notes occur following this upon Fin-rays of Fish, Minnows and Loaches, and Rare Fishes in Scotland [exhibited at meetings of the Society in 1864].

Besides these occur notes on Reptiles and a “List of Specimens of Asiatic and European Quadrupeds and allied species in the collection of Edward Richard Alston, F.Z.S.,” begun in June, 1869, on the page and letter system now generally adopted by naturalists in cataloguing; and corresponding Lists of Birds and Eggs, with very full notes and diary.

Mr. Alston became a member of the Natural History Society of Glasgow in February, 1863, and until the time of his death he

took always an interest in its affairs, and served for some years as a member of council. His chief contributions while a resident member were:—a paper on the habits of the Roe deer, and another on the Reptiles and Mammals of Sutherlandshire. On leaving this district to settle permanently in London, he was elected, in October, 1873, a Corresponding Member. He made about this time several donations of valuable books to the Library. When the Society resolved upon issuing catalogues of the Fauna of Scotland Mr. Alston undertook the preparation of various lists, only one of which he lived to complete—his “Mammalia of Scotland”—which the Society published in 1880. It was much appreciated, and is accounted very complete and trustworthy, embodying as it does the results of many years’ study and observation. At the annual meeting in 1880, Mr. Alston was elected an Honorary Member of the Society, and in acknowledging the notice of his election, he wrote that he considered it a high honour that had been conferred on him, it being the first scientific institution with which he was connected.

In 1871, as already mentioned, he paid a visit to Norway, accompanied by his friend, Mr. Harvie-Brown, for making collections and notes on Natural History—principally birds and mammals, and spent there about 11 weeks, viz., from May 5th to July 25th. The trip was undertaken without any expectations of important results, and no full account of it ever appeared, but several notes and references to the habits, &c., of the birds observed are given in Mr. H. E. Dresser’s “Birds of Europe.”

Another more extensive expedition was planned and carried out in 1872, when the same two friends left Scotland in the beginning of June for Archangel and the White Sea, their stay there being some two months, after which they returned home round the N. Cape, and landed at Peterhead on the 12th of August. The results were a short paper to “*The Ibis*” of 1873, entitled “Notes on the Birds of Archangel,” and considerable additions to their cabinets of birds and eggs.

Since that date Mr. Alston’s travels were for the most part confined to Great Britain—a short visit to Norway for salmon fishing in 1876, a stay at Nice in the winter of 1872-3, and shorter visits to Paris and the Continent, taken with members of his own family, excepted. In Scotland his trips were used more for relaxation and health, after his scientific work in London, than for study, and his

favourite haunt, and that of a few intimate friends, was the county of Sutherland, and especially the district of Assynt, where so many lakes and streams afford ever-varying sport amidst the wildest surroundings. Of both scenery and sport he was a keen appreciator. It was only, however, comparatively late in life that he became enamoured of the gentle art, but he then soon entered into it with the keen zest of a born sportsman.

About the year 1868 he began his scientific and literary career in London, and after living off and on for a year or two in lodgings, he finally settled himself for permanent study and residence in 1873. At this time some of his friends urged him to enter at Cambridge University, but his inherent love of perfect liberty prevented him from doing so. At one time he had thought of entering upon a commercial life, but, no doubt, he considered such a life less suitable to his constitution, and too constant confinement was much against his inclinations. As we all know, the sequel has proved that he judged well, and science has liberally benefited by his choice. He rapidly took his place in scientific circles in the great metropolis, indeed almost immediately after his decision. The better to instruct himself, he attended the course of lectures by Prof. Flower and others. In 1869 he was elected a Fellow of the Zoological Society, and was put upon the council in April, 1880. He also became a Fellow of the Linnean Society, and latterly its Zoological Secretary. Besides doing much scientific work in the Proceedings of these bodies, he edited a portion of the new edition of "Bell's British Quadrupeds" in 1874. In 1873 he accepted the post of one of the recorders of the *Zoological Record*, and carried his laborious and important duty through six volumes, 1873-1878. He also undertook and carried out the treatment of the Mammalia in the great work, *Biologia Centrale Americana*, conducted by Messrs. Godman & Salvin; and it is a source of great satisfaction to his friends and in scientific circles that he was enabled to complete this, his principal work, before he died, the whole of his MS. on the subject being carefully preserved for publication in due course.

Amongst the more important of his minor papers are "Classification of the order Glires";* "Squirrels of the Neotropical Region";† "On the Specific Identity of the British Martens";‡

* *P.Z.S.* Jan. 18, 1876.

† *Op. cit.*, June 18, 1878.

‡ *Op. cit.*, June 3, 1879.

that already mentioned on the "Mammals of Scotland," of which our Society is the fortunate possessor.* There also are his papers on "The Mammals of Asia Minor, from collections formed by Mr. C. G. Danford (in 1877 and 1880)".

To his personal qualifications and social attainments, his genial smile and kindly disposition, and his keen and rapid sense of humour, which, with many other graces, combined to make his society so charming to all who knew him, and the knowledge of which caused a deep sense of personal pain and loss to weigh more and more heavily day by day upon his most dear and intimate friends when they first heard of his alarming illness and then of his death, more than an allusion cannot here be made; but memories of many happy days passed in his company compel a passing touch, however light—a tribute not loud but deep—and bear upon their cloudlands an earnest and a hope beyond the dim portals of the grave.

It now only remains that thanks be returned to those sympathising friends who have assisted in collecting the necessary materials for the foregoing short memoir of their lost friend and fellow-worker. To Prof. A. Newton, of Cambridge, and Prof. Flower, of London; to Mr. John A. Harvie-Brown and Mr. John M. Campbell, as well as to the members of his own family, thanks are due for references to and quotations from Mr. Alston's correspondence, private papers, and published works.

With his sorrowing relatives, the Natural History Society of Glasgow desires to express its earnest sympathy and deep sense of the loss they and his fellow-members have sustained in their friend's early death.

SPECIMENS EXHIBITED.

Mr. James J. King exhibited specimens of *Polycentropus Kingi*, M'Lach., a new species of Trichoptera, from the North of Scotland, on which some remarks were made by Mr. F. G. Binnie.

Mr. Thomas King exhibited a collection of fresh Mosses, collected near Glasgow. The specimens were all named, some of them being rare, and Mr. King indicated the localities where they were obtained.

Mr. James Allan exhibited a series of Himalayan Ferns. These

* *Trans. Nat. Hist. Soc., Glas.*, vol. iv., pt. i., p. 80.

had been collected by one who was not a botanist, and were therefore not valuable as specimens for the cabinet, but were of interest as showing some very peculiar forms, differing widely from any of our native species.

Mr. James Lumsden, F.Z.S., exhibited a specimen of the Slavonian or Dusky Grebe, *Podiceps cornutus*, Gmelin. He said that last year he had the pleasure of exhibiting a specimen of this bird beginning to assume its summer plumage, and shot on Loch Lomond in April, four years ago. That now exhibited, a male, was shot on Loch Lomond between Luss and Inverbeg last winter, by Lieut.-Col. Colquhoun, of Bencruaich Lodge, being the second occurrence of this species in the district. In the early part of the winter, before the Loch was frozen over, a bird, which was thought to belong to this species, frequented the bay near Arden House. It was often seen diving, and the quickness of its movements was noticed. Some shots fired over it caused it to rise and fly a few hundred yards along the shore, where it continued its diving as before. When the Loch was frozen over it departed, and most likely went to the open water above Luss. Probably it was the same bird as that now on the table. This species seems widely distributed; it is found breeding in Iceland and the northern parts of Norway, and is known as a visitant in almost every country in Europe, but is nowhere abundant. In Asia Mr. Dresser reports it to be found right across the Continent to Japan, but it does not range very far south. In North America it is tolerably abundant, breeding in the British Provinces and the northern portions of the United States.

PAPERS READ.

I.—*On some of the rarer Plants found in the Neighbourhood of Greenock.* By Mr. Thomas Scott.

It will be as well, at the outset, to indicate the extent of the district I intend to refer to in the following notes, and that is the ground included in a radius of about six miles, which will take in such localities as the Cloch, Shielhill Glen, and Kilmalcolm.

I do not mean to take up your time by referring to any of those plants, which, so far as Clydesdale, at least, is concerned, may be termed cosmopolitan, my intention being simply to place before you a record of those plants which may be said to be rare or uncommon,

and which are known to the writer to occur, or to have occurred, in the included district. Such a record may serve to indicate that though there is "no new thing under the sun" there may be enough to reward the diligent and careful working up of a district which has been thought to have been well explored. It may also sometimes prove useful as an indication of the geographical extension of certain species, and may serve as a basis of comparison for future investigation, just as some such records have been of use to myself.

The surface rocks of a great portion of the country round Greenock are trap of various kinds, but there are many places, and especially nearly all along the shore of the Firth, where sandstone crops out, and it is interesting to observe, that while the vegetation of those places where the igneous rock prevails, is, with regard to phanerogams, generally meagre both in genera and species, the vegetation where the sandstone occurs is rich, the number and variety, as well as the luxuriance, of the flowers, forming a marked contrast to the monotonous and desolate appearance of the flora of the former; consequently nearly all the rarer plants of the district are found where sandstone comes to the surface.

The order Ranunculaceae is, with the exception of only 3 or 4 species, represented by the most common forms. *Ranunculus lingua* is said to have been found at Gourock, though I have not seen it there or anywhere in the neighbourhood. *R. auricomus* is found at the old Castle of Duchal, Kilmalcolm, and *R. sceleratus* is plentiful a little east of Langbank. *Aconitum Napellus*, one of the "doubtful natives" which we noticed some years ago, still grows where we first found it—at the "Roman Bridge" near Inverkip. *Trollius europaeus* is common, as at Kilmalcolm and Shielhill Glen. *Papaver Argemone* is occasionally found in the corn-fields and on the railway embankments about Kilmalcolm, but the most notable of the Papaveraceae found in the district is the Common Celandine—*Chelidonium Majus*. About 18 years ago this plant was noticed at Duchal Castle, and the summer before last when visiting that locality along with some members of my botanical class we observed a most beautiful specimen, an evidence that this species had not become extinct, a fact which is the more striking when we take into consideration that the place is very much frequented in summer-time by picnic parties and others.

Draba muralis was found for a number of years upon some old walls about Greenock, but these walls have now been taken down or

repaired and the plants destroyed. *Lepidium Smithii*, which is said to be rare, I have found in several places; it was very plentiful on an old road at Kilmalecolm and is still found near Fort Matilda and at several other places by the shore. *Iberis amara* is occasionally found about the shore near Fort Matilda. One of the rarest plants of the West of Scotland, and belonging to the order Caryophyllaceae, should be mentioned; I refer to *Cerastium arvense*, which was noticed about 6 years ago by Mr. Charles Pennell of Greenock (a member of the Society), and which grows by the shore a short distance west from Fort Matilda in a field locally known as the Battery Field. *Silene inflata*, *S. noctiflora*, *Lychnis vispertina*, and *Githago segetum* have also been found in the neighbourhood of Greenock within the last few years. Touch-me-not, *Impatiens noli-me-tangere*, is found by the shore about quarter of a mile west from the Cloch Light-house, growing at one place especially in great profusion; I first noticed it about 4 years ago.

A few plants belonging to the Leguminosae may be noted. *Melilotus officinalis*, the Yellow Melilote, was found last year in the Battery Field by Mr. Struthers of the Watt Museum. *Trifolium arvense*, well named the "Hare's-foot Trefoil," is found in the suburbs of Greenock; and the pretty little *Ornithopus perpusillus*, which I have observed for a number of summers on a dry bank by the side of the road on the north side of the Glasgow and South-Western Railway, and about $1\frac{1}{2}$ miles west from Kilmalecolm. These are the most noteworthy plants belonging to this order found in our district, but there are other two species which, though not found, strictly speaking, within the specified limits, might be noticed before passing on. These are, first, *Vicia lathyroides*, which I happened to find on Dumbarton Rock, in June, 1878, and at a subsequent date. This plant cannot be confounded with *V. angustifolia*, Roth, especially when examined in fruit as well as in flower, its smooth pods and granulated seeds forming a very distinctive characteristic. I am not aware of any station having been found for it so near Glasgow. The second is also a Vetch—*V. sylvatica*, which I noticed in Auchinreoch Glen, near Dumbarton, in 1878, when I was very much struck with its beauty. Among the Rosaceae, *Rosa arvensis* is found at Gourock, and by the shore near Leven House below Ashton. The Crab Apple, *Pyrus Malus*, is found a little off the Larkfield road and about midway between Gourock and Ravenscraig, where it forms part

of an old hedge between two fields. *Saxifraga aizoides*, *S. hypnoides*, and *Chrysosplenium alternifolium* are found in Shielhill Glen, the last mentioned plant being also found in various other localities. *Hippuris vulgaris* is still found where previously recorded, in a small shallow loch on the hilly moors near Ravenscraig. *Peplis Portula* we find at Loch Thom and other places in the neighbourhood of Greenock. *Dipsacus sylvestris* I have found occasionally in the Battery Field near Gourock Toll. The only species of the Umbelliferae I will mention is *Peucedanum Ostruthium*, which we find near the Roman Bridge, near the Whinhill reservoir, and about Kilmalcolm.

Of the Compositaceae very few that may be called rare are found in our district. *Senecio viscosus* and *S. sylvaticus* both occur in the neighbourhood of Greenock. Great-Leopard's-bane, *Doronicum pardalianches*, has been observed for a number of years in a wood near Dunrod Farm. *Anthemis arvensis* has been occasionally found in a field at the east end of Gourock. The very rare and pretty little Ivy-leaved Bellflower, *Campanula hederacea*, need scarcely be alluded to here, it being already so well known to Glasgow botanists, were it not to notice the somewhat interesting fact that the only two stations as yet recorded for it in Clydesdale, the Cloch and Dunoon, are as nearly as may be opposite to each other, as if the idea of near neighbourhood was a factor in the arrangement of the stations. *Vaccinium Oxycoccus* occurs in a marshy hollow a little west of the station mentioned for *Ornithopus perpusillus*. *Echium vulgare* and *Achusa sempervirens* are the only rare Borages found near Greenock, the first in the western suburbs, the other at the Roman Bridge. *Myosotis palustris*, which we find occasionally, is said to be a common species, and there is no reason for doubting the assertion so far as certain localities are concerned; but in regard to the district under consideration, an experience extending over several years tends to shew that it is rather scarce. No doubt the experienced botanist finds little difficulty in making out this species; but still, having on several occasions seen *M. repens* mistaken for *M. palustris*, I am inclined to think that its reported commonness may be due, partly at least, to want of familiarity with its characteristics, and consequently a more restrictive term than "common" would be a more appropriate one. One of its characteristics which I have always found very constant and very distinct is, that the calyx segments are shorter than

the tube of the corolla, and therefore not bent outwards by the rotate divisions of the corolla, as is the case with *M. repens*. In August, 1878, I got *Solanum nigrum* on some rubbish heaps in the neighbourhood of Greenock.

Of plants belonging to the order Scrophulariaceae, a few may be mentioned. *Bartsia viscosa* is common in a field behind Ashton. *Linaria Cymbalaria* I have found at various times on old walls about Greenock. *Verbascum Thapsus* is found in a plantation at Wemyss Bay. A plant belonging to this order, and which is truly a stranger to these parts, has made its appearance in our district of late,—*U. blattaria*. Last year some very luxuriant specimens were noticed in a field between Fort-Matilda and Gourock; and the other day I saw in the same field some root-stocks which gave promise of producing specimens well worth a place in our herbaria. This species is said to be native in the south-west of England, but after standing such a winter as we are just now emerging from—1880-81—I think it is qualified to take its place as a sub-arctic species. *Mimulus luteus*, another plant belonging to the order, is found in a ditch about four miles out on the Inverkip road; and although the ditch is cleared out every season, the *Mimulus* always comes up the following spring as plentifully as ever, which shews it agrees well with its location. The Gipsy-wort, *Lycopus europaeus*, the only rare species of the Labiatae occurring in our district, is found below the Cloch Lighthouse. *Scutellaria galericulata*, which is common on the shore below Gourock, is, I notice in Hooker's Flora entered as "rare in Scotland." *Prinnula veris* I have found both at Parklea near Port-Glasgow, and at Inverkip. *Lysimachia vulgaris* was found some years ago near Inverkip by Mr. Peter Mackellar, Greenock. *Parietaria officinalis* I once found growing on the Roman Bridge. Whether I had injured the plant when securing a part of it for a specimen I cannot say, but I have not seen it there since; this species grows plentifully on the old wall at the Abbey Walk, St. Andrews.

Of the Orchidaceae few that may be called uncommon are found in our district. *Habenaria viridis* and *H. albida* are got on the hills behind Greenock, and one or two other places; I have got very fine specimens of *H. albida* on the Tower hill, Gourock; *Neottia nidus-avis*, which used to be met with in a wood below the Cloch Lighthouse, has not been seen for a number of years. The curious little *Listera cordata*, as well as its more robust companion, *L. orata*, are

frequent in some parts of our district, such as Shielhill Glen and Target Glen.

I shall now mention a few Carices which are to be met with in the circumscribed area under review. *Carex dioica* is found on the hills behind Greenock, Shielhill Glen, and other places; *C. teretiuscula* is got in a wet meadow by the side of the Inverkip road near Ravenscraig; *C. aquatilis*, var. *Watsoni* of Syme, is found in Shielhill Glen; *C. pendula* is also found in the same glen; *C. riparia* grows in a meadow near Dunrold Castle. A reference to a few Grasses will conclude the list of flowering plant. *Setaria viridis* I found on some rubbish in the neighbourhood of Greenock, being no doubt an outcast. *Avena fatua* was got in a corn-field near the Whinhill; *A. pubescens* is found in Shielhill Glen near the middle of the glen. *Lepturus filiformis*, var. *incurvatus*, grows in a meadow by the shore between Fort-Matilda and Gourock. I found this plant some years ago, and though not yet included in Henedy's Clydesdale Flora, there can be no doubt about its being indigenous. This grass presents us with a good example of the law of compensation; the spikelets which are lateral have only one glume, the part of the rachis opposite the spikelet taking the place of the second glume, but the terminal spikelet, which cannot get protection from the rachis, has two glumes.

I will now notice one or two of the higher Cryptogams, which will conclude the present list. *Cryptogramma crispa* I found near Kilmalcolm, where it was discovered many years ago, but I am afraid it is now almost if not altogether extinct. *Aspidium angulare* is got at Gourock and the Cloch. *Asplenium viride* grows in Shielhill Glen and by the side of the Routen Burn near Loch Thom. We get the Adder's tongue, *Ophioglossum vulgatum*, near the Roman Bridge. The Moonwort, *Botrichium Lunaria*, is found on the hills behind Greenock, at Gourock, and other places in the district. The Royal Fern, *Osmunda regalis*, which used to be found near Gourock is now extinct—exterminated I should say. It is much to be wished that something could be done to put a stop to the extermination of plants for mere pecuniary gain. The only other Cryptogam I will mention is the Great Water-horsetail, *Equisetum Telmateia*, got in Shielhill Glen, where it grows most luxuriantly; one plant I got measured fully six feet in length.

It will be observed from what has been said that a good many interesting plants are found about Greenock and neighbourhood,

and doubtless others will yet be added to the list, for it cannot be questioned, I think, that a constant redistribution is going on locally and generally, so that in a number of years rare plants may become commoner and common ones scarcer. The watching of such redistribution is one of the pleasures of the botanist, and I should say not the least one.

[NOTE—Dec., 1881.—Of the two following plants the first was overlooked in the preparation of my paper and the second was found after the paper had been read before the Society.

Claytonia alsinoides, which seems to have become naturalized in many places, is found in a small wood between Ashton and the Cloch, where it has by some means been introduced. It has retained its hold here for many years, and judging by its luxuriance it appears to find the conditions very suitable. Very probably this species will, ere long, have to be included amongst British plants, *C. perfoliata* having been already admitted.

A specimen of a new introduction, *Salvia verbenaca*, has been shown me by Dr. J. K. Robertson, of Greenock, who found it this summer, 1881, in a field near where the Clyde Floating Baths were moored. I have since gathered other specimens at the same place. This plant has hitherto only been found on the East Coast at Salisbury Crags, and in Fifeshire from Burntisland eastwards.]

II.—*On the Protection of Wild Birds.* By Mr. James C. Christie.

The writer, while making every allowance for the pursuits of ornithologists who make the structure, habits, migrations, and distribution of birds their study, deprecated the wanton cruelty and the wholesale slaughter which is often indulged in by sportsmen and collectors—often for mere amusement, and frequently for gain. He advocated the claims of birds to protection, not only on account of the pleasure to be derived from listening to their vocal efforts, but on account of their being amongst the best friends of man in destroying noxious insects and reptiles. A discussion followed, in which several members took part, in the course of it reference being made to the prevailing practice of killing favourite birds to provide ornaments for the head-dresses of ladies, and also to the wanton plundering of nests indulged in by professed oologists and others.

III.—*A Contribution to the Study of the British Carboniferous Chitonidae.* By Mr. R. Etheridge, jun., F.R.Ph.S.Ed.—Cor. Mem.

With two Plates [I. and II.]

I.—INTRODUCTION.

Although numerous papers have been written on Fossil Chitons, it is some time since there appeared any important account of researches amongst the Carboniferous forms. The last, and one of the most useful, was that by Messrs. J. W. Kirkby and J. Young,* in which descriptions and figures of the majority of the British species were given. The British Permian forms have, thanks to the work of Mr. Kirkby, been much more thoroughly investigated than the Carboniferous. With the view of showing what has been written I have appended a list of the more important publications on the subject.

The majority of the specimens now described were forwarded to me for investigation by my friend Mr. James Bennie, by whom they were collected from the rich bed of decomposed limestone at Dalry, Ayrshire. This stratum has already yielded a large number of minute and interesting fossils, amongst which may be mentioned the supposed Opercula of Gasteropoda, lately described by myself,† and, as in the present case, collected by Mr. Bennie. These collections form not the least interesting of the many I am indebted to his kindness for an opportunity of describing. I am also indebted for an interesting series of *Chiton* remains from the same deposit, to Messrs. James Armstrong and David Robertson, of Glasgow, and John Smith, of Kilwinning, who kindly placed them at my disposal for description.

The fossils are all in the condition of isolated plates, but are in a fine state of preservation, as evinced by the perfect condition of the surface ornament. In this feature they bear out the remark made by Messrs. Kirkby and Young on the non-eroded condition of the Scotch specimens, as compared with those from the Yorkshire Carboniferous series.‡ Our knowledge is at present scarcely sufficient to speak with certainty of the distribution of the

* *Geol. Mag.*, 1867, iv., p. 340.

† *Annals and Mag. Nat. Hist.*, Jan., 1881.

‡ *Geol. Mag.*, iv., p. 340.

Chitonidae in the Carboniferous rocks of Scotland. Of *Chiton* proper, two species have been met with in the Upper limestone group, and one in the Lower group. Of *Chitonellus*, two, both in the Lower limestone group. In the present communication additional species of *Chiton*, and four of *Chitonellus* are described, all from the Lower limestone group.

The Carboniferous rocks of Belgium have hitherto yielded the largest number of forms, if we accept all the species described by Baron de Ryckholt. Now, however, both the Permian system of England, and the united Carboniferous series of Great Britain will compare favourably with the above.

2.—DESCRIPTION OF THE SPECIES.

Genus *Chiton*, Linnaeus.

Obs.—Too little is at present known of the entire structure and appearance of the Palaeozoic Chitons to warrant any attempt at generic sub-division, such as is adopted amongst the recent species.

In the recent forms the soft parts have played an important part in the classification of the family, although, to some extent, the exoskeleton has been taken into consideration. To the Palaeontologist the latter is naturally the only part of the Chiton-economy which needs consideration, but, as in the recent forms, this affords anything but a satisfactory basis. The following are the only palaeontological sub-divisions with which I am acquainted.

1. *Helminthochiton*, Salter, 1847. (*Quart. Jour. Geol. Soc.*, iii., p. 51.) Proposed for a Silurian type, in which the plates are "deeply emarginate behind, and, as it were, bent backwards," a character very rare in living species. The apex is on the posterior edge, and without any expansion behind it. The full characters are as follows:—

"Elongate, plates as long as wide; subquadrate, thin; apex of the anal plate remote from its front edge; sustentacula widely separated; shell but very little covered by the mantle," &c.

The genus was divided by Salter into three groups, the genus proper, typified by the species *H. Grijpithi*, Salter, and two other unnamed groups, containing mostly the Carboniferous species. In all probability *Helminthochiton* will be found to be a satisfactory receptacle for such forms as the type species, but the sections will, I think, scarcely stand the test of investigation.

2. *Sulcochiton*, De Ryckholt, 1862. (*Jour. de Conchyl.*, x., p. 259.) This name was proposed by Baron de Ryckholt for a small buccal plate, supposed to be that of a *Chiton*, from the Carboniferous limestone of Vise. The plate is described as divided into two equal halves by a half obliterated groove, passing from the summit to the margin. Too little is known about this fossil to readily accept it as the basis of a generic division. Our species, *Chitonellus Bennieanus*, has the plate similarly grooved, but otherwise differs from de Ryckholt's type.

Two recent genera may perhaps be found to comprise some of the old species, viz., *Schizochiton*, Gray, and *Enoplochiton*, Gray. In the former the plates are as long, or longer than they are wide, with the apex of each plate situated posteriorly, and directed backwards; this will, perhaps, include *Chiton priscus*, Münster, and the like.

In *Enoplochiton*, the valves are subcordiform, and the characters are very much those of the fossil *Chiton Loftusianus*, Kirkby.

Chiton Dalriensis, sp. nov.—(Pl. I., figs. 1-12, 13 and 14.)

Sp. Char.—Anterior plate nearly semicircular, very convex and somewhat high. Front margin rounded, posterior margin rather concave, forming a shallow re-entering angle. Apex minute, most elevated point of the plate, quite blunt in fact, rather depressed than otherwise; two indistinct radii pass towards the front, and faintly subdivide the plate into three areas, of which the lateral are by far the larger.

Intermediate plates—(one of the) twice, or a little more, as broad as long, transversely elongated, varying a little in length according to the position of the plate in the mollusc; much arched longitudinally, with a bluntly carinated median line; the plates do not taper near the lateral extremities, but retain the same size at the latter as in the central line. The front margin is medianally slightly concave, and, at the side rounded; posterior margin convex laterally, curving slightly inwards, and outwards to the apex; extremities broadly rounded. Apex acute, and more or less produced, placed posteriorly, and remote from the front margin. A division into lateral and dorsal areas is hardly perceptible, but when so the lateral are small, curved, and narrow; the dorsal bears the carinated ridge, becoming blunter towards the front of the plate, and it does not appear to be sub-divided by any sulcations.

Apophyses, rather large for the size of the plates, semicircular and plain, dying off towards the sides. On the interior the plate is divided into two almost equal portions by the ridge separating the face from the imbricated position; the facets are large and placed on each side of the central line. Posterior plate semi-capuliform, convex; apex blunt, placed at the end of the dorsal ridge in the middle line, but not projecting beyond the posterior margin, from whence the same declines rapidly and abruptly to the posterior margin of the plate-surface, diagonally angulate on each side to the lateral margin, dividing the plate into its three areas; from the apex forwards the central line is ridge-like. Posterior margin semicircular in outline; anterior margin gently convex throughout its whole course, or sometimes slightly concave in the middle. The ornamentation of the surface in all these plates is upon the same plan; regularly and closely set granules arranged in concentric lines, larger and more apparent round the margin, but faintly present over and around the apical region, where the concentric character also becomes in a measure lost, but an occasional impressed concentric line is present. On the intermediate plates the concentric lines are rather square at the lateral angles, and the granules much closer on the lateral areas.

Obs.—I have combined in one description, and under one name, the three forms of plates just noticed, believing them, from their general appearance and ornament, to be the remains of one form.

There is undoubtedly a very close analogy between these plates and those described under the name of *C. Loftusianus* by Prof. W. King,* and more in detail by my friend, Mr. J. W. Kirkby,† from the Permian rocks of Northumberland. The difference between the two forms chiefly consists in the form of the posterior plate, and the apophyses of attachment; the broader anterior plate; the absence of sulci on the dorsal areas of the intermediate plates; and the generally coarser granulation.

It is difficult to believe, at first sight, that the series of intermediate plates (Plate I., figs. 2-8), figured as those of the present species, are all identical. Notwithstanding, however, the difference in outline shown in the figures, I do not see my way to separate them, with the material at present to hand. The ornament in all

* Perm. Foss. of England, 1851, p. 202, t. 16, f. 9-14.

† *Quart. Jour. Geol. Soc.*, xviii. p. 611, t. 16, f. 31-41.

is similar, and similarly distributed over the plates, only in Fig. 2 it is of a more open and less crowded nature. After all, perhaps, they do not differ more than do those of some recent Chitons, so, in the meantime this determination must suffice.

These plates more closely resemble the intermediate ones of *C. Loftusianus*, than do the anterior or posterior those of the same species. Those from which Pl. I., figs. 2 and 4 are taken are more regularly, and not so obliquely transverse as in the latter species, and the lateral angles are much more rounded. The originals of Pl. I., figs. 7 and 8 are much more sinuate than the intermediate plates of the Permian species, with similar rounded angles to Pl. I., figs. 2 and 4.

The Permian and Carboniferous forms are doubtless very closely allied, so far as the intermediate plates are concerned, and bearing this in mind I forwarded specimens to Mr. Kirkby, who replied that the Carboniferous plates are smaller than most examples of *C. Loftusianus*, and have the lateral areas less pronounced; he further thought it would save difficulties by regarding the plates from Law Quarry as undescribed. Accepting the opinion of one who has worked so extensively at fossil Chitons, I beg to propose for these plates the name of *Chiton Dalriensis*.

There is, again, some resemblance between the posterior plate of one species and that of an un-named *Chiton*, figured by Messrs. Kirkby and Young,* but the latter is not high enough, the dorsal carina is too long, and the apophyses much too near the antero-lateral margin.

Pl. I., figs. 13 and 14 represent a form of posterior plate, rather rare in the present collection, and which may perhaps be only a variety of that just described. It possesses the general characters of the latter, but the keel is continued further posteriorly, so that the immediate end of the plate, instead of forming a gentle declivity downwards to the margin, is abrupt and straight, or even at times a little concave. From the very marked apical point thus formed, there proceeds forwards a groove on each side, giving to the flanks of the plate a rather hollow appearance. Generally speaking the plate represented in Pl. I., fig. 14 has a higher appearance, and is at the same time longer than the corresponding plate of *C. Dalriensis* proper. Internally corresponding differences are perceptible.

* Geol. Mag., 1867, iv., t. 16, f. 7, a & b.

Locality and Horizon.—Law Quarry, near Dalry, Ayrshire ; Main or Hurler Limestone, Lower Carboniferous Limestone group.

Collections.—Messrs. J. Bennie, J. Armstrong, J. Smith, and others.

Chiton Loftusianus, King. (?)

C. Loftusianus, King, “*Catalogue Organic Remains, Permian Rocks*,” 1848, p. 12.

„ „ Kirkby and Young, *Geol. Mag.*, 1867, iv., p. 340, t. 16, f. 17.

Obs.—Through the kindness of Mr. Bennie I have been able to examine the intermediate plate of Carboniferous age, noticed under this name by Messrs Kirkby and Young.

In the explanation of the plate attached to the above paper by these authors, the specimen is said to have come from Settle. In a recent letter, however, Mr. Bennie remarks, “Settle must be a mistake, as in the copy of the paper sent me by Mr. Young, Settle is scored out and Williamwood written instead, which must have been done by Mr. Young himself, or by his direction.” It appears from this that the Carboniferous form of *C. Loftusianus* must also be regarded as a Scotch fossil.

When compared with the intermediate plate of our *Chiton Dalriensis*, the plate of *C. Loftusianus* is visibly less arcuate ; broader in relation to its transverse length ; the apex somewhat more produced, and placed further posteriorly ; the hind margin more or less oblique, instead of concavely sub-parallel to the front margin, as in the Law Quarry form. Finally, the diagonal lines are very strongly marked in *C. Loftusianus*, but not so in the other form ; the lines of growth strong, in the latter faint ; and square instead of rounded.

Locality and Horizon.—Williamwood, near Glasgow ; in shales of the Orchard limestone, Upper Carboniferous Limestone group.

Collection.—J. Bennie.

Chiton Armstrongianus, sp. nov.—(Pl. I., fig. 15.)

Chiton, sp. Kirkby and Young, *Geol. Mag.*, 1867, iv., p. 341, t. 16, f. 7 a-c.

Sp. Char.—Posterior plate shield-shaped, truncated and arched in front, slightly attenuated behind and gradually sloping downwards. Central line earinate, carina extending for about half the length of

the plate, apex depressed, or a little inclined downwards. Front margin although arched, at right angles to the longer axis of plate; anterior lateral angles rounded; lateral and posterior margins forming a continuous curve, narrowing towards the posterior end. The apophyses are lateral in position, broader than long, and with a rounded margin. On the under side the immediate edge of the posterior margin is a little flattened. Surface marked by from one to three well defined concentric grooves, which extend nearly from the front margin, on one side of the keel, to that on the other; the ornamentation consists of close concentric lines of coarse papillae or granules, very regularly arranged, finer on and under the apex, and increasing in size towards the margins.

Obs.—Messrs. Armstrong and Bennie have kindly lent me the original plates of this species described by Messrs. Kirkby and Young, but unnamed by them. Mr. Armstrong has also sent me an additional example from Cunningham Baidland. The material now before us is sufficient to warrant the proposal of a name for this evidently distinct species. I feel, therefore, much pleasure in associating with it the name of Mr. J. Armstrong, to whom I have been indebted for much assistance in the study of Carboniferous palaeontology.

Chiton Armstrongianus, (Etheridge, jun.), may be recognised and distinguished from other species, first by the form; and secondly, by the very coarse nature of the ornament, which resembles, more than anything, the teething of a rasp, or coarse file. The outline approaches nearest to that of *Chiton humilis*, Kirkby,* but it is more pointed behind, and less acute in front; the impressed concentric grooves less in number; whilst the portion of the plate posterior to the apex is a gradual slope from the latter to the posterior margin, and not nearly flat as in *C. humilis*, nor nearly equal to the length of the remaining portion of the plate.

Mr. Armstrong's specimen from Williamwood is a perfect one, with the apophyses preserved, and three distinct impressed concentric grooves. Mr. Bennie's example from the same locality is less perfect, and has only one concentric groove. It is also much longer in that portion of the plate between the apex and the posterior margin, in this respect forming an intermediate link between *C. Armstrongianus* proper, and *C. humilis*, Kirkby.

* *Geol. Mag.*, 1867, iv., p. 341, t. 16, f. 6 a-c.

The specimen from Cunningham Baidland is a good deal worn, and is more rounded at the posterior end than the type; it has only one concentric groove. The size of the ornamenting granules and their arrangement point in the direction of the *Chiton* plate found by Mr. James Thomson, at Strathavon, (noticed hereafter). Moreover, looking at the size and general habit of the two plates, it is a question whether it would not be advantageous to unite them under one name.

C. Armstrongianus need in no way be mistaken for the posterior plate of *C. Dalriensis*. It lacks the short form, and two posterior diagonal ridges of the latter, irrespective of other points of difference. Similarly another coarsely granular species, *C. gemmatus*, de Koninck, is at first sight seen to be also quite distinct.

Locality and Horizon.—Williamwood, near Glasgow; in shales of the Orchard limestone, Upper Carboniferous Limestone group.

Collections.—J. Armstrong and J. Bennie.

Collection.—J. Armstrong. Cunningham Baidland, near Dalry; shales of Lower Carboniferous Limestone group.

Chiton, sp. ind.—(Plate I., figs. 16 and 17.)

[Compare *Chiton gemmatus*, de Koninck, *Descrip. des Animaux Foss. Terr. Carb. Belgique*, p. 323 t., 23 f., 2 c.]

Obs.—A single intermediate plate of a moderately large *Chiton* was found by Mr. James Thomson, in the Carboniferous beds of the neighbourhood of Strathavon, and has been generally referred to *Chiton gemmatus*, de Kon. I am under obligations to Mr. Thomson for the loan of this valuable example, and beg to offer the following remarks on it:—

The surface ornament is arranged like that of *Chiton gemmatus*, and at first sight the outline is similar. On a close comparison, however, it is evident that the lateral margins in the Scotch form are much more evenly rounded, and without any obliquity. Moreover, in the latter there existed a central obtuse keel, more apparent towards the front or anterior margin. There is, also, an entire absence of the faint tripartite division of the surface visible in de Koninck's species. Finally, the apophyses are much narrower, longer, and project more from the front in the Strathavon specimen, whilst the anterior margin is a little more concave.

With the plate provisionally referred to *Chiton Loftusianus*, it need not be compared, but with our *C. Dalriensis* there is a close

affinity. The outline in the two plates appears to correspond, but the proportional breadth is different, and the apophyses are widely different in form.

Locality and Horizon.—Gallowhill, near Strathavon, Lanarkshire; in shales of Lower Carboniferous Limestone group.

Collection.—J. Thomson.

Chiton, sp. ind.—(Pl. II., fig. 10.)

Obs.—The interesting specimen represented by Fig. 10 is again from the cabinet of Mr. Armstrong. It is only a fragment of a plate, probably an intermediate one, but introduces us to something unusual in the way of apophyses or insertion processes. Instead of the usual more or less triangular, lamellar plate, we observe the lateral anterior margin of what must have been a large plate, prolonged into a simple spike-like apophysis. It is obliquely bent downwards, and may be described generally as spike-like, or tooth-like, projecting but little beyond the anterior margin of the plate.

Locality and Horizon.—Law Quarry, near Dalry, as before.

Collection, J. Armstrong.

Chiton soleaformis,* sp. nov.—(Pl. I., figs. 18 and 19.)

Sp. Char.—Acutely triangular, slipper-like, elongate, prolonged backwards into a fine drawn-out point, sharply carinate in the median line, arched. Front margin excavated, arched; apophyses very delicate, simply projecting forwards, not continued laterally along the anterior margin. Surface microscopically granulated in transverse lines; no separation into areas by diagonal lines. On the lower surface there is an elongately triangular, flattened incurved area, extending from the pointed posterior extremity, somewhat less than half the length of the plate, and with an unornamented surface. Interior, shoe-like.

Obs.—These elegant little plates have, at first sight, a resemblance to those bodies described by Mr. Kirkby as the mantle spines of *Chitonellus Hancockianus*.† These, Mr. Kirkby informs me, are not hollow and open beneath, and cannot, therefore, have any direct connection with the present fossils. Furthermore, in certain of the recent Chitonidae, such as *Chiton (Corephium) aculeatus*, Lin., the spines implanted along the margins of the

* From *solea*, *a*, an open slipper, or sandal.

† *Quart. Jour. Geol. Soc.*, 1859, xv., p. 622, t. 16, f. 5-8.

mantle have rounded bases, and do not appear to possess processes of attachment.

I have not been able to meet with any described species of fossil *Chiton*, which would include these little plates. They must, therefore, so far as my researches have gone, be looked upon as undescribed, an opinion in which I am glad to have the support of Mr. Kirkby. *Chiton memphiscus*, de Ryckholt, is somewhat like in outline, but is much shorter. I therefore propose for them the specific name of *C. solaeiformis*, in allusion to their resemblance to an open slipper or shoe, when viewed from one side.

Locality and Horizon.—Law Quarry, near Dalry, as before.

Collection.—J. Bennie.

Chiton cordatus, Kirkby.—(Pl. I., figs. 20-22.)

C. cordatus, Kirkby, *Quart. Jour. Geol. Soc.*, 1859, xv., p. 66,
t. 16, f. 25-26.

„ Kirkby, *Trans. Tyne-side Nat. Field Club*, 1860, iv.,
p. 250.

„ Kirkby and Young, *Geol. Mag.*, 1867, iv., p. 341,
t. 16, f. 10 *a* and *b*, 11 *a* and *b*.

Sp. Char.—Posterior plate acutely cordate, acuminate posteriorly to a sharp point. Median line arcuate, the angulation being moderately acute. The dorsal area is defined by two sub-parallel ill-marked grooves, which proceed forwards from a point about half way between the posterior apical termination and the front margin. Posterior margin of plate a little flattened; the anterior margin is indented in the middle line, the indentation being caused by the projection of the two small and delicate apophyses. Surface ornament consists of granules arranged in transverse, and not concentric lines, no grooving of surface present. Viewed from the interior the plate is seen to be of considerable thickness towards the posterior, forming a smooth triangular surface of attachment destitute of markings of any kind. The dorsal area in its convexity, and the character of the defining sulci (here ridges) are much more marked than on the exterior.

Obs.—Except in a few trivial points the plates I have represented in Figs. 20-22 do not differ from Kirkby's *Chiton cordatus*, a Permian species. The Carboniferous form appears to differ only in possessing a more acutely cordate form, absence of transverse or concentric sulcations, and the position of the sulci defining the

dorsal area. In the Permian variety the latter proceed forwards from the apex itself, but in the Carboniferous form from a point about half-way between the posterior termination of the plate and its front margin. Further, *C. cordatus* has previously been noticed as a Carboniferous fossil by Kirkby and Young, which will strengthen the reference now made.

Lastly, these plates have a certain resemblance to *Chiton mempisicus*, de Ryckholt, but to carry out a detailed comparison with this species, actual specimens are necessary.

The terminal plate of the recent *Chiton hastatus* Sow., much resembles the plate now described. It has a similar recurved under portion, but the recent form lacks the arched appearance of the fossil species.

Locality and Horizon.—Law Quarry, near Dalry, as before.

Collections.—J. Bennie, J. Smith, &c.

Chiton Geikiei, sp. nov.—(Pl. II., figs. 1-3.)

Sp. Char.—Anterior plate semi-conical, snout-like, and convex, anteriorly pointed, posteriorly truncately rounded; lateral margins straight from the pointed extremity to the posterior lateral angles. The middle of the plate is a little flattened, and the sides somewhat bent down. Surface crowded with blunt microscopic tubercles arranged in transverse lines, with here and there growth lines; lateral margins bearing a row of acute spirelets. On the underside of the plate there is a recurved margin at the bluntly pointed extremity, and either about the middle, or towards the posterior, there is a thickened transverse ridge.

Posterior plate square oblong; anterior margin truncate; posterior margin rounded; middle line bluntly carinate; flanks directly bent down, not hollowed out. The dorsal ridge terminates at about two-thirds from the anterior margin in an almost imperceptible apex; a ridge proceeds from this point downwards on each side, in a slightly forward direction. The surface of the plate behind this line is rounded, and curves obliquely downwards to the posterior margin. Immediately behind each of the previously described ridges is a corresponding groove, or sulcus. The surface is highly granulated, whilst a line of sharp spinelets, similar to those on the anterior plate, is placed along each diverging ridge. Apophyses small, close to the antero-lateral angles.

Obs.—The presence of the little spinelets, which assist to ornament

the surface of this species is a very interesting point in the structure of these old *Chitons*. So far as my own observation has gone, it is not possessed by any of the other species. The partial flattening of the middle portion of the anterior plate, and the bending down of the lateral portions, give to each of them a tri-divisional appearance resembling the three areas met with usually on the intermediate plates in *Chiton*.

The pointed, snout-like appearance, and the lateral spines, at once distinguish the anterior plates of this species from that of *C. Dalriensis*. The characters of the posterior piece are sufficiently distinctive in themselves. I have much pleasure in naming this species after my friend, Mr. James Geikie, LL.D, F.R.S.

Locality and Horizon.—Law Quarry, near Dalry, as before.

Collection.—J. Smith.

Chiton, sp. incl.—(Pl. I., figs. 23 and 24.)

Obs.—One or two small plates have been found by Mr. J. Smith, which appear to differ from any of the others described, when carefully and minutely examined. The anterior plates come nearest to *C. Geikiei*, but they are proportionately higher, longer, narrower, and more pointed. Lastly, the spines have not been observed. The posterior margin is a little concave, and the surface for some little distance inwards from the posterior margin is crowded with growth lines. The intermediate plates are small and very much bent. The material is too meagre to do more than casually refer to these plates in passing. They may perhaps subsequently be united with one or other of the other species. The surface is covered with microscopic granules of the smallest size, too small almost to be detected with the hand lens.

Locality and Horizon.—Law Quarry, near Dalry, as before.

Collection.—J. Smith.

Genus *Chitonellus*, Lamàreck, 1819.

(Hist. des Animaux sans Vertèbrès, vi.)

Obs.—The genus *Chitonellus*, or at any rate plates of some members of the *Chitonidae* having closer relations to it than to *Chiton* proper, flourished extensively during the Permian period, and we are now acquainted with several distinct forms from our Carboniferous rocks. The deposit at Law Quarry has yielded species of this genus.

Mr. Kirkby has called attention to the peculiar form of the plates of the Permian *Chitonelli*,* and the great development of the processes of attachment inserted in the mantle. We now know similar patelliform plates of Carboniferous age, although there does not appear to be so large an amount of inserted surface in the latter, as in the former. In *Chitonellus* the relatively larger proportion of free mantle surface to that occupied by the plates is something remarkable.

The plates are placed along the median line, usually separate from, and each independent of, the other. In a few forms, however, only the posterior plates are free and separate, whilst the anterior are close to one another, and there is a partial overlapping, indicating a return to the type of an ordinary *Chiton*. A noticeable feature appears to be the difference in size of the exposed portions of the plates, and that inserted in the substance of the mantle, the latter being, as a rule, much larger than the former, which is usually highly ornamented.

Chitonellus subquadratus, Kirkby and Young.

(Pl. II., figs. 4 and 5).

C. subquadratus, K. & Y., *Geol. Mag.*, 1867, iv., p. 342, t. 16, f. 5.

Sp. Char.—Intermediate plate subquadrate in outline, much arched, and acutely carinate along the middle line; anterior and posterior margins excavate, the former much the most so, the posterior excavation being comparatively shallow. The inserted portion of the plate is greatly developed as compared with that exposed without the mantle. The latter resembles a more or less heart-shaped excrescence, with the point of the heart directed forwards; at the posterior end is a raised and slightly prominent mucro; the lateral margins are well defined, and within their border occur scattered granules gradually becoming smaller inwards, but not extending over the mucro. The general surface of the inserted portion of the plate around the margins is marked by a series of diverging somewhat granular ridges.

Obs.—I am happy in possessing the support of Mr. Kirkby's valued opinion in referring this plate to *Chitonellus subquadratus*, K. and Y. It appears to differ only in the absence of the two angular diverging ridges at the posterior end, and in the possession of a more highly developed mucro on the exposed portion of the plate.

* *Quart. Jour. Geol. Soc.*, xv., p. 618.

Later writers have been in the habit of eliminating from the list of palaeozoic Chitons, the *Chiton (?) cordifer*, de Koninck,* on the authority of Baron de Ryckholt.† I would, however, join with Mr. W. H. Bailly in pointing out ‡ that, according to one of his latest papers on this family, Prof. de Koninck by no means admits this abolition, § but retains the species under the name of *Chitonellus*. There is no doubt that the so-called *C. cordifer*, de Koninck, whatever its nature, and *Chitonellus subquadratus*, K. and Y., do approach one another closely, and the plate above described appears to combine some of the characters of both.

The re-occurrence of a plate of this old form of *Chitonellus* in the Law Quarry bed is not one of the least interesting facts to be gleaned from Mr. Bennie's gatherings at that locality.

Chitonellus, sp. ind. (?).—(Pl. II., figs. 6 and 7.)

Sp. Char.—In marginal outline almost square, but a little longer from before backwards than broad; pyramidal and slightly arched, acuminate upwards; lateral margin parallel, straight, or a little bi-convex; anterior margin slightly rounded; posterior margin concave, the angles pointed and a little produced. The exposed portion is represented by a patelloid cap, rather more anterior than posterior in position, and with a well-defined raised margin separating it from the inverted portion of the plate; apex curved backwards, and rather depressed, but not overhanging the posterior margin; within the margin two or three rows of prominent granules, succeeded by those of a second order, which gradually die out before reaching the apex. The surface of the inverted portion of the plate around the exposed parts is marked by many radiating non-granular ridges, which are much stronger and better marked towards the anterior.

Obs.—It is quite within the bounds of possibility that this may be only another plate in the economy of the last described species. The general character of the plate is the same, although the much squarer form hardly points in this direction. The granulation is likewise much more marked, and the radiating striae on the inserted surface stronger.

* *Descript. Animaux Foss.*, p. 324, t. 22, f. 5.

† *Bull. de l' Acad. R. de Bruxelles*, 1845, xii., pl. ii, p. 60.

‡ *Jour. Geol. Soc., Dublin*, 1860, viii., p. 170.

§ *Annals and Mag. Nat. Hist.*, 1860, vi., p. 95.

If further researches should prove it distinct it might be called *C. quadratus*.

Amongst recent Chitons, *Chitonellus* (*Notoplax*) *speciosa*, H. Adams, from Tasmania, has a granular coronet like the present form of plate, and that described as *C. subquadratus*, K. and Y.

Locality and Horizon.—Law Quarry, near Dalry, as before.

Collection.—J. Bennie.

Chitonellus (?) *patelliformis*, sp. nov.—(Pl. II., figs. 8 and 9).*

Sp. Char.—Anterior (?) plate conical, patelliform, longer than wide, narrowing towards the front. Posterior margin broadly rounded, anterior rounded but contracted—from the apex forwards the plate is obtusely carinated, and gradually descends to the front margin. Apex blunt, scarcely recurved, situated at about the posterior third of the plate, at which point the latter is also widest. From the apex proceeds two grooves forwards to the antero-lateral margins, dividing the plate into three areas, a central one forming the obtuse median ridge, and two others, one on each side, and comprising by far the largest part of the plate. From, and posterior to the apex, radiate six, and sometimes seven strong ridges to the posterior margin; between these are other fine interpolated and quite microscopic granular striae, which are repeated on the flanks of the plate, and in very well preserved specimens are visible on the obtuse central keel also. The inserted portion of the plate is small, forming only a narrow rim, or belt, round the margin of the plate, and more highly developed towards the anterior. The interior surface is quite plain, except that the posterior margin is convoluted by the coarse ribs and intermediate valleys.

Obs.—This peculiar plate, undoubtedly, resembles *Chitonellus antiquus*, Howse, sp.,† to which it is closely allied by its general character and appearance. It may, however, be distinguished by the presence of the double groove from the apex forwards, the constant presence of the six or seven posterior radiating ridges, the more ridge-like character of the median line anterior to the apex, and the broken style of ornament.

Again, it is clearly an ally of *Chitonellus subantiquus*, K. and Y.,‡

* It is possible that fig. 17 (Pl. I.) represents the posterior plate of this species.

† *Quart. Jour. Geol. Soc.*, xv., p. 619, t. 16, figs. 15-23.

‡ *Geol. Mag.*, iv., p. 341, t. 16, f. 12, 13.

but is distinguished by the lateral position of the radiating ridges in the latter, and other minor characters. The relation between the two forms may be nearer than at first appears, as it is stated of *C. subantiquus*, that other ridges "appear to have originally existed in front and behind." Mr. Kirkby has examined these plates, and, in a recent letter* exclaims, "surely they must be far-back ancestors of *C. antiquus*."

Locality and Horizon.—Law Quarry, as before.

Collections.—J. Bennie, J. Armstrong, J. Smith, &c.

Chitonellus Bennieanus, sp. nov.—(Pl. II., figs. 11-13.)

Sp. Char.—Depressed or flattened patelliform, rather obliquely oval, inequilateral, narrower in front than behind, and often irregular. Apex remote from the front, scarcely differentiated from the remainder of the plate; a deep furrow extends from the apex to the front margin. Front margin acutely rounded, more or less produced in the median line; posterior margin obliquely truncated, or obliquely concave. Inserted portion of plate in the form of a narrow marginal rim, including in it the produced portion of the front margin. The surface is ornamented by a series of radiating ridges extending all round the plate, but less plainly defined on the anterior third; the ridges are crenulated by the presence of innumerable granules, whilst between the larger, smaller ones are occasionally interpolated.

Obs.—It is quite within the bounds of possibility, although, I think, not probable, that these plates may have formed part of the shell-covering of the same mollusc as those last described. Without any desire merely to create a species, I have separated them on account of the difference in the general shape of the two plates, the presence of the anterior furrow in the present form, and the much more numerous and more widely distributed crenulated ribs. Should further researches prove the two forms of plates to be identical, I would suggest the retention of the above specific name in recognition of Mr. J. Bennie's careful researches and discoveries in the strata from which the remains are derived.

The furrow extending from the apex to the front would tend to ally the present plate to that described by the Baron de Ryckholt as *Sulcochiton*, but the form and ornamentation of the respective plates is quite different.

* Dated Nov. 6, 1880.

Locality and Horizon.—Law Quarry, near Dalry, as before.

Collections.—J. Bennie, J. Armstrong, J. Smith, &c.

Chitonellus (?) *Kirkbyanus*, sp. nov.—(Pl. II., figs. 14-22.)

Sp. Char.—Anterior plate conoid, except on one side, which is partially truncated. Anterior margin rounded; posterior forming an arched re-entering angle; postero-lateral angles rounded. Apex elevated, sub-central to posterior in position, and when so, overhanging the posterior margin. The plate is more or less arched along the middle line; from the apex to the postero-lateral angles two ridges proceed, which enclose a small obliquely truncated triangular space; two faintly-marked diagonal ridges proceed from the apex forwards, one on each side. Inserted portion of plate forms a small unornamented margin round the edge of the plate, broader on the anterior.

Second plate (?) quadrate in outline, almost as broad as long, very much arched. Median line obtusely carinate. Anterior margin a little concave in the centre, rounded at the sides; posterior and posterior end as in the anterior plate. Apex terminating the central keel, somewhat overhanging. The inserted part of the plate forms a band round the edge as usual, the broadest portion being at the rounded antero-lateral angles.

Intermediate plate elongated longitudinally, and strongly arched; the apex placed at the posterior end of the arched keel is a little elevated, and the dorsal line concave. Anterior margin rounded at the sides, and much excavated in the middle line; posterior margin similar, but the excavation shallower; as in the former plates a small obliquely truncated area is formed at the posterior end by two angles from the apex to the postero-lateral angles. A faint diagonal sulcation passes from the apex forwards on each side defining, indistinctly, the dorsal and lateral areas. Exposed surface of the plate small, as compared with the inserted portion, more or less cordate in outline, and occupying the posterior end of the plate; the inserted margin is broadest forwards, and has a few indistinct radii on the surface.

The posterior plate is narrow and much elongated longitudinally, but patelliform in the hinder portion. Anterior margin excavated in the middle, projecting forwards at the sides; posterior margin rounded. Middle line arched, carinate and concave, terminating in the elevated apex, which is within the margin. The posterior end

slopes obliquely from the apex to the margin; flanks of the plate rather pinched-in. Exposed surface proportionately larger than in the other plates, and with a few coarse radii from the apex round the posterior end of the plate; ridges variable in number, and alternately larger and smaller.

The exposed surface of all the plates is microscopically granular.

Obs.—The large proportion of inserted or covered surface of these plates, as compared with the exposed, and the nature of the ornamentation, will clearly place this form with *Chitonellus* rather than *Chiton*. At any rate this arrangement will be preferable until some further sub-division of the genus *Chiton* is proposed for the accommodation of the palaeozoic species of the family. The reference to *Chitonellus* is borne out by the absence of apophyses, and by the form of the posterior plate. The latter is quite chitonellid in its elongated narrow outline, and so far is comparable with that of *Chitonellus Youngianus*, Kirkby, whilst the arched nature of the plates shews a departure towards those known as *Chitonellus subquadratus*, K. & Y.

The figure of the posterior plate, given by de Ryckholt,* as that of *Chitonellus cordifer*, de Koninck, has much resemblance to that of the present species.

Mr. Kirkby, who has examined specimens, believes this form to be undescribed and to require separation. So far as my own researches have gone it is so, and I have, therefore, much pleasure in associating with it Mr. Kirkby's name, thanking him, at the same time, for the assistance he has always kindly rendered me.

Locality and Horizon.—Law Quarry, as before.

Collections.—J. Bennie, J. Armstrong, J. Smith, &c.

Chitonellus Youngianus, Kirkby.—(Pl. II., figs. 23, 24.)

C. Youngianus, Kirkby, *Trans. Geol. Soc. Glasgow*, 1865, ii., p. 14, t. 1, f. 2.

„ Kirkby and Young, *Geol. Mag.*, 1867, iv., p. 341, t. 16, f. 2-4.

Obs.—A fine posterior plate of this species has reached me from the cabinet of Mr. Armstrong, in which all the details are exceedingly well shewn. The plate agrees with the description given by Kirkby and Young, except that the exposed portion of the plate is rather more pointed in front than is represented in the published

* *Bull. de l'Acad. R. de Bruxelles*, 1845, xii., pt. 2, t. 4, f. 10.

figures. The apex is also more prominent and a little abruptly truncated behind. The surface of the exposed region is very pustulose, and the posterior inserted margin strongly radiately ridged. On the whole, the form of this plate is that of *C. Youngianus*, while the minute details are quite those of that before referred to as *C. subquadratus*, except, of course, that one is an intermediate and the other a posterior plate. If the present specimen is truly *C. Youngianus*, I think it not at all unlikely that it and *C. subquadratus* are plates of one and the same form; all the characters point in this direction.

One of de Ryckholt's figures* of *Chitonellus cordifer*, de Koninck bears much likeness to the posterior plate of *C. Youngianus*.

Locality and Horizon.—Cunningham Baidland, near Dalry; Lower Carboniferous Limestone group.

Collection.—J. Armstrong.

3.—LIST OF WORKS AND PAPERS REFERRING TO THE PALAEOZOIC CHITONIDAE.

1. *Münster, G. Graf zu.*—Beitrage zur Petrefacten-kunde. 4to, Beyreuth, (*Chiton priscus*, Münster. Heft i., 1843, p. 60.)

2. *De Koninck, L. G.*—Description des Animaux Foss., Terrain Carbonifère de Belgique, 4to, Liege, 1842-44. (Genus *Chiton*, p. 319.)

3. *Ryckholt, Baron de.*—Résumé géologique sur le genre *Chiton*, Lin. *Bull. de l'Acad. R. de Bruxelles*, 1845, xii., pt. 2, pp. 36-62, pls., 1-4.

4. *Ryckholt, Baron de.*—Mélanges Paléontologiques; Genus *Chiton*, pp. 63-65, 4to. (Extrait de tome xxiv. des *Mem. de l'Acad. R. de Belgique*, p. 63.)

5. *Salter, J. W.*—Description of a Fossil Chiton from the Silurian Rocks, with Remarks on the Fossil Species of the Genus. *Quart. Jour. Geol. Soc.*, 1847, iii., pp. 48-52.

6. *Roemer, F. A.*—Beitrage zur Geologischen Kenntniss des nordwestlichen Harzgebirges. *Palaeontographica*, 1855, v., lief. 1, pp. 1-46. (*Chiton laevigatus*, F.A.R., p. 36.)

7. *Sandberger, Drs. G. & F.*—Die Versteinerungen des Rheinischen Schichtensystems in Nassau, 4to, 1850-56. (Genus *Chiton*, pp. 237-240.)

8. *Kirkby, J. W.*—On some Permian Fossils from Durham.

* *Loc. cit.*, t. 4, f. 15.

Quart. Jour. Geol. Soc., 1857, xiii., pp. 213-218. (*C. Howseianus*, Kirkby, p. 216.) *Trans. Tyngeside Nat. Field Club*, 1858, iii., pp. 286-294, t. 12.

9. *Stevens, R. P.*—Description of New Carboniferous Fossils from the Apalachian, Illinois, and Michigan Coal-fields. *American Jour. Science*, 1858, xxv., pp. 258-265. (*Chiton carbonarius*, Stevens, and *C. parvus*, Stevens.)

10. *Kirkby, J. W.*—On the Permian Chitonidae. *Quart. Jour. Geol. Soc.*, 1859, xv., pp. 607-626, t. 16; *Trans. Tyngeside Nat. Field Club*, 1860, iii., pp. 238-263.

11. *House, R.*—Notes on the Permian System of Northumberland and Durham. *Annals Nat. Hist.*, 1857, xix.; *Trans. Tyngeside Nat. Field Club*, 1858, iii., pp. 235-285, t. 11. (*Chiton Loftusianus*, *C. Howseianus* and *Calyptraea antiqua*.)

12. *Baillly, W. H.*—On the Occurrence of detached plates of the shell of a new species of *Chiton* in the Carboniferous Limestone at Lisbane, Co. Limerick. *Jour. Geol. Soc., Dublin*, 1860, viii., pp. 167-171.

13. *De Koninck, L. G.*—Observations on two new species of Chitons from the Upper Silurian "Wenlock Limestone" of Dudley. *Annals Nat. Hist.*, 1860, vi., pp. 91-98.

14. *Kirkby, J. W.*—On some remains of *Chiton* from the Mountain Limestone of Yorkshire. *Quart. Jour. Geol. Soc.*, 1862, xviii., pp. 233-237.

15. *Ryckholt, Baron de.*—Diagnose d'un nouveau genre de la Famille des *Chitonidae*. *Jour. de Conchyliologie*, 1862, x., pp. 259-60.

16. *Kirkby, J. W.*—On some Fossils from the Lower Magnesian Limestone of Sunderland. *Trans. Tyngeside Nat. Field Club*, 1864, iv., pp. 212-20. (*Chiton Loftusianus* (?), p. 216.)

17. *Young, J. & Kirkby, J. W.*—Provisional Notice of a new *Chiton*, and a new species of *Chitonellus* from the Carboniferous Rocks of Western Scotland. *Trans. Geol. Soc. Glasgow*, 1865, ii., pp. 13-15.

18. *Thomson, J.*—On a *Chiton* plate from Carboniferous Shale on the banks of the Avon, near Strathavon. *Ibid.*, p. 15.

19. *Kirkby, J. W. & Young, J.*—Notes on some Remains of *Chiton* and *Chitonellus* from the Carboniferous Strata of Yorkshire and the West of Scotland. *Geol. Mag.*, 1867, iv., pp. 340-43, t. 16.

20. *Young, J.*—On *Chitonellus*, recent and fossil. *Proc. Nat. Hist. Soc., Glasgow*, 1878, iv., pp. 322-324.

DESCRIPTION OF THE FIGURES.*

PLATE I.

Chiton Dalriensis, Etheridge, jun.

Fig. 1.—Anterior plate of the full size. $\times 5$. Collection.—J. Bennie.

Fig. 2.—Intermediate plate, largest observed. $\times 4$. Collection.—J. Smith.

Fig. 3.—Side view of the same plate. $\times 4$.

Fig. 4.—A similar but smaller plate, with the apophyses in place. $\times 4$. Collection.—J. Smith.

Fig. 5.—Side view of the same plate. $\times 4$.

Fig. 6.—Another form of intermediate plate, probably of this species, in which the apex is much produced backwards, and the ornament partially removed from the centre. $\times 4$. Collection.—J. Smith.

Fig. 7.—A fourth form, with the granules similarly removed, and the anterior concavity somewhat enlarged by reason of slight fracture. $\times 4$. Collection.—J. Smith.

Fig. 8.—A very delicate and transversely elongated plate, also, probably, of this species. $\times 4$. Collection.—J. Smith.

Fig. 9.—Normal form of posterior plate, with the apophyses a little broken. $\times 7$. Collection.—J. Bennie.

Fig. 10.—Interior of posterior plate. $\times 6$.

Fig. 11.—A posterior plate more transversely elongated in proportion to its length. $\times 6$. Collection.—J. Bennie.

Fig. 12.—Side view of the same. $\times 6$.

Fig. 13.—A posterior plate presumed to be a variety of *C. Dalriensis*, in which the apophyses are larger, and dorsal ridge longer. $\times 8$. Collection.—J. Bennie.

Fig. 14.—Side view of same; the vertical posterior end is well shewn. $\times 8$.

Chiton Armstrongianus, Etheridge, jun.

Fig. 15.—An entire posterior plate of this species, with portions of ornamentation enlarged; Williamwood, near Glasgow. $\times 3$. Collection.—J. Armstrong.

* Unless otherwise stated the examples figured are from Law Quarry.

Chiton, sp. ind.

Fig. 16.—The intermediate plate referred to *Chiton gemmatus*, de Kon. ; Strathavon, Lanarkshire. $\times 2$. Collection. — J. Thomson.

Fig. 17.—A plate which may possibly be the posterior of *Chitonellus* (?) *patelliformis*.—(Pl. II., figs. 8 and 9). $\times 6$.

Chiton solaeformis, Etheridge, jun.

Fig. 18.—A complete posterior plate of this peculiar species, with the apophyses preserved. $\times 8$. Collection.—J. Bennie.

Fig. 19.—Interior view of another example, from the same collection, shewing the in-turned under surface. $\times 8$.

Chiton corlatus, Kirkby (?).

Fig. 20.—Posterior plate, with the apophyses preserved, and the strong dorsal ridge well shewn. $\times 6$. Collection.—J. Smith.

Fig. 21.—Three-quarter view of the same specimen. $\times 6$.

Fig. 22.—Interior of another example, shewing the concavity of the dorsal ridge and the in-turned posterior margin. $\times 8$. Collection.—J. Smith.

Chiton, sp. ind.

Figs. 23 and 24.—Two small intermediate (?) plates, of doubtful identity. $\times 12$. Collection.—J. Smith.

PLATE II.

Chiton Geikiei, Etheridge, jun.

Fig. 1.—An anterior plate exhibiting the pointed posterior end and the lateral spinelets. $\times 8$. Collection.—J. Smith.

Fig. 2.—Interior of another example with the posterior in-curved margin. $\times 8$. Collection.—J. Smith.

Fig. 3.—Posterior plate shewing the dorsal ridge, the posterior divaricating grooves, and the overhanging spinelets. $\times 8$. Collection.—J. Smith.

Chitonellus subquadratus, K. & Y. (?)

Fig. 4.—An intermediate plate, with the leaf-shaped non-inserted space and recurved apex. $\times 8$. Collection.—J. Bennie.

Fig. 5.—Side view of the same specimen. $\times 8$.



Chitonellus, sp. ind. (?)

Fig. 6.—A square intermediate plate, with an oval, granular, exposed area, and recurved apex. × 7. Collection.—J. Bennie.

Fig. 7.—Side view of the same plate. × 7.

Chitonellus (?) *patelliformis*, Etheridge, jun.

Fig. 8.—A conical anterior (?) plate, with the forwardly directed grooves, and posterior radiating ridges. × 8. Collection.—J. Bennie.

Fig. 9.—Interior of another example, from the same collection. × 8.

Chiton, sp. ind.

Fig. 10.—A small depressed plate with the remains of a peculiar spike-like apophysis. × 6. Collection.—J. Armstrong.

Chitonellus Bennieanus, Etheridge, jun.

Fig. 11.—A characteristic example, obliquely oval, and with the narrow inserted margin. × 7. Collection.—J. Bennie.

Fig. 12.—Another example, with the crenulated ridges well shewn. × 7. Collection.—J. Bennie.

Fig. 13.—Interior of a third specimen. × 7. Collection.—J. Bennie.

Chitonellus (?) *Kirkbyanus*, Etheridge, jun.

Fig. 14.—An anterior plate seen from above, with the large marginal inserted area well shewn. × 8. Collection.—J. Bennie.

Fig. 15.—Interior of another example. × 8. Collection.—J. Bennie.

Fig. 16.—Another anterior plate seen somewhat from behind, with the posterior oblique area exposed. × 8. Collection.—J. Bennie.

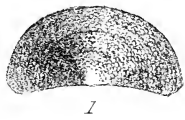
Fig. 17.—Side view of the same. × 8.

Fig. 18.—An intermediate plate, with the large inserted surface, strong dorsal ridge, and oblique posterior area. × 4. Collection.—J. Bennie.

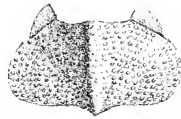
Fig. 19.—Side view of the same plate. × 4.

Fig. 20.—A posterior plate, with its radiating ornamental ridges. × 8. Collection.—J. Bennie.

Fig. 21.—A side view shewing the concave dorsal line and high posterior apex. × 8. Collection.—J. Bennie.



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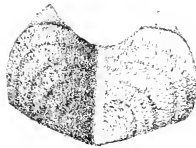
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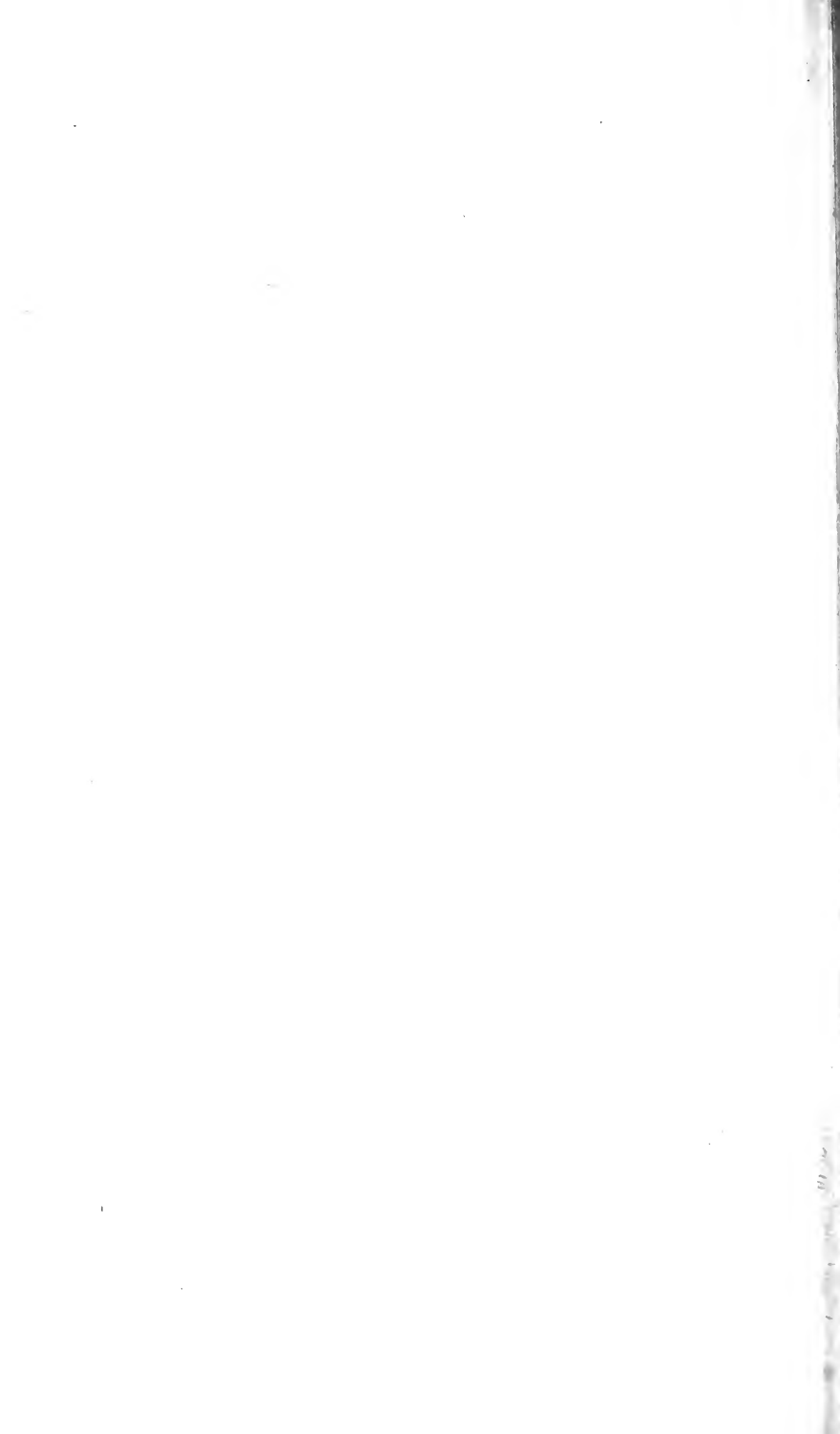


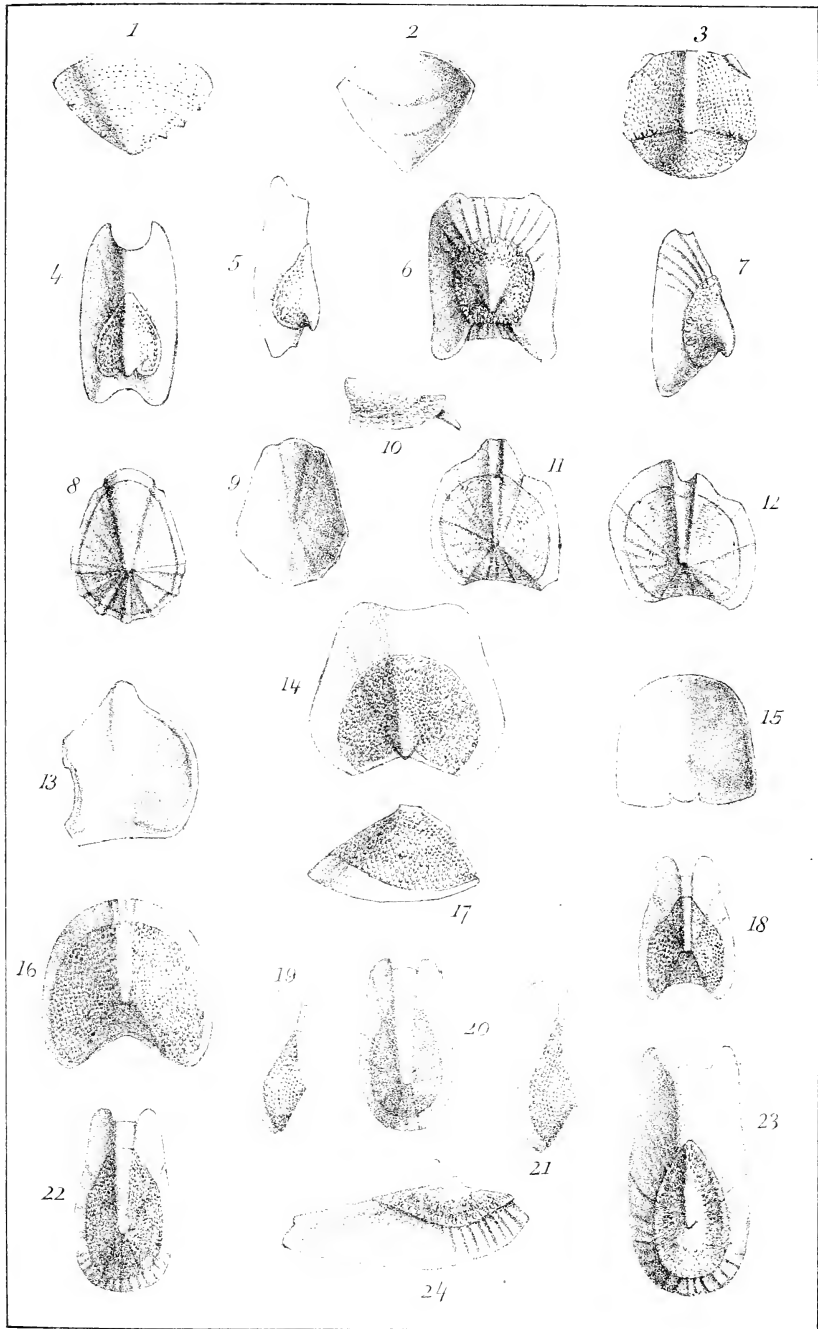
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CARBONIFEROUS CHITONS.





CARBONIFEROUS CHITONS.

Fig. 22.—Another posterior plate somewhat larger than the last.
 × 6. Collection.—J. Bennie.

Chitonellus Youngianus, Kirkby.

Fig. 23—A posterior plate, with the highly granulated exposed area and posterior ridges. × 4. Collection.—J. Armstrong.

Fig. 24.—Side view of the same plate. × 4.

THE SOCIETY'S ROOMS, 207 BATH STREET,

APRIL 26th, 1881.

Mr. John Young, F.G.S., in the Chair.

Messrs. James Riddell, George R. Alexander, Alexander Birrell, John Ingram, and John Alexander Young, were elected ordinary members. Mr. T. E. Buckley, F.Z.S., Attadale House, Strathcarron, Ross-shire, was elected a life member.

It was announced by the Librarian that four volumes of *The Zoologist* had been presented to the Society's Library by Mr. James Lumsden, F.Z.S., to whom the thanks of the Society were therefore cordially awarded.

SPECIMENS EXHIBITED.

Mr. David Robertson, F.L.S., exhibited specimens of *Technitella legumen*, Norman, and *Technitella malo*, Norman, dredged at Oban in September, 1875. They were referred by the Rev. A. M. Norman to the Poriphora, and by Mr. H. J. Carter to the Rhizopoda. The contention was urged for a time somewhat strongly by both parties, and without the dispute being settled they have lain over until almost forgotten. In the interval Mr. Saville Kent, having studied the living animals in the Channel Islands, has finally published (*Annals and Mag. of Nat. Hist.*, vol. ii., p. 68, pl. iv.-v.) his descriptions and illustrations, and states that the foraminiferal nature of these organisms is now established beyond dispute. The tests of the two under notice are made up of sponge spicules, and from external appearance the resemblance to a sponge is very great, and it is not surprising that they should be mistaken for such. At

the same time, it shews the difficulty that exists, and the great care that is required in coming to correct conclusions regarding the true nature of these lowly forms.

The Chairman exhibited specimens of a new species of *Archaeocidaris*, a fossil sea urchin, and a species of *Siliquaria*, a tubular univalve shell, both forms being from the collection of Dr. Rankin, Carluke, which was recently presented by him to the Hunterian Museum. The new species of *Archaeocidaris* is only known as yet by its larger spines, which bear four rows of smaller spines or denticles, their peculiarity being that they are long and thorn-like, and stand out from the body of the main spine at nearly right angles, whereas the denticles on the other species of *Archaeocidaris* are shorter, and clasp or point to the upper end of the spines at acute angles. Specimens of this species have been submitted to Dr. Wright, of Cheltenham, an authority on fossil sea urchins, and he is likewise satisfied that it is still an undescribed one. It has only as yet been found in the limestone shales at Gillfoot, Carluke, and the Chairman (Mr. Young) has provisionally named it after its discoverer *Archaeocidaris Rankinii*. The other fossils from Dr. Rankin's collection were referred, rather doubtfully, to *Siliquaria*, a genus which has not hitherto been identified from older strata than the Eocene beds of the Tertiary formation, and which is only represented at present by seven living species, found chiefly in sponges. The specimens, which are three in number, may be considered unique, and were found in the shales of the Gare limestone series at Carluke. They consist of fragments of tube-like whorls of a large spiral shell, the tubes being nearly one-half inch in diameter, and shewing a moderately thick shell. After a careful examination of these fragments Mr. Young could only refer them to the genus *Siliquaria*, which is characterised by having an open tubular shell with a continuous open narrow slit running along the whole length of the tube. The Carboniferous species seem to agree with the recent shells in this respect, and they further agree in having the slit along the upper and outer sides of the whorls of the tubes, the shell growth being likewise seen to run parallel with the edges of the slit, shewing that it could not be due to accidental fracture. Should the identification of these specimens with *Siliquaria* be confirmed by the discovery of other specimens, Mr. Young proposed to name this species *S. carbonaria*, to denote the formation from which they were obtained.

Mr. John M. Campbell exhibited a specimen of a Swan, on which he remarked as follows:—

On the 8th February last I purchased, at a poultry shop in Glasgow, a Swan which had been killed about 10 miles from Ramelton, County Donegal, Ireland. At first sight I thought the bird was a large specimen of Bewick's Swan, *Cygnus bewickii*, but subsequent examination led me to doubt whether it was really the bird described under that name by Yarrell. The chief point of difference from the bird described by him is that the loop-like form of the trachea, which lies in the cavity of the sternum, is, in this specimen, absent. As the bird, although slightly larger than the dimensions given by Yarrell, agrees in other respects with his *C. bewickii*, this alteration in the character of the trachea might have been an individual divergence from the normal type. But similar sterna of reputed *C. bewickii*, examined by me, all exhibit the same abnormal form, and on communicating with Prof. A. Newton on the subject, he gave his opinion that the loop-like form of the trachea is not constant. What, then, is the true specific distinction of Yarrell's *C. bewickii*? That distinguished ornithologist states that "the principal and most obvious difference is in the trachea," and he very fully explains its structure* as a point of great specific value. If, then, in the specimens of *C. bewickii*, whose sterna I have examined, and in the specimen now under consideration, which Prof. Newton states is the largest he has ever seen or heard of, we find the characters, on which Yarrell founded his species, absent, may we not be led to suppose that it is much more rare than is generally believed, and that a closely allied form is confounded with it? The doubt, if any, can only be thoroughly cleared up by an examination of a good series of British species in the flesh, and of different ages. I therefore wish to draw the attention of the members of the Society to the question with that end in view.

The specimen under notice, which is now in the Kelvingrove Museum, was a male in rather poor condition, the stomach being entirely empty. It weighed $12\frac{1}{4}$ lbs., and measured as follows:—Length, 52"; girth, $30\frac{1}{2}$ "; stretch of wing, 79"; length of wing, $38\frac{1}{2}$ "; length of wing from carpal joint, 22"; length of leg (*tarso metatarsus*), $4\frac{1}{4}$ "; foot, $6\frac{1}{2}$ "; beak, measured along culmen, 4"; greatest width of beak, $1\frac{3}{8}$ "; length of tail from vent, $8\frac{1}{2}$ "; length of sternum from keel to apex, $7\frac{3}{8}$ ".

* "History of British Birds by W. Yarrell," 3rd ed., 1856, vol. iii., p. 205.

Mr. Campbell also shewed a specimen of the Chilian Skua *Stercorarius chilensis*, Saunders, and said:—

In a paper by Mr. Howard Saunders on the Skua Gulls, which was printed in the *Proceedings* of the Zoological Society for 1876, he describes (p. 323) a new species under the name of *S. chilensis*, and which had till then been confounded with *S. antarctica*. The specimens to which he refers were obtained at Mejillones, Bolivia, in latitude $23^{\circ} 5' S.$, at the end of February or beginning of March. This species he distinguishes from *S. antarctica* by the ruddy chestnut colour of the under parts, and axillaries which in the latter species are black; and it agrees more nearly to *S. cataractes*, the northern species. He also says, “in the absence of any reliable information as to its breeding haunts it would be rash to indulge in any speculation as to whether they are to the north or to the south of the equator.” This point I am glad to be able to clear up, having found the species breeding on several points on the east coast of South America, in Patagonia. I first observed this bird in latitude $40^{\circ} 7' S.$, and obtained specimens of it in Desire River, and on an islet a little way up its nest and eggs were first obtained on 30th Nov. 1871. Subsequently it was found breeding at Port San Julian, Watchman’s Cape, and at Port Santa Cruz. At the latter place, on a little island, a great many nests were found in Dec. of the same year. The nest was merely a slight hollow in the ground in which were a few stalks of dried grass, the eggs, two or three in number, were about $2\frac{7}{8}$ inches in greatest length and 2 inches in breadth, and were of an olive brown, irregularly spotted and blotched with ashy and rusty brown spots, more particularly at the larger end, sometimes forming a distinct zone. The birds were bold, and swooped so close that their wings, at times, almost touched our faces.

PAPERS READ.

I.—“*On St. Abb’s Head and its Bird Life.*” By Mr. John A. Harvie-Brown, F.R.S.E., M.B.O.U., &c., V.-P.

A good deal has already been written concerning St. Abb’s Head and its bird life, more especially in the *Proceedings of the Berwickshire Naturalists’ Field Club*, which is, perhaps, the most perfectly organised Society in Scotland. Very little has been left undone in Berwickshire, and anything I have to say regarding St. Abb’s

Head is simply an account of a personal visit to it last summer, and of an endeavour to collect the materials concerning the locality into accessible form. Owing to the rarity of the earlier volumes of the Berwickshire Club's *Proceedings*, my effort may not prove unacceptable, while, at the same time, it will serve as a continuation of a series of similar papers upon other rock-bird haunts in Scotland, which I have personally visited. A comparison of the remarks of naturalists—such as Selby in 1833, and Hepburn in 1850—with those of the present time, is always worth making, as by so doing indications of the changes in the bird-population of the localities treated of are at once observable.

The following is a list of the papers relating to St. Abb's Head and the vicinity which have hitherto appeared, so far as I have been able to ascertain. To Mr. James Hardy, of Old Cambus, I wish—not for the first time, nor, I hope, for the last—to give my thankful acknowledgments for much assistance in the preparation of this portion of my paper.

1832—Dr. Johnston's address to the Club, Sept. 19th, 1832, [*Proc. Berw. Nat. Field Club*, vol. x., pp. 5, 6,] gives a general account of St. Abb's Head and its winged inhabitants, and a confirmatory notice of the Chough from the Rev. A. Baird's observations [p. 6].

—.—Record of another visit [*op. cit.*, pp. 16, 17,] notices plants and land mollusca.

—.—Notice of the birds observed in the neighbourhood of St. Abb's Head on July 18th, 1832. By Mr. P. J. Selby, F.R.S.E., F.L.S., &c. [*op. cit.*, vol. i., pp. 18-20].

1833.—Observations on the birds observed in the neighbourhood of Coldbrandspath* in April, and there at St. Abb's Head in June, 1833. By Mr. P. J. Selby [*op. cit.*, vol. i., pp. 20-22]. Common Falcon seen, and its eyrie, Green Cormorant, &c.

Report on the Ornithology of Berwickshire and district, within the limits of the *Berw. Nat. Field Club*. By Mr. P. J. Selby, of Twizell House [*op. cit.*, vol. i., pp. 250-262]. Lists of birds of Berwickshire and Holy Island and Farne Islands are added.

1850-56.—Notes on some of the mammalia and birds found at St. Abb's Head. By Mr. A. Hepburn [*op. cit.*, vol. iii., p. 70]. Some new birds are mentioned here, and there is a notice of a supposed Wild Cat becoming semi-domesticated.

* The older name of Cockburnspath.

1856-62.—Anniversary address by Mr. J. C. Langlands, *Pres.*, on 29th Sept., 1859, pp. 127-131. A very good account of St. Abb's Head, in which the local names of some of the rocks and promontories are given, along with notices of local traditions and legends, and the view from St. Abb's Head is described.

1863-68.—Anniversary address on 28th Sept., 1865. By Mr. F. J. W. Collingwood, Glanton Pyke, *Pres.* A short account.

Besides the above those who are interested in the wider district of Coldinghame may be referred to a "History of Coldinghame Priory," by A. A. Carr, Surgeon, Edin., 1836, in which a catalogue of its rarer botanical productions is given, and a chapter upon the geology of Berwickshire.

According to arrangement, a party of four, of which I was one, paid a visit to St. Abb's Head, on the Berwickshire coast, on the 25th July, 1880, taking an early train from Edinburgh to Reston Junction, and driving three miles to Coldingham village. From this we walked to the fishing village of Coldingham shore, a short two miles further. There we secured the services of a native fisherman, William Thorburn, an intelligent, active, and obliging man. We first rowed round below the cliffs, to the westward or "up the Firth," which are at no great distance from the fishing village.

What appeared to me the finest and most densely-populated part of the range is a high, projecting, narrow peninsula of cliff, which juts out into the sea at right angles with the shore, the most populous face being that fronting the little village which lies within the bay. This peninsula is accessible from the mainland by a narrow ridge sloping steeply on the west side, but breaking into sheer precipice—in places overhanging—on the side next the village. At the narrowest part rises a curious pinnacled rock, which, whether seen from the land or from the sea, appears extremely like a shattered portion of some ancient keep; and holes piercing it here and there make the deception almost complete, especially when viewed from seaward, along the westward shore. Upon the precipitous side were many Guillemots, occupying broad table-like ledges, which sloped outwards and downwards. Some of these would be most difficult to reach owing to the formation of the cliff above, which projects many feet beyond. We had a good view of this part afterwards from the shore, getting close in underneath

upon the rocks at low-tide. This part of the cliff is known as the Castle Hill.*

Rowing round and sailing, we could not approach very near to the cliff-foot, as a heavy surf was breaking upon the outlying spurs of horizontal rock, and upon the little islets and stacks which stud the undercliff; but we were near enough to see the young Herring Gulls on the grassy tops of the stacks, or distinguish a Starling or a Jackdaw as it flitted across the face of the main cliff, 50 or 60 yards further back, or popped in and out of the holes in the rugged precipice.

We searched eagerly for the Chough or Red-legged Crow, both when on land and in the boat, but failed to observe one; but our failing to see them is no guarantee that they were not there, for as Mr. Robert Gray truly remarked to me afterwards, "unless you could have been there in early morning, or about sunset, you would in ordinary weather have but a poor chance of finding the 'Red-legs' at home." Mr. Gray also instanced his own disappointment on similar occasions, on half a dozen trips to another part of our Scottish coasts where they are still present.

At the same time I may mention that both at the Lizard in Cornwall, and at localities in the West of Scotland, I have repeatedly—day after day, in fine summer weather in the months of May and June—seen the "Red-legs" jerking away along the cliff-face, or sitting on a point below me, as I peered carefully over; and this, both at sea-cliffs and at inland localities. Mr. Gray, however, agrees with me that it is quite possible that they may not have returned to St. Abb's Head, though he sees no other reason to doubt their presence at other localities on the same coast.†

The rock scenery of St. Abb's Head, and some miles of coast-line stretching westwards, is very fine, broken as it is into masses, pinnacles and stacks, pierced by tunnels and caves, and furrowed

* St. Abb's Head "consists of four hills separated from each other by what are here called 'nicks,' or deep valleys. The most southerly and lowest is the Castle Hill," as above, from the resemblance presented by the rocks. The Kirkhill follows, next is Harelaw, and the largest and boldest is Headland [*Proc. Berw. Nat. Field Club*, 1859, p. 127].

† Dr. Geo. Johnston, remarking on the Chough on this coast, speaks of its being "certainly ascertained to breed in the rocks," and repeats a much older record by Bishop Leslie ["*De Origine Scotorum*," 1578], afterwards verified by Rev. A. Baird.

by steep scaurs and rubble slopes, and interspersed with the green patches occupied by the Gull colonies on the tops of the outlying rocks. Especially did we admire the portion underneath the Lighthouse, where the precipitous stacks of Flodécarr and the Claver, topped with sea-pink and grass, are inhabited by a mixed colony of Herring and Lesser Black-backed Gulls, whose white breasts, along with the bright green beneath their feet, shewed in striking and peculiar contrast against the dark red of the cliff-face, which, in turn, is capped by the white walls and outhouses of the Lighthouse station. Near this, also, are the caves and chasms known as "Downie's Goate," and "The Barn Yards."

All along this face the Guillemots and Razorbills inhabited patches of the cliff-face here and there, often near the summits, but even when compared with the Isle of May, which I had shortly before visited, they could not be said to constitute a large colony. According to Selby* the rocks here are porphyritic amygdaloid, and there are few, if any, boulders below the cliff above tide-mark. It appears to be pretty firm in the lower portions and to afford good foot-hold, but I doubt if, higher in the cliff-face, it would be safe. There are no regular ledges, nor flat horizontal platforms, such as those at Handa and Mingalay, or in the Shiant Islands, but only irregular nooks and crevices, as on the cliffs at Stonehaven—which I also visited this year along with Mr. George Sim, of Aberdeen—these being formed by fallen rock-masses. Some of these, however, are of considerable size, affording foot-hold for perhaps 100 birds. A colony has this year chosen a new site upon the precipitous western side of the stack called Girsheugh, our boatman saying that he did not remember its having been occupied before.

As already mentioned, on the best available islet tops colonies of Herring and Lesser Black-backed Gulls were located, and we could see many of the little round puff-balls of down creeping about upon the turf-slopes, and little heads and eyes peering down at us as we passed.

Rounding the western end of the headland we came into the Cove Bay, where is a fishing station and salmon storing-house, the cliffs containing an interesting colony of Guillemots. We could here row close inshore, and dislodge the greater part of the colony. Before doing so, however, I examined them carefully with my

* *Loc. cit.*, vol. i., p. 18. See also "*History of Coldingham Priory*," p. 179.

binocular, but failed to note a single Bridled bird. This form is decidedly scarce here, so far as we had opportunities of judging, and indeed such appears to be the case at most of East Coast sea-bird nurseries.

Away westwards stretched a rather fine range of cliffs, having little or no apparent undercliff or broken frontage like the Headland, but at one part rivalling St. Abb's itself in height. We should like to have taken a row along this shore, but our time was too limited, and we therefore tacked back to the village.

After landing, I and another of the party walked along the cliff-edge as far as the Lighthouse,* over slippery grass slopes, keeping a good look out for Choughs, but with no success.

Mr. Seter, the Lighthouse keeper, told me that scarcely ever does a bird of any kind strike the lanterns, which are 224 feet above the surface of the water, and have a white dioptric light of the first order. In foggy weather a siren horn—at a height of 245 feet above the sea—sounds for six seconds' duration, with intervals of one minute and a quarter between each blast; and it would be interesting to know what effect, if any, the blowing of this gigantic horn has upon the migration of birds. It is in foggy weather that birds usually flit like moths round the bright lanterns, dashing themselves against the domes and glasses, or resting on the balconies; but when the unearthly roar of the fog-horn resounds every minute and a quarter, it would not be perhaps surprising that they fly away terrified into the darkness of the fog and night.†

It is the impression amongst naturalists who have known and visited St. Abb's Head, as well as of the people in the locality, that the rock-birds have decidedly decreased greatly in number during the last twenty years or less. Col. Drummond Hay, amongst others, writes that he observed this decrease while dredging off St. Abb's Head in May last, 1880. He states that "Each time I have passed it there were nothing like the numbers of parcels of birds fishing in the neighbourhood that used to be in former years," but adds, "I have no doubt they are steadily on the increase again." In 1850, Mr. Hepburn described the Guillemots as being in "countless thousands," and spoke of "ledge above ledge crowded with birds."

* Built in 1862 on Harelaw, the middle hill of St. Abb's.

† Mr. Seter has since left St. Abb's Head Lighthouse, and his place is now taken by Mr. W. Anderson, formerly at Sumburgh Head, Shetland.

Certainly no such spectacle presented itself to our vision, all the rock-birds breeding in detached companies; and in only one part of the cliff could they be said to be breeding even in hundreds on one ledge, ledges being almost absent.

Earlier than this, in the beginning of the century, mention of St. Abb's Head is made in a passage of a work which may prove worth the trouble of reproducing. It is said, "There is a prodigious number of sea-fowls known by the name of *Scouts* and *Kittiwakes*, with a mixture of Sea-gulls, that arrive in the spring yearly upon the high and inaccessible rocks on the south side of St. Abb's Head. They breed incredible numbers of young; and about the end of May, when the young are said to be ripe, but before they can fly, the gentlemen in the neighbourhood find excellent sport by going out in boats, and shooting great numbers of them. When they are killed or wounded they fall from the rocks into the sea, and the rowers lift them into their boats. Their eggs are pretty good, but their flesh is very bad; yet the poor people eat them. They leave the rocks about harvest, and none of them are ever seen here before the next spring. Where they go in winter nobody knows."*

LIST OF SPECIES.

Peregrine Falcon. *Falco peregrinus*, Tunstall.—Selby notes it at St. Abb's Head, in June, 1833, and remarks upon the antiquity of the eyrie. Hepburn speaks of four eyries at the date he wrote, 1850, upon the coast between Burnmouth and Fast Castle. Two pairs were seen in 1859 on the Field day of the Berwickshire Club there—20th September.

Kestrel. *Falco tinnunculus*, Lin.—Noted by Hepburn, but not observed on the occasion of our visit.

Sparrow Hawk. *Falco nisus* (Lin.).—Not seen by us, but noted by other observers.

Martin. *Hirundo urbica* (Lin.).—Breeds in the cliffs; noted by Selby, 1833 (*loc. cit.*). In 1880 Martins seemed to be unusually abundant at many cliff stations. A fluctuation of the Martin population at many inland localities, has long been observed and commented upon. The summer of 1880, it will be remembered,

* Forsyth's "Beauties of Scotland," Edin., 1805. It is perhaps needless to say that the date of the young being "ripe" by the end of May, is somewhat premature, as it is after this period that the young of most rock-birds are hatched out.

was an unusually dry one, and may have caused a temporary efflux of the Martins from the interior to the shore-lines.

Wren. *Troglodytes europaeus*, Koch.—Selby notices the escape of a nest of Wrens from the face of one of the highest precipices of the cliff, 1833 (*loc. cit.*).

Carrion Crow. *Corvus corone*, Lin.—Several seen by Selby in 1833 (*loc. cit.*).

Raven. *Corvus corax*, Lin.—Three seen by Selby in 1833. A pair—"the only representatives of a once numerous and daring band of plunderers"—noted by Hepburn in 1850. War was waged against them by the natives owing to their depredations amongst young lambs. Two pairs observed on the Field day of the Berwickshire Field Club at St. Abb's in 1859—*vide* John Charles Langlands.

Jackdaw. *Corvus monedula*, Lin.—Very abundant along the cliff-face. Mr. James Hardy, writing in 1864, remarks upon their recent colonization on the sea-cliffs, and of their increasing numbers in these haunts. As has often been remarked upon before, the increase of the Jackdaw, at sea-nurseries, appears to be the signal for a correspondingly rapid decrease of the following species.

Chough. *Fregilus graculus* (Lin.).—Selby notes it as "not uncommon" at "St. Abb's Head and adjoining coast" in 1833, but Hepburn, in 1850, says—"now extinct, except a solitary pair which, I was informed, seldom strayed far from Fast Castle, a few miles to the eastward of the Head." [See remarks on this species, *antea*, p. 113.]

Starling. *Sturnus vulgaris*, Lin.—Abundant.

Rock Pipit. *Anthus obscurus* (Lath.).—Common; noted by Selby, 1833.

Rock Pigeon. *Columba livia* (Bris.).—Found commonly by Selby in 1833 (*loc. cit.*), but attributed by Hepburn to the dovecot pigeons becoming wild. No doubt the flocks of coast pigeons found all along the coast as far as North Berwick and Tantallon Castle are greatly mixed with parti-coloured birds, much more so than the flocks found in the wild Hebrides, or even on the West Coast of Scotland. But I hardly think it would be safe to assert that the real wild "Rock" is not found at St. Abb's; indeed, the wildness of the birds is only proof of the tendency to revert, and points to the probability of a considerable amount of real wild blood being in their veins.

Common Gull. *Larus canus*, Lin.—Breeds on the rocks to the

south of the Head (Selby, *Proc. Berw. Nat. F. Club*, vol. i., p. 21, 1833). This colony at Ernesheugh was the only one known to Hepburn in the South-east of Scotland.

Kittiwake. *Rissa tridactyla* (Lin.).—Noted as numerous by Selby in 1833. Still numerous in 1850, according to Hepburn.

Great Black-backed Gull. *Chroicocephalus ichthyaëtus* (Pallas). A single pair were reported to Hepburn, by the boatman, as nesting annually on the Flodécarr adjoining the Skelly Rock, but he does not appear to have seen them himself, nor did we meet with them at that part, nor anywhere else in the cliffs.

Herring Gull. *Larus argentatus*, Gmel.—Abundant on the grassy-topped islands and rocks of the undercliff, many of the nests being quite accessible from below when the sea is calm enough to admit of landing.

Guillemot. *Alca troile* (Lin.).—Must be much scarcer now than in Hepburn's time—*vide* general remarks, *antea*, pp. 113-114. I failed to see a single Bridled bird. Hepburn mentions one being shot on the occasion of his visit.

Obs.—The Black Guillemot, *Uria grylle* (Lin.).—Is noted by Mr. Selby as an occasional visitant at St. Abb's Head in winter (*loc. cit.* vol. i., p. 255).

Razorbill. *Alca torda*, Lin.—

Puffin. *Fratercula arctica* (Lin.).—The Puffin appears to have been scarce even in Selby's time, as, in 1833, he only observed two or three specimens during his expedition, and Hepburn put down the total population at some dozen pairs.

Green Cormorant. *Phalacrocorax cristatus* (Faber).—Noted by Selby in 1833 (*loc. cit.*), and a few pairs by Hepburn in 1850.

Common Cormorant. *Phalacrocorax carbo* (Lin.).—Seen by Selby, but at a considerable distance from shore, and flying past. Stated by Hepburn to be commoner than the last species, but he seems not to have seen any number, as they tried "many a dark cave," but only saw two birds on the cliffs, and some fishing parties off Ernesheugh.

II.—*The Mammalia of North-west Perthshire.*

By Mr. William Horn.

Having already given as complete a list as I could of the Birds of the North-west of Perthshire, I have now, as a supplement to it, written a list of the Mammals.

Being, for the most part, a wild and mountainous country, all the rarer mammals were at one time well known. The Wild Cat, Polecat and Marten, now all but extinct, were formerly common all through the district, more especially in the parishes of Blair-Athole, Dunkeld, Fortingal, Kenmore and Killin. The Black Rat has been almost entirely superseded by his pugnacious rival the Brown Rat, which now swarms near all inhabited places. The Rabbit was a rare animal a hundred years ago, but now exists in countless numbers, many proprietors deriving large additions to their incomes from this source. The Squirrel, too, which had been extinct for some time, was re-introduced at Dunkeld by the Duke of Athole in 1776, and has become very numerous since large plantations of fir became common in the country. To such an extent have they increased, that, on one small estate in Strath-Tay, where a reward was offered for their skins, as many as three hundred couple have been killed in one winter.

Besides those above mentioned, many species of wild animals were successfully introduced and acclimatised at Taymouth by the late Marquis of Breadalbane. The American Bison, many varieties of Deer from America and other countries, as well as a considerable number of other animals, might all have been seen here in one day. It is to be regretted that after the Marquis's death the different herds were dispersed.

No one has a better knowledge of the fauna of Loch-Tay-side than Mr. Duncan Dewar, gamekeeper at Remony, who has a most interesting collection made entirely by himself, and he has given me every assistance in this as well as in my former paper. I am also much indebted to Mr. J. A. Harvie-Brown, who allowed me to see his collected notes on the Wild Cat, Polecat, etc., in Scotland.

The nomenclature and arrangement I have adopted are those followed by Mr. Edward R. Alston in his paper on the Mammalia of Scotland, already published by this Society.

I.—RECENT SPECIES.

ORDER I.—CHIROPTERA.

Family: Vespertilionidae.

1. Long-eared Bat. *Plecotus auritus* (Lin.).—Pretty numerous in the neighbourhood of Loch Tay.

Obs.—Greater Horse-shoe Bat. *Rhinolophus ferrum-equinum*, (Leach).—From the description I have received from Mr. Dewar of a Bat found dead by him at Finlarig, near Loch Tay, I have but little doubt that it belonged to this species. It had a short horn above the nose, and was larger than any other species he had ever seen. Unfortunately he gave it away to Mr. Macrae, the late Marquis of Breadalbane's head gamekeeper, who is now dead, and he does not know what became of the specimen.

2. Common Bat. *Vesperugo pipistrellus* (Schreb.).—Very common.

ORDER II.—INSECTIVORA.

Family: Erinaceidae.

3. Hedgehog. *Erinaceus europaeus*, Lin.—Very common, but always killed by gamekeepers on account of its predacious habits. I have frequently known them trapped among pheasant coops, after having killed many young birds.

Family: Talpidae.

4. Mole. *Talpa europaea*, Lin.—Very numerous in spite of the enormous numbers trapped. I am informed by Mr. Dewar that his information leads him to believe that they have existed in this district for at least 150 years. Formerly weasels and other vermin kept them down very much, and they were not nearly so numerous as they are now.

Family: Soricidae.

5. Common Shrew. *Sorex tetragonurus*, Herm.—Common.

ORDER III.—CARNIVORA.

Family: Felidae.

6. Wild Cat. *Felis catus*, Lin.—Formerly abundant, but now extremely rare. A very large female was killed by Mr. D. Dewar in Finlarig Woods in 1869, and he still has it in his possession. This is the last Wild Cat which I have heard of in this district. Thirteen years before, in 1856, he killed a large male in a deep glen above Auchmore House, and it was sent to the late Marquis of

Breadalbane. It was a noble specimen, and, as Mr. Dewar relates in a letter to Mr. J. A. Harvie-Brown, easily knocked over his terrier with each stroke of its paw, and turned twice upon himself when he went to save his dog.

Mr. J. A. Harvie-Brown, in *The Zoologist*, Jan., 1881, says that the last Wild Cat killed in the district south of Glen Dochart was by Malcolm Macpherson, upon Benmore, near Suie, in 1863 or 1864.

Family: Canidae.

7. Fox. *Canis vulpes*, Lin.—Common on the hills in this district, where they feed on the white hares and rabbits, with an occasional grouse. Formerly there was a professional foxhunter in this part of the country who made his livelihood by killing foxes and other vermin. Now, however, he gets but little to do, and is only employed, so far as I can learn, at the head of Glen Lyon and in Balquidder, for the numerous keepers and shepherds now-a-days do all his work. They often turn out in considerable numbers with their dogs in autumn, and have regular foxhunts, killing frequently several in a day. I obtained a very fine specimen of the Mountain Fox, on the top of Farragon, in 1874.

Family: Mustelidae.

8. Yellow-breasted Marten. *Martes sylvestris*, Nils.—One was killed at Remony in 1844. In Oct., 1867, Mr. Dewar killed a Marten at Finlarig, which he still has in his possession.

9. Common Weasel. *Mustela vulgaris*, Erxl.—Common.

10. Stoat or Ermine. *Mustela erminea*, Lin.—Extremely abundant. It frequents old stone walls and cairns of stones. When in its white winter dress, with only a black tip to the tail, the fur is very pretty, and is the ermine of commerce.

11. Polecat. *Mustela putorius*, Lin.—Like the Wild Cat this species was formerly common. Perhaps its most favourite haunts were the hills on the north side of Loch Tay, in Glen Lyon, and the country about Glen Dochart. Mr. Dewar tells me that he killed two Polecats, a male and female, in Feb., 1858, at Finlarig, and that these are the last he has seen or heard of. Mr. J. A. Harvie-Brown has given me the following notes:—"The Polecat became extinct in Glen Queich, above Amulree, thirty years ago, viz., about 1850. One was killed on Ballechin Hill, in Strath-Tay, about the same date, by Mr. Murray, now gamekeeper with

Mr. James Stewart Robertson of Edradynate. They inhabited the east side of Drummond Hill in 1837. More recently, in 1880, two have been killed by Messrs. Duncan and Dickson, co-lessees of the Edinchip shootings at the head of Loch Earn.

12. Badger. *Meles taxus* (Schreb.).—Still pretty common throughout the district, but not as much so as in former years, when there was less cultivation and game preserving. I have seen them myself among the rocks above Killiechassie towards evening, and have seen one taken out of a trap there. They are nearly extinct at the Kenmore end of Loch Tay, but are still found in Glen Lochay, on Morinish Hill, where Mr. Dewar has killed many of them, and in Glen Lyon. The old Gaelic name of the man employed to kill vermin was *Brocan*, or Badger-man.

13. Otter. *Lutra vulgaris*, Erxl.—Often seen in the Tay, Tummel, Garry, Lyon and other rivers, and many of the lochs in this district. The late Duke of Athole kept a pack of otter-hounds, and hunted them regularly on the Garry and Tummel.

ORDER V.—ARTIODACTYLA.

Family: Cervidae.

14. Red-Deer. *Cervus elaphus*, Lin.—Common on Drummond Hill, near Taymouth, in Athole Forest, at the head of Glen Lyon, on the borders of the Black Mount, and in other places from which they often stray to great distances. In Athole Forest, in 1845, there were said to be as many as 7000 Red-Deer.* In cold winters they are driven by hunger down to the low grounds, and frequently visit gardens and farm steadings at night, whence many never return to their old haunts.

Obs.—Fallow-Deer. *Cervus dama*, Lin.—Thrives in the Park at Taymouth, and also exists in a semi-wild state in the large woods to the south of the road between Aberfeldy and Kenmore.

15. Roe-Deer. *Capreolus capraea*, Gray.—Abundantly distributed throughout the district.

Family: Bovidae.

Obs.—White Bull. *Bos taurus*, Lin.—A herd of white cattle of the same breed as those still existing at Cadzow Forest in Lanarkshire, and Chillingham in Northumberland, was preserved in Blair-Athole until the year 1834.† When the herd was dispersed

* New Stat. Acct., Perthshire, p. 563.

† "Wild White Cattle of Great Britain." By Rev. J. Storer, Lon., 1879, p. 345.

in 1834 the Marquis of Breadalbane attempted to introduce them at Taymouth, and a few of the descendants of this herd still exist at Kilmorey House, Argyllshire, the property of Sir J. P. Orde, Bart.

ORDER VI.—GLIRES.

Family: Sciuridae.

16. Squirrel. *Sciurus vulgaris*, Lin.—Great numbers of Squirrels are to be found in this district, where they were re-introduced, after becoming extinct, by the Duke of Athole, about the year 1776.*

Family: Muridae.

17. Black Rat. *Mus rattus*, Lin.—In Bell's British Quadrupeds † I find that, while staying at Pitlochry in 1860, Col. Drummond Hay discovered a small colony of Black Rats in a drain. They were very shy, and decamped as suddenly as they came.

18. Brown Rat. *Mus decumanus*, Pall.—Now by far the commonest species of Rat in the country. It has almost succeeded in exterminating the Black Rat.

19. House-Mouse. *Mus musculus*, Lin.—Far too common.

20. Wood-Mouse, or Long-tailed Field-Mouse. *Mus sylvaticus*, Lin.—Very common. Does a great deal of damage to young plantations and gardens.

21. Common Field-Vole or Short-tailed Field-Mouse. *Arvicola agrestis*, De Selys.—Pretty common. Mr. Dewar sent me one the other day for identification.

22. Red Field-Vole or Bank-Vole. *Arvicola glareolus* (Schreb.).—Rare. Mr. Dewar obtained a specimen lately for me at Remony.

23. Water-Vole or Water-Rat. *Arvicola amphibius* (Lin.).—Both varieties of this species extremely abundant along the banks of the Tay, Tummel, and other streams and burns.

Family: Leporidae.

24. Common Hare. *Lepus europaeus*, Pall.—Common on the low-lying ground in the valley of the Tay, especially at Castle Menzies, where they are killed in great numbers, and where they grow to an enormous size. At Killiechassie I have killed many of

* Essay on the Squirrel, by Mr. J. A. Harvie-Brown.—*Proc. Roy. Phys. Soc.*, Edin., 1881.

† 2nd ed., 1874, p. 303.

11 lbs. weight, and one of 12 lbs. Mr. Dewar mentions that the heaviest he has weighed has been 11 lbs.

25. Mountain Hare. *Lepus variabilis*, Pall.—Found in great numbers on all the higher hills. Mr. Dewar writes me that 31 years ago Mr. Arch. Campbell, private secretary to the late Marquis of Breadalbane, killed 230 white hares with one gun, a muzzle-loader, at one drive, on Remony Hill. Since then, in 1849, as many as 685 white hares have been killed on Remony Hill in a day. In 1880, on one occasion, 500 were killed. At Ardeonaig, in 1880, 509 were killed by the Earl of Breadalbane and his friends. The average weight of this species is between 6 and 7 lbs., though I have frequently weighed them up to $7\frac{1}{2}$ and 8 lbs. Mr. Dewar says that of all the White Hares he has weighed the heaviest was $7\frac{1}{2}$ lbs.

26. Rabbit. *Lepus cuniculus*, Lin.—Of late years the Rabbit has increased to an enormous extent in the valleys of the Tay, Tummel, and Garry. This is especially the case at Blair Castle. They were brought to Taymouth in the year 1820 by Mr. John Cameron from Monzie, near Crieff, and holes were made for them near the river, east from Taymouth Castle, as well as on Drummond Hill, and in Blairmore, and Finlarig Woods to the north of Loch Tay.

II.—FOSSIL AND EXTINCT SPECIES.

ORDER I.—CARNIVORA.

Family: Canidae.

1. Wolf. *Canis lupus*, Lin.—Once common in the wilder parts of Perthshire. In the New Stat. Acct. of Scotland,* the Rev. Robert Macdonald says that the Wolf, Wild Boar, and White Cow formerly inhabited the parish of Fortingal, and that many places in the district take their names from wild animals, as *Ruighe-a-mhadaidh*, i.e., the haunt of the mastiff or wolf. In the *Proceedings* of the Society of Antiquaries,† the Rev. Mr. Porteous says that two Wolves, the last seen in Scotland, were chased from the wood of Trowan, and followed into the highlands where they were killed. Wolves were included in the game lists of the great hunting parties at which the successive Earls of Athole entertained James V. in

* Perthshire, p. 542.

† Vol. 2. part i., and New Stat. Acct., Perthshire, p. 731.

1528, and Queen Mary in 1563, and there is abundant proof of their existence in the following century.*

Family: Ursidae.

2. Brown Bear. *Ursus arctos*, Lin.—Mr. Harting, in his “Extinct British Animals,”† remarks that, in so far as history informs us, the Caledonian Forest was the chief stronghold of our British Bears, and quotes Bishop Leslie‡ to the same effect, as well as Camden, who, writing of Perthshire, observes, “This Athole is a country fruitful enough, having woody valleys, where once the Caledonian Forest (dreadful for its dark intricate windings, and for its dens of bears, and its huge, wild, thick-maned bulls) extended itself far and near in these parts.”

ORDER IV.—ARTIODACTYLA.

Family: Suidae.

3. Wild Boar. *Sus scrofa*, Lin.—Up to the middle of the 13th century the Wild Boar was one of the favourite beasts of the chase in Scotland, and its popularity is attested by its name being preserved in many names of places in the Highlands. In the parish of Fortingal, the Rev. Robert Macdonald mentions *Tom-an-tuirc*, *i.e.*, the knoll of the Boar.§ In the “Old Statistical Account,” two places are mentioned in Perthshire on the west side of Ben-y-gloe, *Carn-torey*, and *Corrie-torey*,—*i.e.*, the hill and hollow of the Boars; while in the same country is *Loch-an-tuirc*—*i.e.*, the Boar Loch.|| Mr. Alston, in his valuable paper on the Mammalia of Scotland, published by this Society in its *Fauna of Scotland*, says that he has been unable to ascertain how much later than the year 1263 Wild Boars existed in Scotland.¶

Family: Cervidae.

Obs.—Elk. *Alces machlis*, Ogilby.—In dredging Ochtertyre Loch for marl, very large stags-horns have frequently been found, and they have been supposed to be those of the Elk.**

* *Proc. Nat. Hist. Soc. Glas.*, vol. iv., part i., p. 32. † P. 20-21.

‡ *De Origine, Moribus, etc., Scotorum*, 1578.

§ *New Stat. Acct., Perthshire*, p. 342.

|| *Old Stat. Acct. Scot.*, vol. ii., p. 478.

¶ *Proc. Nat. Hist. Soc. Glas.*, vol. iv. part i., p. 34.

** *New Stat. Acct., Perthshire*, p. 731.

Family: Bovidae.

4. Gigantic Fossil Ox or Urus. *Bos primigenius*, Boj.—The Rev. Mr. Macdonald of Fortingal, in his account of that parish in the New Stat. Act.,* asserts that this species once existed in this district, and quotes the name, *Doire-na-bogile*, i.e., the thicket of the White Cow.

According to Boethius†, writing in 1526, White Cattle existed throughout the Caledonian Forest from Callander to Athole and Lochaber. A very perfect skull of this species was found at Blair-Athole, and is now preserved in the British Museum.‡

III.—*On the Birds of the East of Sutherland.*

By Mr. Thomas E. Buckley, F.Z.S.

The following notes on the Birds of the East of Sutherland extend over a period of twelve years, from 1869 to 1880 inclusive, during which time I was either a resident in the county or else paid it long annual visits. My time in the spring was much taken up by salmon-fishing, and to be successful at this requires a very constant attendance at the river-bank; when therefore I went out birds'-nesting I naturally gave preference to those species that had the greater interest in my eyes, such as hawks and waders. This will account in a great measure for my very scanty notes on the smaller birds; for these, the south-eastern part of the county is most suitable, as containing more cultivated ground, hedges, woods, etc., in which they delight.

From the tameness of the eastern part of the county as compared with the west, the larger birds of prey are not nearly so numerous as might be expected, the Golden Eagle only breeding in one locality, or two at the most: one eyrie mentioned below having been deserted of late years. This was placed in an exceptionally wild bit of country quite unlike the surrounding district, and resembling much more the western division; in this spot the last Wolf was killed in Sutherland, and here the Fox and Wild Cat still maintain a precarious footing. The Sea Eagle never seems to have bred here; Peregrine Falcons used to be fairly common, but from the greater accessibility of their haunts have been the more easily destroyed.

* Perthshire, p. 542.

† "Scotorum Historiæ a Prima Gentis Origine," Paris, 1574; fol. 6, l. 63.

‡ Owen's "British Fossil Mammals," p. 498.

The same may be said of the Common Buzzard. The smaller Raptores still hold their ground fairly, and the Owls are, if anything, increasing.*

Among the smaller birds, I should say that, from what I can hear, all, with the exception of the Goldfinch, are increasing, both residents and migrants. This of course is accounted for by the greater extent of cultivated land, and also the great number of plantations springing up on every side, which must greatly increase the food supply, and may ultimately affect the climate itself. Hard winters, such as that of 1878-1879, have a great effect on the soft-billed birds; in the spring of 1879 I never saw a Missel Thrush at Balnacoil, and scarcely a Gray Wagtail; even the hard-billed birds were much scarcer, and there was not one Willow Wren for four of the year before; the hardy little Wren, too, suffered greatly, and all the summer visitants were much scarcer. I much regret that I was not in the county in the spring of 1880, as I should like to have seen if the exceptionally mild weather then prevailing brought the usual numbers of birds back to their old breeding haunts.

Many birds that are residents spread out into the inland woods during the breeding season and retire more to the coast for the winter, as the food supply soon dies out when the hard weather sets in: most of the Thrushes, Blackbirds, and even the Chaffinches certainly do so, while only a certain number remain about the houses and farm-steadings. Other birds, again, appear more numerous, such as the Bullfinch, and Long-tailed and Cole Tits, these, however, no doubt receiving large additions from abroad. Besides, being birds of rather retiring habits in the nesting season, they are more easily noticed when the leaves are off the trees.

Amongst the Corvidae the Rook and Jackdaw appear to be on the increase; the Raven and "Hoodie" Crow are still fairly numerous, especially the latter, despite every effort to exterminate it; the Magpie is very rare now.

When we come to the family of Grouse we find the eastern part

* For some time back I have been collecting statistics of the various kinds of "Vermin" killed, both in Sutherland, and in Scotland generally. These lists, going back in many instances to a pretty early date, are most instructive to the student of Geographical Distribution, as regards certain species; and at some future time I hope to give some account of these records. To any one willing to assist me it will give me pleasure to forward the necessary printed forms for filling up, and such lists I especially desire to receive from large Highland Estates.—J. A. H.-B.

of the county particularly well adapted for them. Grouse never seem to flourish really well in a mountainous country ; flat or undulating ground, with hills sloping gradually down to the rivers, and well intersected with convenient burns, being what suits them best. The reason of this is partly that in a very mountainous country it is very rare to get a sufficient depth of peat for the heather to grow well in, the constant heavy floodings seemingly washing off all the good soil. Even when the heather looks well in such places, it will take seven or eight, or more, years, to grow again after burning, whereas on good ground it would only take one or two years; and generally a sort of rank coarse grass comes up after all. From my own observations I find that heather in these mountainous districts looks hard and sapless, but wherever you find a piece of good sound heather, there the Grouse are. Good ground, too, absorbs the wet much more quickly, and consequently the young birds are not drowned so often as they are on the bad grounds, where the water pours down every little runlet after each shower. Of course these high hills are the very places for the Ptarmigan, which is rare on the East Coast. Black Game are much more independent of good heather : they like a mixture of heather, brackens, rushes, and grass, and are fond of the vicinity of water, at least in the early part of the season. They should, therefore, be numerous in the West and in the East, where such combinations are found, but Grey-hens are apparently very bad mothers, and a heavy shower of rain when the birds are very young destroys numbers.

Waders are numerous in such localities as suit them : Greenshanks, Curlews, and Golden Plovers on the hill ; Lapwings and Redshanks on the green flats so often met with along the burn- or river-sides. The Greenshank is not a sociable bird, a pair here and there being met with throughout the hills ; the Redshanks, on the contrary, are sociable, that is to say, when you meet with one pair there are generally one or two others not far off, at least such is my experience. It is singular that the Dunlin should be so comparatively rare, but it may be much commoner than I suppose, as it apparently likes a very wet "flow" to breed in, and of these there were only two or three in my neighbourhood, which I rarely visited during the breeding season. There are only two places on the East Coast well adapted for Waders in the winter; the first of these, the Little Ferry, I have often visited, rarely seeing anything, however, but Oystercatchers and a very few Dunlins; the second place, the Dornoch Firth,

I have never visited, but it covers a large extent of ground, and I have no doubt large flocks of different species would be met with. Of Ducks there are great quantities in both places; at the former place the flocks are comprised mostly of Widgeons, with a few Wild Duck, Scaup, and the ubiquitous Golden-eye. Pintail have been obtained here on one or two occasions; as the spring advances large flocks of Teal congregate in the Fleet, where it enters the Little Ferry, near a place called "The Mound," and their whistling call is heard on all sides.

The East of Sutherland is not nearly so well supplied with lochs as is the West, the eastern part of the parish of Rogart excepted, but still there is a fair number, and when we go more to the centre of the county we get to the larger lochs, such as, Baden Loch, Loch-an-ruair, etc. All these are much frequented by Divers, Ducks, Geese, and Gulls, which breed more or less numerously about the shores. The Geese, I am afraid, are not nearly as numerous as they used to be, though they are now unmolested, when formerly they used to be shot as "flappers." Gulls are very abundant, in spite of the war waged against them, both by shepherds and keepers, who kill them, or smash their eggs whenever they get the chance.

I think from these few remarks it will be seen that Sutherland is as interesting a county as the naturalist can well visit, and I believe further research would bring out many new facts, and add, for certain, to the recorded number of species breeding in it, some that are now only supposed to do so. What is much wanted is the presence of a good resident naturalist in the county, one who is thoroughly well acquainted with all the commoner species, who would be able to detect by ear or eye a new or uncommon bird at once, and who could afford to give plenty of time to the pursuit, especially in the breeding season.

It will be seen that in the following list, comparatively few rare visitants are mentioned, and this may no doubt arise in great measure from there being so few close observers in a district so wide, more than from the absence of the birds themselves.

LIST OF SPECIES.

1. Golden Eagle. *Aquila chrysaëtus* (Lin.).—A few years previous to 1870 there used to be two nesting-places of this bird on the East coast. In one, however, one or both of the old birds used to be shot year after year when sitting, but two or three years

before I came to the county the place was deserted. This nest was placed near the Sletal Cairn, in Glen Loth, where the last Sutherland wolf is supposed to have been killed. Eagles visit this place yearly, both in spring and autumn, and I have often seen one or a pair soaring round; on one occasion I saw three together near this in the autumn. At that season Eagles are not uncommonly seen in different parts of the East coast.

The other nesting-place is, I believe, still used. In 1878 one young bird was hatched out, and was so conspicuous that a shepherd told me he could see it a mile off showing white in the nest, which was placed in such an accessible spot, that the same shepherd said, with a little care he could have taken a horse into it. The birds and nest are strictly preserved here, and also in the Reay forest.

My keeper once trapped an Eagle which, however, managed to loose the string by which the trap was fastened to a stone; the man pursued the Eagle for some time, getting pretty close to it (he had not his gun out that day or could easily have shot it), till at last the Eagle hit the trap against a stone, broke it, and so escaped.

2. White-tailed Eagle. *Haliaëtus albicilla* (Lin.).—Much rarer than the Golden Eagle, and I never heard of even an old nesting-place near. I have now and then seen what I thought was this bird on the wing, in the autumn, and one young one that was trapped by a friend of mine is now in the Dunrobin Museum, where there is also an albino specimen, shot at Auchinduich, in Nov. 1854.

3. Osprey. *Pandion haliaëtus* (Lin.).—Rarely seen on the East coast. I fancied I once saw one at Loch Naver in 1870 or 1871. In 1879 an Osprey came down to Loch Brora for a week at the latter end of June, and on one or two occasions I saw it fishing. During the time it was there I saw it every day.

Obs.—I saw an Osprey, one Sunday in the autumn of 1874, fly over a house on the Cromarty Firth, where I was then living. It was followed by a mob of Gulls.

4. Peregrine Falcon. *Falco peregrinus*, Tunstall.—Still fairly common, though shot or trapped out in one or two of the more easily accessible places. A pair breeds nearly every year on Carral Rock, overlooking Loch Brora. One year they changed to a rocky burn on the other side of the Loch, where they reared one young one, which was taken; there was an addled egg also in the nest. When

breeding on the Carral side they are preserved, being in the Duke of Sutherland's forest. One bird was taken in a pole-trap on my ground, but they are not often caught that way, as they are, I think more in the habit of perching on the side of any eminence than on the top of it.

5. Iceland Falcon. *Falco islandus*, Gmel.—A fine specimen, which is in the Dunrobin Museum, was killed at Sciberscross, in 1868. Another was taken some years back at Altnaharra, and is now in the possession of Mr. Akroyd, who was the shooting tenant at that time.

6. Merlin. *Falco aesalon*, Tunstall.—A common bird on the East coast, breeding in long heather, and returning, as I fancy most Hawks do, to the same place year after year. In reference to what is said in one of Mr. Harvie-Brown's papers on the number of eggs in this bird's nest, I certainly never got more than four.* I once got only three, on May 7th, 1872, and from this nest I shot the male, but it is probable that the hen had not then finished laying.

7. Kestrel. *Falco tinnunculus*, Lin.—Extremely common. In a rocky channel through which the river Brora flows, there were, nearly every year, three or four nests of Kestrels within a very limited space. One year, however, the keeper caught eight Kestrels in one place in a pole-trap set for Hoodie Crows, which reduced them a good deal, so in the breeding season I ordered the trap not to be set in that place again. Kestrels leave this part of the country entirely, or nearly so, in the winter. I never remember seeing one then.

Obs.—One Kestrel, or a pair, was observed for some time in the month of January, near Attadale, on Lochcarron, in the west of Ross-shire.

8. Sparrow Hawk. *Accipiter nisus* (Lin.).—Very common in the autumn, when many young birds appear about the fields on the coast. Though, no doubt, it breeds commonly in the big woods about Dunrobin, I only knew of one nesting-place in the Gordon-bush woods, near Loch Brora. A small clump of tall spruce firs stood close together, and here, year after year, a pair of Sparrow-hawks built. I took the nest first in 1872, and after an absence of seven years, went back in 1879, and took the eggs again. I knew the hen and young ones had been shot on one or two occasions between these years.

* *Proc.*, Jan. 31st, 1871, revised, May, 1875, vol. ii., part i., p. 76.

9. Buzzard. *Buteo vulgaris*, Leach.—Not a common species on the East coast, possibly from want of suitable localities for nesting. I have seen them at most times of the year; and they are so easily trapped that the wonder is there are so many left. A pair once bred in the rocky part of the river Brora, referred to under the Kestrel, and the eggs, two in number, were taken on the 11th of May, 1874, and sent to me. I never heard of their breeding there before or since. The keeper told me that neither of the birds were killed. It seems a great pity that the Buzzard should be so persistently killed, as it is a comparatively harmless bird, and a fine looking object on the wing.

10. Rough-legged Buzzard. *Buteo lagopus* (Gmel.).—I saw a specimen of this bird in Mr. Macleay's shop in Inverness, and which, he told me, had been sent from Helmsdale to be stuffed. I have also seen specimens from Berriedale, the Duke of Portland's forest, in Caithness.

11. Honey Buzzard. *Pernis apivorus* (Lin.).—This species has certainly occurred thrice on the East coast, once at Dunrobin in the summer of 1878, and another example was killed in the Helmsdale strath, near Kildonan, and is now in the Dunrobin Museum. I forget the year, but it was in the early autumn. This latter is a fine specimen, and, if I remember rightly, is a male; the other is not so good. One shot by a friend staying with me at Balnacoil on the 11th of Sept., 1879, had still a little down adhering to the tips of the feathers.*

12. Hen-Harrier. *Circus cyaneus* (Lin.).—This destructive bird still seems to hold its ground well, the East coast being apparently well adapted to it. The same site is occupied year after year, which makes it easy for a keeper, once he knows the ground well, to find out every Hawk's nest on his shooting. One day I took two nests without any information as to where I could get them, containing four and six eggs respectively, and I shot the hens from each, missing the cock at one nest, and it, I find from a note

* See my remarks to this Society upon the occurrences of Honey Buzzards along the East Coast of Scotland, and regarding its having *once at least* bred in Scotland. *Proc.*, 30th Sept., 1879, vol. iv., pp. 145-7. As will be seen there, the birds breeding are believed to leave about the middle of Sept., and, as they are late breeders, laying in June and July, they probably do not, in this country at least, rear more than one brood. Eggs taken on 3rd July were quite fresh.—J. A. H.-B.

in my Egg-book, was the noisier of the two. The cock is by no means easy to get at the nest, rarely venturing within shot, while the hen is almost certain to come, but he appears, however, to roost near it, and by stalking may be got. In May, 1879, I went up to a shepherd's house for a night, with a friend who was anxious to get a nest, and the old birds, if possible; the hen was shot at once, and we set a trap in the nest for the cock, which we saw at a distance. A shepherd who went out late to look at the trap found the cock sitting near, but not on the nest, and it allowed him to approach pretty close, so my friend went out and returned with the bird. Except at the breeding season the old male seems to be rarely seen, whereas females and young birds are very common. I never saw it mentioned in any work on Natural History, but keepers have a theory that Hen-Harriers, and Merlins, almost invariably have their nests facing the north, and it is generally the case, as I have often proved since.* In one nest of the Hen-Harrier's that I took in 1879, one egg had been sucked, and another rolled out of the nest, by a Hoodie Crow, apparently, which we saw sitting on a rock not far off.

13. Tawny Owl. *Strix stridula*, Lin.—Breeds near Rosehall, where I have often heard it. From one hollow tree, the only one on the place that I was then occupying, I have twice taken the eggs, although I never saw the bird, the reason being that on one occasion my man, seeing the owl come out of the hole, hit it on the back with a stick. After such treatment it naturally deserted; this was in 1875. In 1877 the bird again laid in the same place; this time one of my setters put his head into the hole and so frightened the bird that she again deserted; there was, however, no doubt of its being the nest of the Tawny Owl. The species would breed, I am sure, much more frequently were there more hollow trees for its accommodation. A female that I got in Sutherland was trapped, the bait being the inside of a rabbit; it was one of a pair that used to breed near Balnacoil, where I was then living. A shepherd told me

* Of four nests known to me in the West of Sutherland, three of which I have visited myself, one faces the north, and is placed in old, deep, rank heather; one faces the east, and is placed on almost perfectly bare ground, and a third faces the west, in deep heather by the side of a burn, and is only removed about fifty paces from a Merlin's nest, also facing the west, and on the same side of the burn. These nests are not actually in Sutherland, but are across the Ross-shire march.—J. A. H.-B.

of its nest in a hollow tree near there, but I never had time to visit it in the breeding season. This species seems to be spreading much in Scotland, as I have seen quantities sent in to Mr. Macleay's shop in winter and spring to be stuffed.

14. Short-eared Owl. *Asio accipitrinus* (Pall.).—I never saw this bird but once, when I flushed it out of some long heather one day in autumn, when out stalking. The eggs marked as "Short-eared Owl's" in the Dunrobin Museum should be received with caution, as the date of their capture is given as March, 1847; the bird itself is certainly not common.*

15. Night-jar. *Caprimulgus europæus*, Lin.—A common summer bird, breeding about the woods near Brora. The only nest I ever took was on the 16th of July, 1878; the eggs were quite fresh, and placed under a tuft of heather on the bare ground.

16. Swift. *Cypselus apus* (Lin.).—Common in the summer. Several pairs used to breed in some old disused houses in the village of Brora.

17. Swallow. *Hirundo rustica*, Lin.—Not by any means common, though a few pairs appear every summer.

18. House Martin. *Chelidon urbica* (Lin.).—Appears in about the same numbers as the preceding.

19. Sand Martin. *Cotyle riparia* (Lin.).—The commonest species of all the Swallow tribe, breeding in colonies in any suitable sandy bank.

20. Tree Creeper. *Certhia familiaris*, Lin.—Common and breeds. One nest I found was under the bark of an oak tree. This bird used the same place at least two years in succession.

21. Common Wren. *Troglodytes parvulus*, Koch.—This little bird seems to frequent the very wildest places on the hill, being generally found, when there, all along the burn-sides, up to their sources, even in the winter.

22. Sedge Warbler. *Acrocephalus streperus*, Vieill.—Common in suitable localities about Brora and neighbourhood, where I have often heard its chattering notes.

23. Whitethroat. *Sylvia rufa*, Bodd.—Often seen along the banks of the Lower Brora, and, if I remember rightly, about Dunrobin.

* A thorough examination of the Dunrobin Museum specimens appears desirable. All specimens which bear no distinct history, or about which the slightest doubt can exist, should be rejected, and their place supplied by thoroughly authentic examples.—J. A. H.-B.

24. Willow Wren. *Phylloscopus trochilus* (Lin.).—The very commonest of all the warblers, and I have seen many nests about Balnacoil and the neighbourhood. On one occasion I found a nest in the fork of a large tree, at least four feet from the ground. During the breeding season the males seem to be answering one another in every direction.

25. Wood Wren. *Phylloscopus sibilatrix* (Bechst.).—I just observed this species at Glenrossal near Rosehall, in 1875. I had only within the last year or two made its acquaintance in the South of England, so recognized it the more readily. Again when going through the grounds about Dunrobin, in 1877 or 1878, with a friend, we heard it pretty commonly, so it is evidently far from rare on the East coast. I have had no opportunities of looking for its nest, but it must have been breeding, as it was towards the end of May, or the beginning of June, when we observed it.*

26. Wheatear. *Saxicola oenanthe* (Lin.).—A very common species, breeding in the old dykes which are so often seen about the green patches of grass throughout Sutherland. I once got a nest in a hole in the ground from which a stone had been removed. On another occasion I observed one of these birds hovering persistently over a spot at the roadside, and on going up found an adder lying, which I killed.

27. Whinchat. *Pratincola rubetra* (Lin.).—A common summer visitant all along the coast.

28. Stonechat. *Pratincola rubicola* (Lin.).—As common as the last, a certain number remaining in favourite localities the winter through. †

29. Redstart. *Ruticilla phoenicurus* (Lin.).—Apparently increasing. There were one or two pairs breeding about Glenrossal, and also at Balnacoil, while, I believe, they are much commoner than they used to be about Dunrobin. I got a nest of seven eggs out of the garden wall at Balnacoil, and on another occasion found a nest of young ones near there. ‡

* As I have elsewhere remarked already, it seems desirable to collect localities in Scotland where the Wood Warbler is found, as its distribution, as yet, is but imperfectly worked out.—J. A. H.-B.

† The comparative distribution of these two species throughout Scotland would form a good subject for a paper.—J. A. H.-B.

‡ Redstarts bred and reared a brood at Inchnadamph in the West for the first time in 1880. [The late E. R. Alston *in lit.* to J. A. H.-B., 27th August, 1880].—J. A. H.-B.

30. Redbreast. *Erithacus rubecula* (Lin.).—I don't think that in any place is this species numerous, though common enough in most places. It is fairly common all along the East coast.

31. Hedge Sparrow. *Accentor modularis* (Lin.).—About as common as the Robin; the only nest I ever took contained three eggs.

32. Great Titmouse. *Parus major*, Lin.—I have never seen this species myself, not having had the opportunity of closely examining the vicinity of Dunrobin, which is the most likely locality.

33. Cole Tit. *Parus ater*, Lin.—The commonest Tit in the breeding season. I got two sets of eggs from one nest in 1878; the first, of six eggs, on the 6th of May, and the second, of seven eggs, on the 13th of the same month; the nest was in a small hole in the ground, and was lined with rabbit's fur almost entirely.

34. Long-tailed Tit. *Acredula caudata* (Lin.).—Very common in the winter, and no doubt breeds also. Both this and the Cole Tit go about in small flocks in the winter, and seem to be much more abundant then than at other times.

35. Pied Wagtail. *Motacilla lugubris*, Temm.—Fairly common in the breeding season, but scarce, if not altogether absent, in the winter; it appears about the time of seed-sowing.*

36. Gray Wagtail. *Motacilla sulphurea*, Bechst.—Common in the breeding season, and seems to nest at, or near, the same spot year after year. Appears to leave in the winter, or is then, at least, very rare.

37. Meadow Pipit. *Anthus pratensis* (Lin.).—Very common, and more so even in the breeding season than in the winter.

38. Tree Pipit. *Anthus trivialis* (Lin.).—Two pairs bred at Glenrossal, in 1875, and I procured one nest. There may have been more about Rosehall, as the bit of wood in which I found these two pairs was very small.†

39. Rock Pipit. *Anthus obscurus* (Lath.).—Common along the

* Hence the names "Seed Lady," used in Peeblesshire, and "Seed-bird," in Berwickshire. I have a considerable list of local names of birds, collected from all parts of Scotland, and would be glad to add to their number. I have also collected their local Gaelic names, but this list must necessarily be imperfect.—J. A. H.-B.

† Rosehall at present appears to be the limit of the extension of many species towards the West. At Inchnadamph, up to 1879, I had only met with one Tree Pipit—see my first paper in our *Proc.* vol. ii., part i., p. 93.—J. A. H.-B.

shore in winter. On the north side of Helmsdale there are very suitable localities for its breeding, but I have never had time to examine them there.

40. Dipper. *Cinclus aquaticus*, Bechst.—Most burns have a pair or more of these cheerful little birds upon them, and they breed pretty much in the same spot, year after year. Early in February, if not before, the male may be seen, singing away on a stone or lump of ice in the middle of the river. One nest that I found would most certainly have been washed away the first heavy flood that came in the river, if I had not taken it; the birds never came there again.*

41. Missel Thrush. *Turdus viscivorus*, Lin.—Common and increasing. They are later in building in the North than in England, as I find I took a nest at Glenrossal on the 18th of June, 1875, which contained four fresh eggs. I have often seen the nest and old birds at Balnacoil.

42. Song Thrush. *Turdus musicus*, Lin.—Common everywhere. One nest I took at Balnacoil was placed on the ground among a tuft of rushes, and that, too, in a very damp place; the nest was deserted.

43. Blackbird. *Turdus merula*, Lin.—Scarcely as common as the Song Thrush.

44. Ring Ouzel. *Turdus torquatus*, Lin.—A common species in the breeding season. It is a shy bird, and I have rarely taken its nest. Those I procured in Sutherland contained three, four, and five eggs respectively. Stray specimens often remain until very late in the autumn.

45. Fieldfare. *Turdus pilaris*, Lin.—This species and the Redwing arrive in large numbers in the autumn, and the flocks at first remain on the hill-sides. The greater bulk, however, soon go

* Once persecuted as a fish destroyer in the West of the county, now not so generally molested. I am glad to say I have succeeded in getting the blood-money removed from their heads at one place, where rewards were paid up to as late as 1880. That they cannot have been common here is shewn by statistics which I have. In 1875, 10 were killed; in 1876, 7; in 1878, 6; in 1879, 12. Previous to 1875 no records of any being killed appear to have been kept, though records of other species of "vermin," in my possession, date back as far as 1870, in this district. It is earnestly hoped the blood-money on these innocent heads will be everywhere entirely withdrawn. In the Reay country, in 1873, and up to the first six months of 1879, no less than 368 were slaughtered. This destruction has also been put a stop to.—J. A. H.-B.

off further south, and only a few stragglers, or at the utmost very small flocks, are seen in the winter, the most of these even disappearing if the winter be very severe.

46. Spotted Flycatcher. *Muscicapa grisola*, Lin.—Very common species.

47. Pied Flycatcher. *Muscicapa atricapilla*, Lin.—I obtained one specimen near Gordonbush on the 27th of May, 1872.*

48. Great Gray Shrike. *Lanius excubitor*, Lin.—I have on two occasions noticed this bird, in both cases in the autumn.

49. Magpie. *Pica rustica* (Scop.).—Getting very scarce now, as compared with a few years ago, so much so, that when shooting with a friend last year, I was asked not to shoot one if I saw it, as they had become nearly extinct.†

50. Raven. *Corvus corax*, Lin.—Very common, especially in the late spring and autumn. I do not understand where they can come from, as nests are scarce on the East coast; yet, about the lambing time or a little later, I have often seen a dozen in a day. In a certain rock near Balnacoil I have seen from eighty to one hundred and fifty Ravens roosting; they come in detachments from all parts of the country. So numerous are they that, on one occasion, when wanting a pair for a friend, I sent my keeper to the rock, and though he missed the first shot, he got two with the second.‡

* This appears to have been the only specimen ever obtained in Sutherland until the spring of the present year, 1881, when an apparently decided and extraordinary irruption of the species took place, the individuals observed arriving on or about the same day that the Spotted Flycatcher and Cuckoo appeared—viz., the 3rd of May. I first heard of two found dead on the public road, and of another, bearing marks of shot wounds, which eventually came into my possession. The next I heard of were two apparently paired, which appeared near Kintradwell, Brora, as I am informed by an obliging correspondent, Mr. William Houston, of Kintradwell, who writes me:—"They are undoubtedly rare on this coast, and I have never either heard or seen of any with the exception of a single specimen secured by Buckley some years ago in a strangely desolate burn at Balnacoil."—J. A. H.-B.

† From tables of "vermin" killed at Dunrobin between 1873 and 1880, I find that in 1873, 16 were killed; in 1874, 26. None again till 1877, when 4 were killed; in 1878, 2; in 1879, 3; in 1880, 5; in all 56 in 8 years.

‡ These large flocks of Ravens are not commonly seen in Scotland, and such gatherings are not general, but only very local. Other great gathering-places known to me are at the other extremity of Scotland, viz., at certain points along the Wigtownshire coast, and also on the hills of the Stewartry of Kirkcudbright.—J. A. H.-B.

51. Hooded Crow. *Corvus cornix*, Lin.—This most mischievous and destructive of all birds still holds its own, notwithstanding that every keeper's hand is, and rightly so, against it; it is, however, slowly decreasing in most places. The nest of the Hooded Crow referred to before, as having begun the destruction of the Hen-Harrier's nest, was found placed under a stone on the hill-side amongst some long heather; a position I never heard of before

Obs.—Not far from these two nests was a Merlin's, a marvellous collection of "vermin" so near together.*

52. Carrion Crow. *Corvus corone*, Lin.—I saw a bird that I took to be this, walking about with a "Hoodie" one day, when driving down to the river, and I heard later on that a Black and a Hooded Crow had been shot at one nest by one of the Dunrobin keepers.†

53. Rook. *Corvus frugilegus*, Lin.—There is one very large Rookery at Dunrobin, and several smaller ones in different places on the East coast. There would be a great increase of these birds if they were left alone at the breeding season, but in several places they are then fired at and the nests pulled down.

54. Jackdaw. *Corvus monedula*, Lin.—Another abundant, and very destructive species, nesting in old banks and low cliffs. These birds destroy most of the seabirds' eggs along the shore, and eat the rabbits out of the snares. Nothing seems to drive them away completely.

55. Starling. *Sturnus vulgaris*, Lin.—A bird that, though rare ten or twelve years ago, is now comparatively common. A pair bred in the spout of my house at Balnacoil, about ten miles from the coast.

56. Bullfinch. *Pyrrhula europaea*, Vieill.—Fairly common, and resident. Much seldomer seen in the summer than in the winter, when they appear to go about in small flocks.

* See my remarks also under Hen-Harrier, *antea*, p. 132. As regards the breeding of Hooded Crows upon the ground, this is the situation almost invariably chosen in North Uist, simply from the lack of either rocks or trees. I have found several such nests, usually in sloping banks of long heather, and I have seen a shepherd's dog there, that, besides being a good otter dog, was a capital bird's-nester, and actually *pointed* the nests. In South Uist Kestrels also breed on the ground.—J. A. H.-B.

† For an account of accumulations of Carrion Crows in the Tongue district of late years, and of nesting sites, see my 2nd Report on Scottish Ornithology. *Proc.*, vol. iv., p. 307.—J. A. H.-B.

57. Greenfinch. *Ligurinus chloris* (Lin.).—Not a very numerous species.

58. Goldfinch. *Carduelis elegans*, Steph.—I have never seen one of these birds on the East coast, though I am informed that they still breed at Dunrobin. They are, however, very much scarcer than formerly.

59. Siskin. *Carduelis spinus* (Lin.).—I heard of the young ones being taken near Dunrobin to be brought up as cage birds.*

59B. Crossbill. *Loxia curvirostra*, Lin.—This interesting species also breeds at certain localities in the East of Sutherland.†

60. Lesser Redpoll. *Linota rufescens* (Vieill.).—Breeds rather commonly in some of the birch and alder woods on the East coast. One nest I took on the 13th June, 1877, contained four fresh eggs, and was made of twigs of birch and heather, then fine grass, and lined with hair, moss, feathers, hare and rabbit fur, and thistle-down; it was placed on the very top of a birch tree. Another taken out of an alder contained two hard-set and two addled eggs; this was on the 25th of May, 1878.

61. Linnet. *Linota cannabina* (Lin.).—An abundant species, breeding in the whinbushes that are so common along the coast.

62. Chaffinch. *Fringilla coelebs*, Lin.—The very commonest small bird on the East of Sutherland, and seems to be everywhere; those breeding inland draw down to the coast and the stackyards in the winter.

63. House Sparrow. *Passer domesticus* (Lin.).—Common and spreading.

63B. Tree Sparrow. *Passer montanus* (Lin.).—

64. Common Bunting. *Emberiza miliaria*, Lin.—A common species, some remaining through the winter, but apparently receiving additions in the breeding season.

65. Yellow Hammer. *Emberiza citrinella*, Lin.—Like the preceding, very abundant. Those that breed any distance from cultivation, as they do at Balnacoll, go to the coast or to the neighbouring stackyards in the winter.

66. Black-headed Bunting. *Emberiza melanocephala*, Scop.—Common in suitable localities.

* The Siskin also breeds, or used to breed, nearer the shores of the Dornoch Firth.—J. A. H.-B.

† Vide *Proceedings*, vol. ii., part i., page 102.

67. Snow Bunting. *Plectrophanes nivalis* (Lin.).—A common winter visitant, arriving in large flocks.

68. Sky Lark. *Alauda arcensis*, Lin.—Much commoner, apparently, from spring to autumn than during the winter, and I fancy most of them migrate. They certainly leave the straths, and I do not now remember seeing many when shooting in the fields near the coast, in winter; I have often observed them on the hill during the autumn, but not in the breeding season.

69. Hoopoe. *Upupa epops*, Lin.—Obtained on two occasions at Kintradwell.

70. Greater Spotted Woodpecker. *Picus major*, Lin.—An irregular winter visitant.

71. Cuckoo. *Cuculus canorus*, Lin.—Very common summer visitant; often seen chasing one another from tree to tree. One or two individuals used regularly to haunt the garden at Balnacoil, sitting under the bushes, and no doubt picking up the gooseberry caterpillars which swarmed there; they were very tame. The only egg of this bird I ever obtained in Sutherland was taken from a Titlark's nest on the 27th of June, 1879.

72. Ring Dove. *Columba palumbus*, Lin.—A very common resident species, and increasing very much.

73. Turtle Dove. *Turtur auritus*, Gray.—A specimen in the Dunrobin Museum is labelled Kirkton, July, 1852.

74. Pallas' Sand-Grouse. *Syrhaptes paradoxus* (Pall.).—One in the Dunrobin Museum, taken at Dornoch, on June 6th, 1863.

75. Ptarmigan. *Lagopus mutus*, Leach.—I am afraid from all accounts that the Ptarmigan is decreasing in the East of Sutherland. Some years previous to 1870 a few used to be found on Ben Varie, in Glen Loth, but I doubt if there are any left now, and they were also found on the Ben Griam hills, but are now extinct. A few still exist on Ben Armine, but I hear they are much scarcer than they used to be, even a comparatively short time ago. The same may be said of Ben Clibrick, but this is certainly their greatest stronghold anywhere near the East. On the 1st of June, 1869, I saw several on Ben Clibrick, principally cocks, but could not obtain a nest, and the only one I ever took was in Assynt, on the 4th of June, 1870; it contained eight eggs, and was made of moss and feathers placed among the stones.

76. Red Grouse. *Lagopus scoticus* (Lath.).—In spite of the almost periodical attacks of disease, by a few years' rest the Grouse soon gets

up its numbers, at no time being more abundant than it is now. Although the Sutherland shootings in the East have been very much sub-divided of late, and consequently far more birds are yearly killed, no doubt the stricter preservation from vermin, Hoodie Crows in particular, enables them to keep up their numbers. They appear, however, to be much wilder than formerly, and in the more open moors a good deal of stalking has to be done to make up a bag in October, whereas ten years ago, you could shoot over dogs anywhere up to the end of the season; no doubt their increased numbers make them pack more, and so they are more on the alert. Early in March the cocks begin to chase the hens, and about the middle of April the first eggs are laid, but the greater bulk not until the middle or end of May, and I believe, on some occasions, the late nests are not hatched out till August. Grouse vary a great deal in colouring, the cocks more so than the hens. The commonest variety by far is that with a black breast and a good deal of white down the middle, the next, that with a red breast and the white feathers, and the third and rarest, as it seemed to me, and certainly so on my shooting at Balnacoil, the real Red Grouse with few or no white feathers. I have occasionally got birds with a black breast, and no, or at least very few, white feathers, but these were much darker on the back, as a rule, and were almost a true melanite. Many Grouse are very much marked and mottled with white, some very beautifully so, and this seems to run in families, for before our shooting season my keeper had noticed a bird that was very much marked with white, and this bird was shot during October of that year. Next season, near the same place, there was another covey which contained three or four of these white mottled birds, and I shot a very good pair, of which, however, I only kept the cock. It is common to meet with birds whose primaries are very strongly marked with white on the outside edging. Hen Grouse are, as a rule, much more marked with yellow spots and lines on the back and breast than the cocks, but not the redbreasted variety which is marked on the back like a cock. There are other varieties, but I think these are the ones most commonly met with. From the beginning of the season until the end of September, Grouse keep mostly in coveys, but after that the cocks seem to leave, and go about singly or in pairs, and sometimes in threes. I have often observed that where more than three birds were together in October or November, and a brace shot out of them, these were

almost invariably hens. The number of eggs in a nest varies from seven or eight to thirteen.

77. Black Grouse. *Tetrao tetrix*, Lin.—This species seems much more independent of wood than many people suppose. On the Balnacoll shooting I had no wood to speak of, and none in which Blackgame either bred or to which they resorted, except on rare occasions; and yet I had plenty of them. These birds like the edges of burns where there are plenty of rushes or long heather and brackens, especially at the commencement of the season. When the old cocks are moulting in August they lie very close in the detached patches of brackens here and there through the hill, and are not very easy to raise; at other times they are wild enough and not often caught napping. I have seen a cock in May still retaining many of its immature brown feathers. Greyhens seem to be bad mothers, often only having one young bird with them, and, I fancy, they do not breed regularly every year, at least there always seems to be a number of barren birds going about at all seasons. During the severe weather of December, 1878, or 1879, I shot one old Blackcock with lumps of ice on its feet.

78. Pheasant. *Phasianus colchicus*, Lin.—Fairly common about Dunrobin, and has been introduced at Suisgill, on the Helmsdale strath, where I have often seen them.

79. Partridge. *Perdix cinerea*, Charleton.—Common along the coast, and goes far up to the shepherds' lots among the hills to breed. During the storm last December, I saw several large flocks flying over the fields at Kintradwell, apparently driven to seek shelter lower down than usual, on account of the snow.

80. Quail. *Coturnix communis*, Bonn.—Has been shot on one or two occasions at Brora, in the autumn.

81. Heron. *Ardea cinerea*, Lin.—There used to be a small Heronry near Loch Brora, on the forest-side, and from it I have taken eggs at the end of March. On visiting the same place in the spring of 1879, I found it deserted, the Herons, or at least a few pairs of them, having crossed the loch, and breeding on the Gordonbush side. On an island in Loch Madie, near Altnaharra, I have taken fresh eggs, and seen young ones nearly able to fly at the end of May.

82. Curlew. *Numenius arquata* (Lin.).—A common species, and very evenly distributed over the hills during the breeding season. The earliest nest I have taken was on the 26th of April,

with four eggs, but the season (1878) was very forward, the usual time being the first week in May. The birds begin to leave the shore and come up the straths about the middle or end of March, and soon after that the flocks break up into pairs and go to their breeding grounds.

83. Whimbrel. *Numenius phaeopus* (Lin.).—A scarce spring and autumn visitant.

84. Bar-tailed Godwit. *Limosa lapponica* (Lin.).—An uncertain autumn and winter visitant. I procured two or three specimens on the 11th of November, 1877.

85. Greenshank. *Totanus glottis* (Pall.).—This fine and interesting wader is fairly distributed through the East of the county, but is nowhere common. Its eggs are difficult to find, and are a prize when found. I knew of four or five pairs breeding in the district about Balnacoil, but only succeeded in getting one nest, which a shepherd found for me. Sometimes these birds sit very close on their nests. In 1869, at Altnaharra, I took a nest which was placed between two stones at the edge of a loch. Passing by the same place, when fishing, in 1871, I happened to think of the Greenshank, and there, between the same two stones, sat the old bird on her nest, and she allowed me to touch her with my fishing-rod before she went off. The first time I took the nest it only contained three eggs, two hard-set and the other addled, the date being the 24th of May; the second time the nest contained four nearly fresh eggs, and was taken on the 26th of May. When the young are hatched the old birds are very bold and vociferous, coming down close above one's head with a swoop, and then shooting up into the air almost perpendicularly.

86. Redshank. *Totanus calidris* (Lin.).—Common the whole year round, and coming up the strath to breed. I used to take their eggs in a meadow at Balnacoil, about a mile from the house, where there were always several pairs breeding. The nest seems to be invariably placed in a tuft of grass, and like the Peewit, several nests are made before they finally fix on one in which to lay. They are very difficult to find, and during the time they are laying the birds never appear near the nest. The eggs are not laid on four consecutive days. When they go far up the hill to breed, I have generally noticed that they keep near any green spot, and do not nest in heather like the Greenshank.

87. Common Sandpiper. *Actitis hypoleucos* (Lin.).—A very

common summer visitor, and very conspicuous to anyone fishing among the lochs and rivers of Sutherland, as it is sure to be seen sitting on some stone by the waterside, nodding its head, moving its tail up and down, and whistling. This bird lays sometimes three, but generally four eggs, and the nest is usually placed in a very open place.

88. Sanderling. *Calidris arenaria* (Lin.).—An autumn visitant, but by no means very common.

89. Purple Sandpiper. *Tringa striata*, Lin.—A very common winter visitant, sometimes appearing in considerable flocks. They invariably alight on stones, and can stand a good knock from a wave without being washed off.

90. Dunlin. *Tringa alpina*, Lin.—Not a very common species at any time of the year, though a certain number breed on the hills, and I have seen their nests at Balnacoil and Altnaharra. I have seen a few birds in the winter at the Little Ferry, but never in such flocks as one sees on the Humber.

91. Woodcock. *Scolopax rusticola*, Lin.—A resident species, breeding all through the county, and beginning to lay about the middle of April. The nest is very much exposed, being generally a slight hollow at the foot of a birch tree. In the evening, all through the spring and summer, the birds may be seen flying over the trees, now and then suddenly dropping down like a bat, and they seem to have regular roads in the air, so to speak, as evening after evening they take the same line. Their note is a sort of chirrup, and their flight laboured, very different to that of a 'Cock in the season when he has been flushed once or twice. Whinbushes are excellent cover for these birds in the winter, especially the larger ones open at the bottom, for they don't like to sit in a place where they cannot move about. During open weather the 'Cocks on the East coast are very much scattered through the hills, but the first heavy snow drives them in, where they can find shelter.

92. Snipe. *Gallinago gallinaria*, O. F. Müll.—Resident throughout the year, unless an unusually heavy storm prevails, when they leave; but they are by no means very common. They are most numerous when the northern migrants arrive, as they then stay a day or two on their way south. Should there be a slight snow-storm at the time, the birds are driven down to the lower meadows, and, on one occasion, I got seven couple at Balnacoil.

93. Jack Snipe. *Scolopax gallinula* (Lin.).—A few appear in the late autumn, but do not appear to stop through the winter.

94. Grey Phalarope. *Phalaropus fulicarius* (Lin.).—A specimen was obtained at Kintradwell, in December, 1869, swimming about in a pool of water on the sand-hills near the sea.

95. Turnstone. *Streptilas interpres*, Lin.—Common all the year round, except May, June, and July. I shot one in a ploughed field near the sea, when it was in company with some Golden Plovers.

96. Lapwing. *Vanellus cristatus*, Meyer.—During the last few years the Peewit has remained, more or less, the whole year round, even during very severe weather, though formerly they used, I understand, to disappear during the winter.

97. Gray Plover. *Squatarola helvetica* (Lin.).—I once shot a specimen near Kintradwell, on the 20th of January, 1871, but I have never seen another.

98. Golden Plover. *Charadrius pluvialis*, Lin.—Not nearly such a common species as might be expected, but still fairly plentiful during the breeding season. Their nests are very difficult to find, as the male bird seems to be always on the watch, and his melancholy whistle soon brings his mate from the nest. On the two occasions on which I have taken their nests, the hens flew off and did not run, this being, I think, a commoner way amongst most of the waders of leaving their nests, than by running, though they often get up an immense distance off. The first nest I got was on the 11th of June, and the hen did not get off until I was close to her; the eggs being quite fresh. The other nest was on the 27th of April, and contained only three eggs; the hen rose at such a distance that I merely saw a flash of white as she shewed the under parts of her wing. I walked straight to the place and found the nest. I have always observed that Curlews fly from their nests.*

99. Ringed Plover. *Aegialitis hiaticula* (Lin.).—A common bird along the sea shore, and it also breeds inland, in, at least, one locality.

* This, also, I have always noticed, but, in returning to the nest, they alight at a considerable distance and run to it, as, indeed, do many other species. Some waders, on the other hand, fly very close up to the nest, and then run quickly on to it. The more shy species appear to follow the first method, and the tamer species the latter, but no doubt in all cases something will depend upon the state of incubation of the eggs at the time.—J. A. H.-B.

100. Oyster-catcher. *Haematopus ostralegus*, Lin.—Breeds in considerable numbers along the shore. On one or two occasions I have seen or heard these birds up the Brora river, some seven or eight miles from the sea, but they only stayed for a day or two at most. The Oyster-catchers assemble by thousands, in winter, on the mussel scalps at the Little Ferry, near Golspie.

101. Water Rail. *Rallus aquaticus*, Lin.—An autumn visitant.

102. Corn Crake. *Crex pratensis*, Bechst.—A very common summer species.

103. Water Hen. *Gallinula chloropus* (Lin.).—A resident species, spreading out to certain localities to breed, and drawing down to the coast in hard weather. One favourite winter locality is the burn running by the Clynelish Distillery, near Brora, where I have seen eight or ten at a time, by the side of the stream.

104. Coot. *Fulica atra*, Lin.—I have seen the Coot on the hill lochs on one or two occasions, in the breeding season, but I never saw a nest, nor have I seen it in the winter.

105. Arctic Tern. *Sterna macrura*, Naum.—There are several colonies of these, or the Common Tern, breeding along the coast, but I have not been able to identify the species for certain.

106. Lesser Tern. *Sterna minuta*, Lin.—I have never seen but one pair of these Terns on the coast, and they were evidently nesting at the time, though I could not find the nest. The eggs in the Dunrobin Museum, said to be those of this bird, were merely those of either the Arctic or Common Tern.

107. Ivory Gull. *Pagophila eburnea* (Phipps).—A fine adult specimen was shot at Scourie, and sent for presentation to Mr. Macleay, bird-stuffer, in Inverness, where I saw it. I believe it is now in the possession of Mr. Crawford, of Tongue.

108. Kittiwake. *Rissa tridactyla* (Lin.).—Seen about the Little Ferry in spring.

109. Black-headed Gull. *Chroicocephalus ridibundus* (Lin.).—A common species the year over, breeding in several colonies throughout the hills. These birds nearly always choose a muddy, reedy island to nest on, very difficult of access without a boat, on account of the depth of mud, but sometimes an inexperienced bird or two will place their nest on the edge of the loch on the mainland, though this appears to be rare. I once saw a single pair on a loch, where the only other species was *Larus canus*. The nests are made of reeds, a few heather stalks, and dead brackens.

110. Little Gull. *Chroicocephalus minutus* (Pall.).—The only specimen I ever saw was a dried-up mummy which I picked up in a cart track near Balnacoil, in 1874.

111. Iceland Gull. *Larus glaucus*, O. F. Müller.—A winter visitor, not very rare.

112. Great Black-backed Gull. *Larus marinus*, Lin.—A resident species, but not very common. A few pairs breed about the hill lochs, always on islands, and generally only one pair on each island. They lay early in May, and if the first eggs are taken they lay a second batch in the old nest. They apparently return to the same place year after year, though now and then a pair will desert a locality.

113. Lesser Black-backed Gull. *Larus fuscus*, Lin.—Only a too abundant species, being very obnoxious to game preservers and shepherds, who destroy them on every occasion. They are, as a rule, later in laying than the former species, fresh eggs being found late in June. These birds eat a great deal of corn in the spring months, as may be seen by a visit to the localities in which they breed, for they cast up the husks in "quids," like the Rooks. They also bring up fish and small crabs from the shore. On two occasions these birds robbed me of a Goose nest which I was very anxious to obtain.

114. Herring Gull. *Larus argentatus*, Gmel.—Abundant, though not nearly so common as *Larus fuscus*. The eggs are difficult to get on account of being laid amongst those of the last-named species, as there is little or no difference between the eggs of the two. The best way to get them is to watch the birds with a glass, at least this is the way I obtained authentic eggs. They breed indifferently on an island or on marshy ground.

115. Common Gull. *Larus canus*, Lin.—Breeds abundantly in the same places as the last two species, but I noticed that they were more often on the mainland than on the islands in the lochs. They lay about the same time as *Larus marinus*. I believe these birds do little or no harm, and I never allowed them to be molested on my ground, where I had a very flourishing colony.

116. Pomatorine Skua. *Lestris pomatorhinus* (Temm.).—Four birds seen at Balnacoil on the 13th of October, 1879.

117. Richardson's Skua. *Lestris crepidatus* (Gmel.).—Often seen off the coast in autumn. I understand from Mr. Houstoun of Kintradwell that a pair breed regularly on a very boggy piece of

ground on his shooting. I have never personally seen the birds in Sutherland during the breeding season, nor do I know of any one who has, except in the above-mentioned instance.

118. Razorbill. *Alca torda*, Lin.

119. Common Guillemot. *Alca troile* (Lin.).—Seen off the coast in winter and spring. Numbers of dead birds come ashore after a storm, especially in early spring, nine out of ten being Razorbills and the others Guillemots, Puffins, and Little Auks. Near the mouth of the river Brora I got a specimen of the Guillemot which was swimming about in a half-stupified state.

120. Black Guillemot. *Uria grylle* (Lin.).—Commonly seen off the coast in spring in both the full breeding and speckled plumage.

121. Little Auk. *Mergulus alle* (Lin.).—Some years abundant, judging from the number of dead birds found on the shore. The only live one I ever saw was swimming about within two or three hundred yards of the shore, as if it could not get further out. When these kind of seabirds come so close in they seem either stupified or weak, and, I fancy, generally perish.

122. Puffin. *Fratercula arctica* (Lin.).—Chiefly young birds picked up dead in the winter or spring.

123. Great Northern Diver. *Colymbus glacialis*, Lin. — A regular spring visitant to the coast. I have a fine specimen in full breeding plumage, which I shot in May, on a pool in the Brora river, about eight miles from the mouth; it had never left the pool all day, though two gentlemen who were fishing there had been pelting it with stones a good part of the day, under the belief that it was a Cormorant.

124. Black-throated Diver. *Colymbus arcticus*, Lin.—A very common species, a pair breeding in most of the larger lochs on the hill, if suitable. Their usual time of laying is about May 15th, but, on one occasion, I saw a pair of these birds, and a young one pretty well grown, either in the end of May or very early in June. The Black-throated Divers seem to go straight to their breeding haunts, not loitering on any of the lower lochs by the way, and return, as soon as the young can fly, equally quickly. They nearly always have their nests at the point of some island in a loch, but I have, on one occasion, taken the nest on the shore of the mainland, the old bird being very tame, and swimming about within twenty or thirty yards of us.

125. Red-throated Diver. *Colymbus septentrionalis*, Lath.—A

much later breeder than the last-named, and also a much scarcer species. A pair bred on my ground on the edge of a small black loch, about fifty yards long and twenty broad, at the outside, and when visited, they rarely left the loch, merely diving from one end to the other; the nest being placed on an island. I believe those inveterate robbers, the Lesser Black-backed Gulls, used to take the eggs, as I got one fresh egg, on the 12th of July, 1877, and this egg had been in the nest three or four days before I took it. In 1878, the eggs were taken by a friend of mine, who wanted them for his collection. I have no doubt they laid again, but I did not trouble them further by going to see. In 1879, the birds hatched two young ones, which lived till they were about half-grown, when, I am sorry to say, one disappeared, and I have often noticed, with Divers, that one young one was a commoner number than two. There were no fish of any description in the loch, so the old birds must have had, at least, four or five miles to fly every time they wanted food, for, although there was a burn full of small trout not far off, I never saw them there, nor do I think they would have gone there, as the pools were scarcely big enough for them to rise easily from.

126. Little Grebe. *Podiceps minor* (Gmel.).—A summer visitant. I once took a nest, with four eggs, on Loch Brora.

127. Cormorant. *Phalacrocorax carbo* (Lin.).—A common species, even during the summer. One or two were generally to be seen sitting on a sand-bank, at the end of Loch Brora, drying their wings.

128. Shag. *Phalacrocorax cristatus* (Faber).—Common during the winter and spring.

129. Gannet. *Sula bassana* (Lin.).—Often seen fishing off the coast, except during the breeding season.

130. Grey Lag. *Anser cinereus*, Meyer.—Even yet fairly common in the localities it frequents. Though many birds may be seen in a station, I believe that out of the number only a certain relatively small proportion breeds, as flocks of Geese may be seen flying about the lochs during the breeding season, and that these are not all males was proved by a hen being shot out of a lot of three or four that were flying overhead. Geese are early breeders, generally hatching out about the middle of May, and about this period I have often seen two old birds accompanied by, at the most, six young ones. On one occasion I found a brood just hatched

on a bog, and picked up a young one which had barely absorbed all the yolk of the egg by the umbilical cord, a small bit, about a quarter of an inch long, still sticking to it; the old Geese were in great excitement, walking about some forty yards from me, and cackling. I put the small bird down again, and it soon set off after the rest. On the 21st of May, 1869, I took a Goose egg, fresh, out of a Lesser Black-backed Gull's nest, containing three eggs, and the old Gull appeared to be sitting on all four eggs.

131. Brent Goose. *Bernicla brenta* (Pall.).—A few of these birds come to the Little Ferry every winter.

132. Whooper. *Cygnus musicus*, Bechst.—I have seen the Whooper on two occasions at Brora; once on April 20th, 1871, I saw four fly over Loch Brora, and again in the end of March or beginning of April, 1878, a lot of about twenty fly over Balnacoil.*

133. Bewick's Swan. *Cygnus bewicki*, Yarrell.—I saw one in Mr. Macleay's shop in Inverness. It had been shot at Altnaharra, in the winter of 1879-80.

134. Sheldrake. *Tadorna cornuta*, S. G. Gmel.—A common summer visitant, breeding in the sand-hills along the coast; the species appears to be increasing.

135. Widgeon. *Mareca penelope*, Lin.—Common, and resident; numbers remaining to breed. About May, I have often seen a large flock of old males, in splendid plumage, in a pool near Loch Brora; near here I once disturbed an old duck and her brood, and on the duck giving a note of alarm, the drake came and joined her; so, perhaps, the males of some species of Ducks do not moult until the young are pretty well able to take care of themselves.

136. Teal. *Nettion crecca*, Lin.—Common most of the year, but rare, if not altogether absent in winter.

137. Pintail. *Dajila acuta* (Lin.).—I have a specimen of a female, or young male, which was shot at the Little Ferry, on Nov. the 14th, 1877.

138. Wild Duck. *Anas boschas*, Lin.—Common, and resident. I have seen, on one occasion, thirteen eggs in a nest of this bird.

139. Pochar. *Fuligula ferina* (Lin.).—I believe I saw this bird, on one occasion, on the river Brora, in the early spring of 1870, but it is certainly a very rare bird on the East coast.

* They are also known to visit certain lochs near Tongue in the North of the county in spring.—J. A. H.-B.

140. Scaup Duck. *Fuligula marila* (Lin.).—Occurs sparingly at the Little Ferry in winter.

141. Black Scoter. *OEdemia nigra* (Lin.).—Neither this nor the Velvet Scoter appears to be as common as formerly, at least, in one locality, and this, too, since 1870.

142. Velvet Scoter. *OEdemia fusca* (Lin.).—I got a fine specimen which was swimming among the breakers, near the shore, apparently stupified, on April 18th, 1870. They are plentiful outside the Bar at the Little Ferry.

143. Golden-eye. *Clangula glaucion* (Lin.).—Very common in the winter and spring both at sea and on Loch Brora. The old males are, however, very difficult to get, though females and young birds are easily obtained.

144. Long-tailed Duck. *Harelda glacialis* (Lin.).—A very common winter visitant, arriving in large flocks. They are very restless birds, almost for ever on the move.

145. Redbreasted Merganser. *Mergus serrator*, Lin.—Very common, and resident; a pair or two being found on most of the larger hill lochs. They are shot down a good deal on account of the mischief they do in the salmon rivers. Ten is the largest number of eggs I have seen in a nest; the yolk is rather difficult to extract, being so very solid. At times these birds use the same nest as they occupied the previous year, as I took a nest of six eggs, well hidden under some long heather, underneath which were the remains of egg shells of the year before. I saw the old bird, with my glass, come off the nest.

ABSTRACT STATEMENT OF ACCOUNTS—SESSION 1879-80.

To Cash in Bank per last Account,	£76 15 11	By Attendance of Janitor,	£1 10 0
„ in Treasurer's hands, per last Account,	0 6 0	„ Postages, Carriages, &c.,	9 16 8
„ per 179 Members' Annual Subscriptions, at 5/, 44 15 0		„ Bookbinding and Cases,	1 15 9
„ per 9 new Members' Entry-money, at 10/, ... 4 10 0		„ "Proceedings" to Account of Printing, £40; Paper, £5 2s. 6d.,	45 2 6
„ per 42 Members' Arrears,	6 5 0	„ Book "Mycologia,"	0 8 0
„ per "Proceedings" sold,	1 14 6	„ Lithographing Certificates, Receipt Books, &c.,	6 0 0
„ Interest from Bank,	1 10 9	„ Engraving Illustrations for Plates,	6 1 0
„ Donation,	0 15 0	„ Printing Circulars, Lists, Rules, &c.,	8 19 0
		„ Cash in Bank per Book,	56 16 8
		„ „ in Treasurer's hands,	0 2 7
	<u>£136 12 2</u>		<u>£136 12 2</u>

30th September, 1880.—Compared with Vouchers and found correct.

(Signed) JAMES LUMSDEN.
 GEORGE E. PATERSON.





PROCEEDINGS

OF THE

NATURAL HISTORY SOCIETY OF GLASGOW.

SESSION 1881-82.

THE THIRTIETH ANNUAL GENERAL MEETING,
THE SOCIETY'S ROOMS, 207 BATH STREET.

SEPTEMBER 27TH, 1881.

Professor John Young, M.D., F.G.S., President, in the Chair.

The Treasurer submitted his Annual Financial Statement, which shewed a balance in favour of the Society of £15 17s. 9d.

REPORT OF THE COUNCIL—SESSION, 1880-81.

The Secretary read the Report of the Council on the business of the past session. The number of members reported at last Annual Meeting was 230. During the session 33 names had been added, and after making allowance for deaths, resignations and removals, the number on the roll at present was 246; being an increase of 16. No special meetings had been held, but the eight ordinary monthly meetings had been well attended, and the interest seemingly fully sustained to the close.

During the year the members have had to regret the death of Mr. Edward Richard Alston, F.L.S., E.G.S., &c., an honorary member of the Society, and also of four ordinary members:—viz., Mr. James Allan, who became a member on the incorporation of the Field Naturalists with the Society, having acted for some years as Secretary to that body. Mr. Arthur Pratt, who joined in 1875, and who for some time served as a member of Council, was much respected and esteemed by all who were acquainted with him, always proving himself a warm friend of the Society,

to which he made himself in many ways useful. The other two deceased members, Messrs. James Smith and Alexander Kyle, were not generally known, having but lately been elected.

The Council has made an arrangement with the Parks Committee of the Town Council to provide a collection of plants and invertebrate animals, which is to be placed in the Kelvingrove Museum, the committee of that institution providing cabinets to contain the collection, and material for mounting the specimens, which are to be named and labelled by the members, and kept distinct from any of the other collections. It is expected that some progress will be made in the formation of this collection by spring, and as it will be accessible to members of the Society, it is hoped it may prove useful in assisting them in the study of natural history.

At the close of last session the Society approved of a proposal to hold a *conversazione* of the members, and to have a public exhibition of natural history objects in the city during the winter. The Council appointed a committee to make inquiry and ascertain the practicability of carrying out this scheme, but after frequent meetings and due deliberation, the committee reported that, owing to difficulties which stood in the way, it was not desirable to go on with the project at present. The Council unanimously approved of the report, and agreed to recommend that the matter should therefore be postponed in the meantime.

LIBRARIAN'S REPORT—SESSION 1880-81.

I have to report the books all in good condition. Since our last report our library, as the members are aware, has been safely removed and duly arranged in new cases in the council-room. It is a matter on which we may congratulate ourselves that our collection is rapidly increasing, but it will necessitate steps being taken to add considerably to our present accommodation, which is becoming quite inadequate to meet the requirements, and I hope the Society will soon accord an increase of case-room.

Serials to which we are subscribers are continued.

We continue in active exchange relations with a large number of kindred societies, British, Continental, and American. Several important societies have been added to the list, shewing not only the scientific value of our *Proceedings*, but a continued and increasing appreciation of our work by outside societies.

I regret that we have not been able to issue the promised complete catalogue of the library—mainly due to the now restricted accommodation for the proper and convenient arrangement of the many valuable contributions from other societies. I hope to be able to say something more satisfactory on this point during the course of the present session.

We have added by purchase one of the most valuable (from a scientific point of view) of the volumes of Sowerby's English Botany, viz., vol. 10, which includes the Carices and allied orders. This, I hope, will be appreciated by our botanical members.

We have to accord our thanks for various donations. I may mention 3 volumes of the *Zoologist* (for 1874-75-76), presented by one of our members, Mr. Lumsden, and "The Cobham Journals," presented by the editor, Miss Ormerod.

The issue of books to members has not equalled that of previous session, but I am pleased to be able to state that this is in no way to be attributed to a diminishing interest on the part of members, but from having to temporarily close the library to permit of its removal and arrangement in the new cases.

The last part of the *Proceedings* has been duly distributed to the various societies, &c., and to all members who have paid their subscriptions.

FRANCIS G. BINNIE, *Librarian*.

The Report of the proceedings of the Summer Session was read by Mr. James Steel, Secretary for the Session:—

PROCEEDINGS OF THE SUMMER SESSION, 1881.

17TH MAY, 1881.

The first meeting was held in the Society's Rooms, 207 Bath Street, this evening.—Mr. Peter Cameron in the Chair.

The Chairman in his opening address alluded to the difficulties with which students of systematic biology in Glasgow had to contend, in the want of sufficiently extensive and available collections of properly named specimens. This was particularly felt in the case of the Invertebrata. The Council of the Society had made an effort towards remedying the evil, and had entered into an arrangement with the City authorities, by which collections would be formed and maintained in Kelvingrove Museum, so that in a

short time, he anticipated, almost complete herbaria of British phanerogamic and cryptogamic plants, and an extensive series of the Invertebrata would be available to students of natural history. He then proceeded to discuss the question of "Species." He contended that at the present time, and so far as experience is concerned, species are real entities, and that we should be able clearly to separate each from the other, if all the relative physiological and morphological data were mastered. He adduced many instances of species of insects which had been confounded, when only known in one stage of their lives, but had proved quite distinct when their larvae were discovered; and of species that had been mixed together, from too much attention being paid to variable characters such as colour, whilst structural peculiarities were neglected. He then referred to the investigations of Weismann on the seasonal dimorphism of butterflies and of others on the brine shrimp, as tending to rectify our ideas of species, and to throw light on the causes of variation. In explanation of his remarks he exhibited a series of specimens illustrative of dimorphism in gall-flies and ants, and of the phenomena of mimicry.

31ST MAY, 1881.

Mr. Peter Cameron in the Chair.

Mr. Peter Ewing exhibited a series of mosses from his herbarium. He had made a short excursion into the Highlands a few days before, and reported that alpine vegetation was this year more than usually advanced by about two weeks. He had observed *Saxifraga oppositifolia* and *Silene acaulis* in fine fruit at a higher elevation than the snow patches still left. He could only attribute this to the persistent and unbroken coating of snow which had protected the plants all winter.

The Chairman exhibited the gall and both sexes of *Spathogaster verrucosus* from Mugdock Wood. The galls are found on the leaf-buds of the oak, three or four on each, and frequently on the young leaves. This species has not been previously recorded for Scotland.

Professor A. S. Wilson, M.A., B.Sc., read a paper entitled "The Morphology of Underground Stems," in which he explained the true relations of these organs. In every respect these underground structures agree with ordinary leaf-forming axes, and the same law

that determines the branching of the largest trees is concerned with the production of the various parts of the bulb of a lily or a narcissus, the tuber of a potato or an artichoke, thus affording a striking illustration of that unity in the midst of infinite diversity, which is so remarkable a feature in the vegetable kingdom.

14TH JUNE, 1881.

Mr. William Stewart in the Chair.

Mr. R. Turner gave an account of the excursion to Kilmalcolm on the 11th instant. Amongst the noteworthy plants gathered were *Sedum villosum*, *Geum intermedium*, *Myosotis versicolor*, and *Trollius europæus*. A fine example of *Salix pentandra* was observed near Duchall Castle, and in the same locality *Polypodium Dryopteris* and *P. Phegopteris* were found. Many species of mosses were collected, the rarest of these being perhaps *Bryum alpinum*. *Adoxa Moschatellina* was found in fruit, and some specimens gathered were infested with the leaf-fungus *AECidium albescens*. Several other leaf-fungi were found. Hawthorn blossom was everywhere profuse, in marked contrast to last season.

Mr. Peter Ewing exhibited specimens of *Anthriscus vulgaris* from the East coast.

Mr. David Gregorson read an interesting paper on the "Geographical Distribution of Plants."

28TH JUNE, 1881.

Mr. Alex. Noble in the Chair.

Mr. Richard M'Kay gave an account of the excursion to Shielhill Glen on the 25th instant. At Greenock the members were taken under the leadership of Mr. Scott, and they were afterwards joined by excursion parties—one of the Greenock Natural History Society, the other of the Geological Class under charge of the curator of the Watt Museum, Greenock. The primrose was found to be still in flower in the glen. Among the noteworthy plants found were:—*Trollius europæus*, *Cardamine amara*, *Sedum villosum*, *Saxifraga hypnoides*, *Listera ovata*, *L. cordata*, *Carex aquatilis*, *Avena pubescens*, *Hymenophyllum unilaterale*, *Asplenium Trichomanes*,

Cystopteris fragilis, *Nephrodium Oreopteris*, *Polypodium Phegopteris*, *P. Dryopteris*, *Ophioglossum vulgatum*, *Equisetum marimum*, *Bartramia fontana*, *B. pomiformis*, *B. arcuata* (in fruit), *Bryum pseudo-triquetrum*, *Hypnum undulatum* (in fruit), and *Tetrodontium Brownianum*.

2ND AUGUST, 1881.

Mr. William Stewart in the Chair.

Mr. Thomas King reported that an excursion had been made on the 30th ult., to Innellan. Among the flowering plants found were the following:—*Raphanus maritimus*, *Hypericum dubium*, *H. quadrangulum*, *Agrimonia Eupatorium*, *Epilobium hirsutum*, *Lythrum Salicaria*, *Carum verticillatum*, *Daucus Carota*, *Eupatorium cannabinum*, *Gnaphalium sylvaticum*, *Matricaria inodora*, var. *maritima*, *Melampyrum pratense*, *Linaria vulgaris*, and *Rumex viridis*. The following fungi were collected:—*Agaricus laccatus*, *A. infundibuliformis*, *A. radicans*, *A. stercorarius*, *Lactarius deliciosus*, *L. glycosmus*, *Russula foetens*, *R. heterophylla*, *Hygrophorus conicus*, *H. chlorophanus*, *H. miniatus*, *Boletus flavus*, *B. scaber*, and *Hydnum repandum*.

Mr. Richard M'Kay exhibited the moss, *Splachnum ampullaceum*, collected near Milngavie, this station being the nearest to Glasgow yet recorded.

16TH AUGUST, 1881.

Mr. Peter Cameron in the Chair.

The Chairman referred to the loss the Society had sustained in the decease of Mr. James Allan, and spoke at some length of the valuable services he had rendered, and the readiness he had ever shewn to further the study of natural history.

Mr. Richard M'Kay reported on an excursion he had made to Finn Glen, and exhibited the moss *Amblyodon dealbatus*, new to Clydesdale.

Mr. Peter Ewing reported that in the excursion made to the Highlands, nothing very unusual had been found. The following plants were gathered, in addition to those exhibited by him at the

Society's meeting on the 3rd August, 1880:—*Potentilla alpestris*, *Saxifraga nivalis*, *Juncus bighuis*, *Phleum alpinum*, *Avena alpina*, *Polypodium alpestre*, *Gymnostomum squarrosum*, *Eucalypta ciliata*, *Racomitrium heterostichum*, var. *gracilescens*, *Polytrichum strictum*, *Hypnum striatum*, *H. sarmentosum*.

Mr. Thomas King exhibited a series of flowering plants from North Queensferry, and of fungi from Bishopbriggs; also a specimen of *Anacharis alsinastrum* bearing male flowers, collected by Mr. R. Turner in a pond at the foot of the Braid Hills, near Edinburgh, the only known station for the male form in Britain. It was discovered in this pond (the first record of its occurrence in Britain) by Mr. David Douglas, of Edinburgh, in the summer of 1880.

Other specimens, plants and insects, were exhibited by Mr. Renwick, Mr. Noble and Mr. Cameron.

30TH AUGUST, 1881.

Mr. Peter Cameron in the Chair.

Mr. Richard M'Kay gave an account of the excursion to Ben Voirlich on the 27th instant, and exhibited *Polytrichum striatum* (in fruit) collected on the mountain.

Mr. M. C. Duff exhibited a beautiful specimen of the rare fern, *Woodsia hyperborea*, from a locality in the Breadalbane mountains, where he had found it rather plentiful.

Mr. Peter Ewing exhibited *Pulicaria dysenterica* and *Carlina vulgaris* from the Struey Rocks, Arran.

13TH SEPTEMBER, 1881.

Mr. Alex. Noble in the Chair.

Dr. James Stirton, F.L.S., exhibited a series of lichens of the genus *Umbilicaria*, some of them collected at Loch Coruisk, Skye. Mr. Thomas King exhibited the curious fungi, *Spathularia flavida* and *Torrubia militaris*, from Mull.

Mr. R. Kidston read a paper "On the Flora of Schiehallion and the neighbourhood of Tummel Bridge." Generalizing from the results of the trip, the district cannot be said to be rich in rare

plants. Schiehallion—3,547 feet—was especially barren, and the few alpine plants collected on it were small and stunted. Farragon Hill was also visited, and though 100 feet lower than Schiehallion, possessed a richer flora. This hill is composed of micaceous schist, and is consequently more moist. The little strath through which the river flows at Tummel Bridge contains a great number of common species of plants, which, being well sheltered, attain great luxuriance. In the bog-pools, some desmid gatherings made were found to be rich in species. The principal plants collected were:—*Radiola millegrana*, *Lycopodium annotinum*, *Utricularia minor*, *U. intermedia*, *Arctostaphylos Ura-ursi*, *Epilobium alpinum*, *Thalictrum alpinum*, *Vicia Orobus*, *Oxyria reniformis*, *Sedum Rhodiola*, *Sagina saratilis*, *Draba incana*, *Arabis hirsuta*, *Mentha Athamanticum*, *Polystichum Louchitis*, *Asplenium viride*, *Nitella opaca*, and *Chara fragilis*.

These reports were all unanimously approved of, and it was agreed that they should be printed in the next part of the *Proceedings*.

The election of office-bearers was then proceeded with, the subjoined list for 1881-82 being the result:—President—Professor John Young, M.D., F.G.S. Vice-Presidents—W. J. Milligan, John Kirsop, F.S.A.Scot., Professor John Cleland, M.D., F.R.S. Secretaries—Robert Mason, John M. Campbell. Treasurer—Robert J. Bennett. Librarian—Francis G. Binnie. Members of Council—James B. Murdoch, F.S.A.Scot., Rev. A. S. Wilson, M.A., B.Sc., Richard M'Kay, John Young, F.G.S., Thomas King, Robert Turner, John A. Harvie-Brown, F.Z.S., F.R.S.E., &c., Peter Cameron, and M. C. Duff.

The following gentlemen were elected members of the Society:—as honorary members—Messrs. James Murie, M.D., LL.D., &c., Burlington House, London; and Osbert Salvin, F.R.S., F.L.S., &c., Cambridge; as corresponding member—Mr. John King, British Vice-Consul, Carizal, Bajo, Chili; as ordinary members—Messrs. James Johnston, John Thomson, Alfred Kling, Charles Mackinnon Ramsay, John Hill, Alexander Martin, and Alexander Somerville, F.L.S.

Mr. John M. Campbell exhibited a specimen of a variety of the Common Ringed Snake, *Natrix torquata*, Ray, which he had received from Cambridgeshire. He called attention to the colour

markings in this variety, the yellow collar-marking being replaced by one of a greenish colour. The President also made some observations on the specimen.

Mr. David Robertson, F.L.S., exhibited specimens of four species of Foraminifera from Cumbrae. (1) *Hyperammina* (*Psammodendron*) *arbuscula*, Norman. The only record of this species hitherto made is that brought up on the fluke of an anchor during the "Valorous" expedition among the Knight Islands, Greenland, in 20 fathoms of water. At Cumbrae it is moderately common in 60 fathoms, attached to stones, shells, and annelid tubes. It is a very remarkable form, more like a plant than a foraminifer. (2) *Technatella legumen*, Norman.—A few of these found at Cumbrae, for the first time, in the Firth of Clyde, are covered with sand—a peculiarity that had not, so far as known, been noted before. (3) *Hyperammina elongata*, Brady.—Mr. Robertson had exhibited specimens of this species from Skye before the Society last winter, it being then new to Britain. Those now got at Cumbrae are in better condition and more perfect, being whole at both ends, a state that from their brittleness they are liable to lose. (4) *Pelosina variabilis*, Brady.—This species has only been recorded by Mr. H. B. Brady from material obtained by the "Challenger" expedition. In a note received by Mr. Robertson that day from the Rev. A. M. Norman, the writer said that he had procured it at Tarbert, Lochfyne, some years ago, but it had not at the time been recognised as a rhizopod, which indicates that when our lists are more complete many of these obscure forms will be found to be more widely and variously distributed than is at present supposed.

Mr. Peter Ewing exhibited a collection of mounted specimens of some of the rarer flowering plants of the East coast. Among them were examples of *Melilotus alba*, *Scirpus Savii*, *Orobanche rubra*, *Diplotaxis tenuifolia*, *Scabiosa Columbaria*, *Marrubium vulgare*, *Allium vineale*, var. *compactum*. Also from Ben Lawers, specimens of *Juncus castaneus*, *J. biglumis*, and *Poa Balfourii*.

PAPERS READ.

I.—*Apiarian notes in Argyllshire for 1881.* By Mr. ROBERT J. BENNETT.

In concluding my notes for 1880 I said it was the finest season we had had in Scotland for many years. Besides the large harvest

gathered, the hives were put into winter quarters with more stores of honey than they possessed for years, and it was well for them that it was so.

On the 10th November I visited my apiary, and rarely have I witnessed such an interesting sight. The day was lovely, and the bees were sporting themselves in mid air, thousands crossing each other in their flight, forming myriads of angles and all manner of geometrical forms in very sport during their cleansing flight. My man remarked, "We will have a severe winter. Take a good look at them. It will be the last you'll see of them this year;" and he was right, for they were not again on the wing till the last day of December. The storm began on the 12th of November, by the 14th the whole country was covered with snow, and during five long months the bees were only seven times on the wing.

January 1st, 1881, like the last of December, was very mild, so that the bees again came out in great force, and, strange though it may appear, many queens began laying at this time. This I account for from their having had plenty of stores, and being six whole weeks in total confinement. On the 2nd January frost again set in, and continued with greater or less severity until the middle of March.

March 22nd, I examined stocks and was glad to see all in fair condition, many young bees being in most of the hives, and breeding going on more or less in all of them. They were all perfectly dry, another proof that the use of the "quilt" with upward ventilation is almost perfect. The main reason, however, to which I attribute the fine condition of my bees at this time is, that they had gathered all their own stores, no artificial feeding having been given them. My observations over a number of years lead me to believe that for good wintering nothing succeeds so well as to allow the bees plenty of their own ingathered honey and pollen, and there need be no fear of leaving them too much. They will take good care of it, and, if opportunity occur, will repay your kindness with interest.

During April we had very few fine days, but those we had the bees made the most of, working with great ardour at bringing in pollen. On the 18th I examined stocks and found all in good condition, but the stores were visibly diminished, and I began artificial feeding so that breeding should not be checked.

May was really the finest month of 1881 for bees. Towards

its end the heat was intense, the trees were covered with flourish, and the hives rapidly filled, and swarming commenced. Our hopes were raised, and we thought that the season would excel all that had preceded it. I waited anxiously to see a swarm of Cyprians, but alas, on the 28th a terrific thunderstorm came on and was followed by rain, which continued more or less till 15th July, by which time every hive was depending on artificial feeding for its very existence. The 15th of July was lovely, and most of the hives gathered on it alone from 8 to 10 lbs of honey. Rain again set in and continued till the end of August, so that but for artificial feeding most of the stocks would have perished.

About this time I received a letter from a gentleman in the south of England, who wrote—"We have been slinging honey for five months continuously. Never before have we had such a surplus. The tables of the British Beekeepers' great show at Kensington proved that, as there were several tons of honey exhibited. The yield was enormous, and beekeeping, alike to the cottar and honey man, has been a profitable business."

August. We left the Cyprians in May about to swarm. They had not done so up to the beginning of this month, but in the abnormal state of the hive we witnessed a strange phenomenon, over 200 queen cells being in it. At last on the 2nd they swarmed, and over a dozen princesses with them. Some of the latter were not much larger than the ordinary workers, and all were deposed but the finest. They worked with great vigour, but, strange as it may appear, the queen was not fertilized, the bees began to dwindle, and it was only on Saturday, 24th September, that I saw worker brood in the hive, although many drones had been hatched. I am anxious to see the result, and whether they will be pure or crossed.

In September, from the 10th till the 18th, the weather was lovely, and the bees wrought with right goodwill, putting in on the average from 15 to 25 lbs. per hive. Never before had I observed them so jealous of their stores. On the least provocation they used their lances freely.

In another week they will be all put into winter quarters, and from my twenty stocks I have not taken a single pound of honey, choosing rather to keep them strong, and trusting for a successful season next year. During the summer I have given them one and a half hundredweight of sugar. Only last Friday I had a letter

from a Beekeeper in the Upper Ward of Lanarkshire, who says—
 “My bees have been costly bees to me this season, as I have had to feed them all summer, and the prospects are no better now. Out of 17 hives I sent to the heather, one is dead, three have made from 3 to 8 lbs., the remainder are worse than when they were taken away. Bings of dead lie at all our hives, and the enclosure where they are is strewn with their bodies.” I am sorry to hear such accounts. Another gentleman told me a cottager was about to destroy 10 stocks, but I told him I would willingly give him 10s. each for them rather than hear of such barbarity.

Is it not time our Government were wakening up and establishing experts throughout the length and breadth of the land, *especially in Ireland*, so that honey may no longer be one of our imports, when, in a good season, hundreds of tons might be secured if we had only bees to collect it, and farmers qualified to take care of them.

Although this year has been one of unparalleled honey-famine in Scotland, let us hope there are seven years of plenty yet in store for us.

II.—*The cultivation of the Potato in its Native Country (embodying a communication from Mr. John King, British Vice-Consul, Carrizal, Bajo, Chile)*, by Mr. Thomas King.

In a paper on the Flora of Chile, read before the Society some time ago, I had occasion to mention the potato as a Chilian plant. I made some remarks on its cultivation, and stated that during a residence of eight years in Chile I had never heard of the potato disease. I also suggested means by which its recurrence in this country might possibly be prevented. However there were some points on which I wished to possess more definite information, so last winter I wrote to my brother, who has lived upwards of twenty years in Chile, asking him to make inquiries. I also sent him the blue-book on the potato crop issued by our Government last autumn. He obtained the desired information, and a fortnight since I received from him the following communication:—

“Carrizal, Bajo, July 27, 1881.

“I am now able to give you the result of my inquiries regarding the cultivation of the potato in Chile.

“Juan de Dios Maraboli describes the mode of cultivation practised by the large growers for the Valparaiso and northern markets:—‘I was born in the province of Talca, where my father was a tenant farmer. I used to work on the farm till I was 18 years old, when I came to the north. When a field is to be planted with potatoes it is ploughed as soon as the previous crop of wheat or barley has been cut. The stubble is left long, and this ploughed in is the manure for the potatoes. By the time the rainy season is over—in September or October—the stubble has decayed and the ground is again ploughed, in some cases as often as five times, and harrowed well each time. The rainy season extends from April to September, that is from the autumnal to the vernal equinox. In November it is drilled. The distance between the drills is one step (about 33 inches), and they are made as deep as possible (about 16 inches). The potatoes are planted whole, a short step apart (about two feet), by a man carrying a basket on his shoulder. He walks erect and quickly, drops a seed each step, and presses it into the ground with his naked foot. If when he puts his hand into the basket he gets a small one, he takes two seeds and plants them together; if very small he puts in three. The largest potatoes are not planted, but middle-sized and small ones. The seed is covered by splitting the drills, and then the field is harrowed flat, and and remains so till the potatoes are dug. As the rainy season is now past few weeds grow, and they are soon smothered with the shaws, but sometimes they are cut down with hoes. If the land can be irrigated it is watered once or twice in January or February, after the shaws are well up, the leaves of which are not wetted. The crop is ripe in April, and is dug after the first rain, never before, one reason being that the ground is so hard the potatoes cannot be got out easily till it rains. After the potatoes have been dug they are spread on a high piece of ground, and repeatedly turned till they are quite dry. They are then piled in long heaps and covered with rushes. Sometimes dried rushes are put under them, but not always. The piles or pits are made up in the early morning, when the potatoes are cold, as well as dry, never in the afternoon, when they are warm with the sun. Trenches are dug round the heaps to take away the water, and the potatoes keep dry and good all winter. On some estates they are all taken into sheds with thatch roofs, and laid on wooden shelves. They keep good both ways.’

“Felipe Diaz was also born and bred in Talca. His statement

was almost exactly the same as that just now given. He laid great stress on making up the pits when the potatoes were cool. He had often to get up at three in the morning to do this work.

“Don Augustin Herreros has rented an estate near Santiago for the last eight years, and grows potatoes for the Santiago market. The land is good, is irrigated from the river, and requires no manure. He can grow potatoes on the same ground year after year, but generally raises the three following crops in succession—1st, wheat; 2nd, French beans; 3rd, potatoes; then wheat again. He sometimes plants his own seed, but usually gets it from estates farther south. The smaller potatoes are selected for seed, and are always planted whole. He never saw any disease. The details as to planting and treatment are nearly the same as given by Juan de Dios Maraboli, but he plants earlier—in September or October—and keeps down the weeds by hoeing. Near Santiago potatoes seldom get rain from the time they are planted till they are ripe.

“Don José Bruno Gonzalez Julio.—I enclose a copy of this gentleman’s letter. He is an engineer and farmer, and a very intelligent man.

“ ‘Mariposas, Talca, July 10th, 1881.

“ ‘Dear Sir,—I received your esteemed letter of June 3rd, which I have not answered sooner, partly because I was from home when it arrived, partly because I had to ask information from those who know the subject better than I do. I am very much pleased to be able to say that the answers to the questions you sent me have been obtained from trustworthy sources. 1st Question. Is ground for potatoes manured, and if so with what kind of manure? Answer—If the ground is poor, it is manured with farm-yard manure. 2nd Q. Is the seed planted whole, or divided? A. The general custom in the country is to plant it whole, but latterly, if large, to divide it. Great care is taken to select as seed, smooth, well-formed, medium-sized potatoes. 3rd Q. In a good year what is the greatest quantity in weight a hectarea will yield? (A hectarea equals $2\frac{1}{2}$ English acres.) A. In free, rich soil 350 fanegas (a fanega is 200 lbs.), or, expressed in English terms, 12 tons an acre. 4th Q. Is special care taken to change the seed from one estate to another? A. It is not the general practice to change the seed from one estate to another; what is aimed at is to find the varieties best fitted for each district. 5th Q. Has the potato in Chile been affected by the disease so common in Europe, and which makes such

havoc in the potato-fields of Great Britain and Ireland?—I mean the disease caused by *Peronospora infestans*. A. It has not been affected. We have not had that importation. There are no cases in which an epidemic disease has been observed. 6th Q. Is the potato a common article of food, and is it generally used by the poor in the south? A. In the provinces of Valdivia and Chiloé it forms great part of the food of the working classes. In the rest of Chile it is used generally by all classes. 7th Q. After taking up the potatoes, is any system adopted for preserving them during the winter? A. After the potatoes have been dug they are exposed for a few days to the sun in order to free them from moisture and from the earth adhering to them when taken out of the ground. They are then deposited in dry places, where they are protected from rain and frost, but exposed to the air. I answer your letter with the greatest pleasure, and remain, your most obedient servant,

JOSE BRUNO GONZALEZ JULIO.'

“I got some valuable information from intelligent workmen born and bred in the South, some of whom had wrought in the potato fields when young, and are now employed on the railway. One of them, Jose Maria Lorca, is from the island of Chiloé (S. lat. 43). He thinks there are no good potatoes out of his own country, and I believe there is some reason for this opinion. For, unlike the rest of Chile, the potato is there the staple article of food, consequently more attention is paid to the selecting of good varieties, and to the best modes of cooking. He said to me, ‘Mr. John, here in the north people don’t know what potatoes are. They neither know how to cook them nor how to eat them, and the potatoes are not so good as in my country. There you have something worth eating—potatoes so mealy you can’t boil them for breaking them to pieces.’ Potatoes are roasted in the ash-pits in wood ashes. They are always ready there, and if a friend comes in he is offered a hot potato out of the ash-pit, with salt, or a piece of dried fish. They are white and floury and fall to pieces when the roasted crust is taken off. In fact Chiloé is the Ireland of Chile as regards potatoes. Jose did not know much about their cultivation, but he had never heard of any disease attacking them. Chiloé is very rainy. Indeed it rains almost continuously there while the greater part of the rest of Chile is dry. In the report for 1873 issued by the Santiago meteorological office the annual rain-fall of Valparaiso is given as 12 inches, that

of Ancud in Chiloé as 52 inches. The varieties grown there thrive with rain, and suffer from the want of it. Seed taken from Chiloé ought to suit Ireland and the West of Scotland and England.

“The following is the mode of cultivation in the ‘chacra,’ or large kitchen garden:—The plot of ground selected for potatoes is sown with barley in March or April as soon as the previous crop has been harvested. The barley grows till August, when it is in the ear. The ears are then cut off and sold for feeding horses, cows, or pigs. The long green stubble is ploughed or dug into the ground, where it soon rots, and serves as manure. In October the ground is prepared for planting. The seed is planted at a depth of from 8 to 10 inches below the surface in rows one ‘vara’ apart (33 inches). However, the seeds are not put in singly, but in groups of four, and the distance between the groups is also one ‘vara.’ Some people put four small potatoes in each group, but the newer improved method is to put in four sets of one eye each, cut from the one or two principal eyes of large potatoes. If there are any small eyes in the sets they are destroyed to prevent them from growing. After the plants are well through the ground they are dug all round and the ground thoroughly loosened. Some time after the earth is hoed up about them into round piles like big mole-hills, and when further grown they get another hoeing up. I am assured that immense crops are procured by this method—as much as 18 tons per English acre—mostly of large potatoes. The rotation in chacras includes maize, French beans, pumpkins, &c. I do not know the order, but have been told several times that you always get a good crop of potatoes after French beans (frijoles).

“As regards the varieties cultivated in the country, some are adapted for early consumption, others for keeping through the winter. I have heard a good deal about ‘Papas Reynas.’ The potato-men cry them in the streets of Valparaiso. They are fine dry, mealy potatoes, and really the best in Chile, but do not keep well during the winter. They become soft and black. The ‘Borrajilla,’ a dun potato, keeps well. I see by the Blue-Book on the potato crop that Peruvian guano has been blamed for producing the disease, or for carrying it to Europe, and it is well to remember that though guano exists in Chile little or none is used. The soil is composed of disintegrated granite, the torrents descend from the mountains loaded with earthy matter, and where irrigation is practised the water deposits part of this in the fields, so that the soil is being

constantly renewed. I have inquired about the wild potato, but nobody knows it. Most of the people have heard that the potato is a native of Chile, but think of it only as a cultivated plant, and have never seen it on the hills except where planted. I find that on the eastern side of the Andes, about Mendoza and San Juan, the potato is scarcely known. Jose Andino was born in San Juan, and lived there till he was 18. He never saw a potato till he came to Copiapo. People in his native place live on maize and wheat. Manual Flores was born in Mendoza, and has seen potatoes grown in gardens to make salads like cucumbers. I do not know of anything else to add at present.

JOHN KING."

My object in bringing this paper before the Society is a practical one, to try to do something to prevent the annual recurrence of the potato disease. The cultivation of the potato has of late received special attention. A select committee of the House of Commons investigated the subject in the summer of last year, and in autumn issued a valuable report, in which it is shewn that the severity of the disease has been greatly mitigated by the production of new varieties, such as the Champion. Judging from the communication just read, it seems to me that something might be done in the same direction by the introduction from Chile of sound varieties. If we knew exactly the causes of the disease we might perhaps find a remedy. Of course the immediate cause is a fungus, but what are the remoter causes that predispose the plant to fungoid attacks? We may answer this question generally by saying that by our methods of cultivation we put a strain on the constitution of the plant which it is unable to bear. But what is the nature of this strain? I am inclined to attach a good deal of importance to cutting the seed. By this practice we destroy the natural protection of the tuber—the skin—and lessen the supply of food for the young plant. We probably over-stimulate by manures, and in many cases store imperfectly for the winter. Such treatment continued through a course of years at last renders the plant so weak that it falls an easy prey to *Peronospora infestans*. Now, it is noteworthy that in many respects the Chilian methods differ from our own, and from all the evidence before us the disease is unknown in Chile. I do not think we can lay the blame on our rainy climate, for the potato has failed in many different climates, and we see from the testimony of Senor Julio that in the two rainy provinces of Chiloé and Valdivia the

potato forms the staple article of food. I find that from the meteorological report the annual rainfall of Valdivia is 99 inches, spread over all the months of the year.

OCTOBER 25th, 1881.

Professor John Young, M.D., F.G.S., President, in the chair.

Mr. David Taylor, 49 Virginia Street; Mr. Robert Bullen, Royal Botanic Gardens; and Dr. James Adams, 49 Cambridge Street, were elected ordinary members of the Society.

The secretary read the following Agreement between the Society and the Town Council regarding the formation and development of collections of Plants and Invertebrata for the Kelvingrove Museum.

Agreement between the Natural History Society of Glasgow of the first part, and the Lord Provost, Magistrates and Council of the City of Glasgow, acting under the Glasgow Public Parks Act, Eighteen Hundred and Seventy-eight, of the second part, in regard to the formation and development of collections of Plants and Invertebrata.

It is agreed as follows:—

First.—The first party shall hand over to the second party, for the purpose of being placed in the Kelvingrove Museum, certain collections of Insects and Plants in possession of the first party, and shall supplement these and add other branches of British Invertebrata and Plants from time to time, accurately named and systematically arranged.

Second.—The second party shall (1) supply (*a*) materials required for mounting and holding the specimens, (*b*) properly constructed dust-tight cabinets to contain the specimens, and (*c*) keep the cabinets always supplied with camphor, or other insecticide, and otherwise in such a way as may best preserve the contents. (2.) Keep a register (apart from the general register of said Museum) of all specimens presented, the register to contain—(*a*), the name of the species; (*b*), the locality and date when found; (*c*), the donor's name; (*d*), date of presentation. Each specimen shall have a number on it corresponding with that in the register, to be labelled with the name in the case of pinned insects, and, in the case of carded specimens and mounted plants, the name and locality to be written on the card or paper on which the specimen is mounted.

Third.—In the case of duplicates not required for the collection proper being received from the first party by the second party, these shall be entirely at the disposal of the second party, who may exchange them for other specimens not represented in the collection, or otherwise dispose of them in such a manner as they may consider best fitted to promote the interests of the Museum.

Lastly.—In order to secure completeness, and to prevent unnecessary duplication of specimens, collections already in the Museum, or which may hereafter be added, may be incorporated with those presented by the first party, but such separate collections shall be distinguished by special labelling and registration. In witness whereof these presents, duly stamped, written by James Boyle Lang, apprentice in the Town Clerk's Office, Glasgow, are subscribed in duplicate by John Laing, William Wilson, and John Farquhar, three members of the Town Council, and by James David Marwick, Town Clerk, on behalf of, and as specially authorised by, the said Lord Provost, Magistrates and Council in Council assembled at Glasgow, upon the Sixth day of October, Eighteen Hundred and Eighty-one, before these witnesses—James George Monro, writer, Town Clerk's Office, Glasgow; and James Brown, Council Office, Glasgow; and by John Young, President; Robert Mason, Secretary; and Robert James Bennett, Treasurer, of and on behalf of the said Natural History Society of Glasgow, at Glasgow, upon the Eleventh day of November, and year last mentioned, before these witnesses, William W. Christie, Medical Student, Thirteen Westercraigs, Dennistoun, Glasgow; and William Livingstone, Medical Student, Seventeen Hill Street, Wishaw.

(Signed) John Laing. (Signed) John Young, M.D.

„ William Wilson. „ Robert Mason.

(Signed) James G. Monro, *Witness.*

„ James Brown, *Witness.*

(Signed) John Farquhar. (Signed) Robert J. Bennett.

„ J. D. Marwick, *Town Clerk.*

(Signed) William W. Christie, *Witness.*

„ William Livingstone, *Witness.*

The meeting then formally approved of the signature of the Agreement on behalf of the Society by the President, Secretary, and Treasurer.

A donation to the Society's Library was intimated of a copy of "The History of Salt," by E. Marlett Boddy, F.S.S., F.R.C.S.,

presented by Miss Kingsford, Barton House, Canterbury, and a vote of thanks was accorded to Miss Kingsford for the gift.

On the motion of Mr. Robert Kidston, it was resolved that a notice of the death of Mr. Arthur Pratt should be placed on the record, and that an extract of this portion of the minutes be sent to the widow and family of the deceased, with an expression of the sympathy of the members with them in their bereavement.

Mr. Pratt, who joined the Society in 1875, had, in early life, acquired a taste for the study of nature from his uncle, who was a diligent collector of specimens (which were at that time looked upon very much as curiosities, their scientific character being little understood). In after life all the time at his own disposal was devoted to scientific pursuits. His chief study was palaeontology, and he had formed a well-furnished cabinet of the fossils of the district. Of late years his attention had been principally directed to petrology, and he had, with steady perseverance and considerable labour, made hundreds of microscopical sections of the igneous rocks of the West of Scotland. But, although with leanings in such directions, Mr. Pratt was warmly interested in all branches of natural history, and made varied contributions to the business of the meetings of the Society. He served for some years on the Council, of which he was a member at the time of his death. He was of an amiable and modest disposition, and was much regarded and esteemed by all who were acquainted with him, while those who enjoyed his more intimate friendship valued him for his many excellent qualities, and will long continue to lament his loss. Mr. Pratt, after a protracted and severe illness, died at his residence in Renfrew Street, on 25th August last.

The President delivered an address "On the Relations of Natural History to Medicine." In the course of his remarks, he referred to the infectious diseases by which the stock of the agriculturist was decimated, and in discussing the cause of these diseases he argued against the theory that they were the result of microscopic vegetable germs. Referring to preventive medicine, he made numerous references to the experiments of Pasteur, Naegeli, and others. At the close of the address, on the motion of Mr. Kirsop, a hearty vote of thanks was awarded to Dr. Young.

Mr. Robert Turner exhibited a collection of plants from Fife and the Lothians. Among these were many species rare or unknown in the Clyde district, and several seldom found in Britain, as the

male form of the Canadian Weed (*Anacharis alsinastrum*), the Golden Dock (*Rumex maritimus*), the German Catchfly (*Lychnis Viscaria*), the Smaller Gentian (*Gentiana Amarella*), the Forked Spleenwort (*Asplenium Septentrionale*), and the Vernal Sandwort (*Alsine verna*); a specimen of the Brown-rayed Knapweed (*Centaurea Tacea*), of which only a very few examples have ever been found in Britain, and one of the Narrow-leaved Pepperwort (*Lepidium ruderale*) with conspicuous petals. Mr. Turner gave a short description of the plants characteristic of shore, wood, ballast heap, loch, and sandhill, and a sketch of his excursions in the district during the past summer. Mr. Turner was awarded a vote of thanks for his interesting notes.

Owing to the lateness of the hour other papers and specimens were held over till the next meeting, on 29th November.

29TH NOVEMBER, 1881.

Professor John Young, M.D., F.G.S., President, in the Chair.

Messrs. Robert Pinkerton, M.B., C.M., 1 Stanley Street, Woodlands Road, John M'Lellan, 8 Eaton Terrace, and John L. Steven, M.B., C.M., 34 Berkeley Terrace, were elected ordinary members of the Society.

Mr. John Young, F.G.S., exhibited several slides of mounted specimens of finely preserved casts of Carboniferous Foraminifera, from the weathered limestones of the Beith and Dalry districts in Ayrshire, and belonging to the genera *Textularia*, *Endothyra*, *Valvulina*, and *Nodosinella*. In his remarks as to their mode of occurrence, he stated that these casts were of more interest than the specimens that possessed the outer shell, as the casts shewed the chambers more clearly, as well as the space occupied by the soft parts of the organisms. Mr. Young also exhibited a species of *Athyris*, shewing the spiral arms, on which he made some remarks.

Mr. Thomas King exhibited specimens of *Climacium dendroides*, and said that this moss receives its name from its tree-like appearance. It is frequent in marshy places but fruits rarely. Mr. MacKay, Mr. Turner, and himself had lately found these specimens at Newmills, Lochwinnoch, a new station for it in fruit. Dr. Stirton

had found it in the same condition years ago at Possil Marsh, but though Mr. King searched there he found it very little in fruit.

Mr. Richard Mackay exhibited *Callitriche autumnalis*, Lin., from Johnston Loch, Gartcosh. This plant, although found near Edinburgh and elsewhere in the East of Scotland, has not yet been recorded as a native of this district.

Mr. James J. King exhibited the following species of Caddisflies taken at Carluke, viz.:—*Stenophylax infumatus*, M'Lachlan; *Stenophylax rotundipennis*, Brauer; and *Hydropsyche lepida*, Pict.; also *AECETIS ochracea*, Curtis, taken at Lanark. These insects, Mr. King stated, were all new to Clydesdale, *S. rotundipennis* being new to the Scottish fauna.

Mr. J. B. Low, M.A., exhibited a specimen of Black Coral, *Antipathes spiralis*, Lin., from Manilla; also some Barnacles, *Lepas anatifera*, Lin., from the River Tay.

Mr. Peter Cameron exhibited a Hymenopteron and a Bug from South America, which in appearance closely resembled each other, and in the course of his remarks on the causes of their similarity, referred to the theories of "Mimicry" and "Protective Resemblance."

Mr. John Kirsop, F.S.A.Scot., V.P., exhibited a number of miscellaneous natural history objects from Berbice, on which the President made some remarks.

PAPERS READ.

I.—*Notes on a Short Sun-fish*, *Orthogoriscus mola*, Lin., caught in the Firth of Clyde. By Mr. John M. Campbell.

The Sun-fishes, which belong to the order Plectognathi of Cuvier, are fishes whose skeletons are cartilaginous or incompletely ossified, having a small number of vertebrae, and mostly with rough scales or scutes. The gill-openings are narrow, the gills pectinate, the mouth small, and the jaws modified into a hard beak.

The genus *Orthogoriscus* is, according to Günther, represented by three species, two of which are British, the Short Sun-fish and the Oblong Sun-fish, *O. mola* and *O. lanceolatus*, the former being the more common. They are found in all the seas of the tropical and temperate regions. They are evidently sluggish in their habits, and can be easily approached when they appear, as they often do, on the surface. At such times they swim very slowly, and such

examples as I have had an opportunity of observing do so in a languid manner, rolling their bodies from side to side so as almost to submerge the dorsal fin, which, on these occasions, appears above the surface like that of the shark. Their food is sea-weeds, which their strong and powerful cutting jaws are well fitted to crop.

In shape they are very remarkable, the body being compressed and deep in proportion to its length, young examples being almost circular. At the tail they are abruptly truncated, as if the latter part of the body had been cut away immediately behind the dorsal fin. With age the body assumes a more elongated appearance, and what was in its early stage a mere tubercle above the mouth, becomes a hump. Internally there are some peculiar points of structure worth noting, the spinal cord being absent, or at least in a very rudimentary condition. Those who are interested in the anatomy of the Sun-fish might consult a paper by Dr. Cleland, our Vice-President, in the *Natural History Review* for 1862, p. 183. The stomach is not dilatible, resembling a portion of the intestine.

Although not what one might call a rare fish on our coasts, the visits of the Short Sun-fish are sufficiently uncommon to be worth recording. Balfour, Sibbald, Neill and Parnell all notice its occurrence in Scotland, and it has also been taken on several occasions in Irish and English waters. Most of these specimens have been of small size; but Colonel Montagu, in his MS. notes, mentions one which had been caught at Salcomb in July, 1799, weighing 300 lbs. In the *Zoologist* for 1876, Mr. Barker, late of the Rothesay Aquarium, describes one taken at Ardglass, Ireland, which he says was of fair average size, its total length being 3 ft. 6 in., and its height 4 ft. 10 in. Mr. Barker also states that, probably, not more than three are taken yearly on our shores. Recently there has been quite a number recorded. On the 11th Sept., the crew of the Dundee Pilot Cutter caught a fish, said to be a Sun-fish, four miles east of the Buoy of Tay, which measured about a yard long, and weighed two cwts. About the same time, two Orkney fishermen, fishing off Brisay, observed one basking on the surface, which, after an unsuccessful attempt to capture it, escaped; and in the beginning of October, a fine specimen, measuring 3 ft. 9 in. long, and 2 ft. 3 in. deep, was caught at the Little Ferry, Sutherlandshire, and is now in the Dunrobin Museum.

The example which I am now about to describe was taken in

the Firth of Clyde on 10th Sept. last. It had been observed floundering in the shallow water off the red lamps on the Greenock Esplanade, and some boatmen went out to it; after no little difficulty it was landed. It was said to weigh about a ton, and lived for some hours out of the water. Its dimensions, taken after death, were as follows:—Length, 7' 9"; height, 3' 9"; snout to eye, 10"; diameter of eye, $4\frac{1}{8}$ "; snout to gill-opening, 1' 11"; width of gill-opening, 3"; depth of gill-opening, 6"; snout to pectoral limb, 2' $4\frac{3}{4}$ "; base of pectoral, $7\frac{1}{4}$ "; length of pectoral, 1' $1\frac{1}{2}$ "; snout to base of dorsal, 4' $4\frac{1}{2}$ "; width of dorsal at base, 1' 11"; height of dorsal, 2' 1"; mouth to vent, 4' 8"; mouth to anal fin, 5' 5"; width of anal at base, 1' 9"; depth of anal, 1' 9". The liver was absolutely crammed with a scolecid worm, *Tetrarhynchus reptans*.

II.—*On the Viscera of the Porpoise and White-beaked Dolphin.*

By John Cleland, M.D., F.R.S., &c., Professor of Anatomy in the University of Glasgow.

This communication consisted of a description of specimens in Dr. Cleland's Museum, prepared from viscera presented to him by Mr. John M: Campbell.

Stomach and intestines.—The stomach in both species is similar, divisible into three main compartments: a panch, lined with horny epithelium; a digestive stomach, highly rugose and glandular; and an elongated pyloric portion, with thin walls, and communicating with the digestive rugose stomach, by the intervention of a very small compartment. The panch and the second stomach communicate with a small opening, guarded by a highly rugose disposition of horny epithelium; and the circumstance that in both the animals examined the panch and gullet contained numbers of clean fish bones, while the succeeding course of the alimentary canal was free from all but pulpy contents, suggested the probability that these animals habitually dispose of the bones of the fish on which they feed by vomiting them.

In the Dolphin it was noticed that the gall duct was thick-walled, sacculated, and dilated, recalling the condition figured by Camper in the elephant. Unfortunately this part was not preserved in the Porpoise. The whole length of the intestine presents longitudinal rugae, and has a very smooth-surfaced mucous membrane. In

the Dolphin, however, it exhibits also a certain slight tendency to transverse folding, and has a more glandular appearance. But the most striking contrast is in the rectum, which, in the Porpoise, is of much the same diameter as the rest of the intestine, and presents a similar smooth surface and longitudinal folds; while in the White-beaked Dolphin it is greatly dilated, with a much-thickened mucous membrane thrown into reticulated irregularities, which seems to shew that digestive and absorptive functions are still remarkably active at the very termination of the intestine. In both animals the narrow part in the grasp of the sphincter is an inch and a half in length, and of slight vascularity. Even in the Porpoise it is to be noted that the calibre of the intestine increases from the stomachic to the rectal end, and the longitudinal rugae, which are disposed on the unattached side, increase in number.

Heart and great vessels.—The principal points shewn by the specimens were, the shortness of the auriculo-ventricular valves, the remarkable venous plexus surrounding the commencement of the pulmonary artery and falling into the coronary vein, the great strength of the auricular walls, and the upper end of a large rete mirabile on each side, which is continued back under the ribs, in connection with the intercostal arteries; also, the ductus arteriosus, which is minutely pervious, and in reference to which the exhibitor remarked that he had found this vessel still more widely patent in another diving animal, the Seal.

Lungs.—The density of texture and want of lobation of the lung of the porpoise were pointed out by John Hunter. The specimens exhibited shewed further a sulcus at the apex of the right lung (found also in the Dolphin). In it lay the vena azygos, and thus the projection internal to it represents the supernumerary lobe occasionally found in man. The pleura is prolonged into a remarkable fringe along the costo-diaphragmatic border of the lung. It is thick, and exhibits a system of blood-vessels of its own, which in one specimen has been stripped off with it, and is seen to be independent of the lung.

Male genito-urinary organs.—These are similar in the two species. It was shewn that within two inches of the slender point of the penis, the combined corpora cavernosa suddenly become smaller, and at the same time take an abrupt turn dorsally, as if by loss of substance on the ventral aspect, and become very feeble further forwards, so that the tail-like end of the organ can no doubt

be reflected on the part behind the bend, when resistance is opposed to it during erection. Further, a large dilatation, or lacuna magna of the urethra is seen. From these circumstances it appears evident that the seminal fluid must lodge in this lacuna, and be wiped out into the female passages in the process of withdrawal.

In the White-beaked Dolphin it was further shewn that there are four openings in the floor of the first part of the urethra, namely, to the sides, the two vasa deferentia, and between them two larger openings leading into one sinus pocularis. The exhibitor commented on this as a condition which he had never before met with, and remarkable as representing double vagina in the female. Each testis is attached to the corresponding pelvic bone by a gubernaculum, and connected with it is a large rete mirabile, and the small arteries composing this come off in numbers from the aorta.

27TH DECEMBER, 1881.

Mr. John A. Harvie-Brown, F.Z.S., F.R.S.E., &c., in the Chair.

Mr. David Anderson, School of Art; Mr. William Goodwin, 3 Lynedoch Street; Mr. Andrew Hogg, George Street, Edinburgh; and Mr. J. Young, F.Z.S., 64 Hereford Road, Bayswater, London, were elected ordinary members of the Society.

Mr. George Combe exhibited specimens of *Marsupella Stableri*, Spruce, a new species of Moss which had been sent to him by Mr. G. Stabler, for exhibition to the Society. This moss, which is described in the *Revue Bryologique* for 1881, was found at Langdale (Oxendale), Westmoreland, in June last.

A finely-mounted collection of Fungi, chiefly Agarics, from Germany, were sent for exhibition by Mr. J. C. Christie. The specimens were all carefully prepared to shew the most important features in the structure of this interesting botanical group.

Mr. John Kirsop, F.S.A.Scot., V.P., exhibited two small specimens of the Horned Trunk Fish, *Ostracion cornutus*, 1 in., from the South Atlantic, and stated that these little fishes belonged to a genus of the Sclerodermi, which had the body entirely encased in a carapace or bony crust, leaving only the tail, fins, and mouth capable of movement. They are nearly all natives of the Indian and American seas, none being found in British waters. Some of the

species are used as food, and in all there is an abundant supply of oil, the liver being large. Mr. Kirsop also exhibited several other interesting objects from various places, and an ink-bottle shewing the industrial applications to which natural objects are sometimes put, it being an epitome of the mineralogy of the Colorado district in the United States.

Mr. Peter Cameron exhibited several interesting species of Hymenoptera, amongst them being an ant which inhabits the thorns of an acacia in Guatemala, Central America. When these ants were found the acacias became modified in certain parts to suit their insect inhabitants, several different species of which are known. He also exhibited specimens of *Tenthredopsis nigriceps*, *Nematus Breadalbanensis*, Cam., *Tenthredo Scotica*, Cam., also the type specimens of *Megaspilus mullensis*, discovered by himself.

Mr. J. M. Campbell exhibited some specimens of Brooke's Snail, *Helix Brookei*, from Borneo, as many of the members might not have had an opportunity of seeing this fine species. It derived its specific name in compliment to the late Sir James Brooke, Rajah of Sarawak. Mr. Campbell noticed some of the peculiarities of the genus *Helix*, such as their longevity, a specimen of one species having been known to live for 20 years without sustenance.

Mr. R. Turner made a few remarks on a curious circumstance connected with a piece of pavement, observed in Hillhead some time ago. About a foot square of solid asphalt pavement became gradually elevated in an arch till it was clear of the kerbstone, and a space left in which one could readily turn his hand. On looking into the hollow thus formed, the mystery became apparent. The whole space was seen to be full of growing Agarics, of an edible species, *Coprinus comatus*, which had forced up the hard asphalt by their vegetative power. Many inequalities in newly formed pavements are due to a similar cause.

PAPERS READ.

- I.—*The Islands and Rocks of Haskeir, off N. Uist, and their Bird Life.* By Mr. John A. Harvie-Brown, F.R.S.E., F.Z.S., &c. With a Sketch by the Author [PLATE III].

No special papers have appeared upon Haskeir, that I am aware of, but numerous short notices of it are scattered about in the works of authors who have written on the Hebrides generally.

1540.—Thus Dean Munro mentions it as a great resort of “selchis,” but dismisses it in four or five lines of manuscript.*

1703.—Martin,† writing of these isles, says:—“About three leagues and an half to the West, lie the small Islands called Hawsker-Rocks, and Hawsker-Eggath, and Hawsker-Nimannich, *id, est, Monks’-rock*, which hath an Altar in it, the first called so from the Ocean as being near to it, for *Haw* or *Thau* in the Ancient Language signifies the Ocean: the more Southerly Rocks are six or seven big ones, nicked or indented, for *Eggath* signifies so much. The largest island, which is Northward, is near half a Mile in Circumference, and it is covered with long Grass. Only small Vessels can pass between this and the Southern Rocks, being nearest to *St. Kilda* of all the West Islands; both of ’em abound with Fowls, as much as any Isles of their extent in *St. Kilda*. The Coulterneb, Guillemot, and Scarts are most numerous here, the Seals likewise abound very much in and about these rocks.”

1751.—Haskeir is spoken of by George Buchanan as “Havelschyer, to which, at certain seasons of the year, many *Sea-calves* (or *Seals*) do resort, and are there taken.”‡ They are spoken of also in somewhat similar terms in Monipennie’s “Abridgement of the Scots Chronicles,” under the name *Haveskera*.

* I am obliged to Mr. James Macpherson for the loan of a most beautiful MS. copy of Dean Munro’s account—“Description of the Western Isles of Scotland, called Hybrides, by Mr. Donald Munro, High Dean of the Isles, &c. Edinburgh: 1774,” This work is printed in “Miscellanea Scotica,” vol. ii., 1818.

† “A Description of the Western Islands of Scotland,” &c., 1703, p. 66. *Eagach, notched, indented.* [*Vide* Macleod and Dewar’s Gaelic Dictionary.] The meaning *toothed* was also given to me, an adjective admirably descriptive of these isles when approached from the main island of Uist, as will be observed in the accompanying sketch. The New Stat. Acct. says:—“On Husker (anciently named Iollen na Moinich, or Island of the Monks), are found several crosses, rudely cut in stone.” This Iollen na Moinich is the “Hawsker-Nimannich” of Martin, as quoted above, and the Helsing-Vetularum of George Buchanan (English Translation of 1751), and are the islands now known as the Monach Islands, which lie $10\frac{1}{2}$ miles S.S.W. $\frac{1}{2}$ W. of the Haskeir group.

Haskeir is variously spelled by authors—Hawskeir (Martin), Hyskere (Knox’s Tour), Heisker (M’Donald’s Agricultural Survey), Havelschyer (Buchanan), Haveskera (Monipennie), Helsing (Irvin), and Haskeir (modern writers).

‡ “History of Scotland.” English Translation of 1751.

1819.—This Irvin repeats, and speaks of them thus:—“*Havelskyra*: Havelskyre; an island. *Helskir Vetularum*, vel *Hilkyr Namonich*: *Helskyr Egach*; and *Helskir na Meul*: these are three little islands that lie three miles to the west of Uist, belonging to the lairds thereof.”*

1764.—It is also referred to by Macaulay, who had landed there when on his way to St. Kilda. He speaks of it as “accessible in a single place only,” but this is hardly correct, as I will shew later on. He refers also to the Great Seals, and describes the method by which many Cormorants were taken in the western caves which terminate the deep göes, and he speaks of the great abundance of the wild-fowls’ eggs. †

1869.—Capt. H. J. Elwes visited Haskeir in a boat from N. Uist on June 30th, 1868, and he gives us a short notice of it in his admirable paper in the *Ibis* for 1869. ‡ He found breeding there a large colony of *Sterna arctica*, of which, in the beginning of the same month this year, I saw no trace whatever. In Newton Bay, however, one of our men found an egg the day previous to our visit. Capt. Elwes succeeded in landing on Haskeir Aag, and on this second island from the south found fresh eggs of Cormorants, while on the rock also were a good many Herring Gulls and Great Black-backed Gulls, and one pair of Oyster-catchers.

The Island of Haskeir, with its outlying skerries of Haskeir Aag, as shewn upon the Admiralty Chart, § is described in the accompanying Sailing Directions|| in the following terms:—

“Haskeir Islands, two in number, are distant from each other one mile in an E. by N. $\frac{1}{4}$ N. and W. by S. $\frac{1}{4}$ S. direction. The easternmost and highest, which lies N.W. $\frac{1}{3}$ N., $6\frac{1}{2}$ miles from Griminish Point, North Uist, and N.N.E. $\frac{1}{2}$ E., $10\frac{1}{3}$ miles from

* “*Historiæ Scotiæ Nomenclatura Latino-Vernacula.*” 1819.

† “*The History of St. Kilda, containing a description of this remarkable Island,*” &c., &c. By the Rev. Mr. Kenneth Macaulay, Minister of Ardnachan, Missionary to the Island from the Society for Propagating Christian Knowledge. London: 1764.

‡ “*Bird-stations of the Outer Hebrides.*” By Henry John Elwes, Lieut and Capt. Scots Fusilier Guards, F.Z.S. *Ibis*: 1869, p. 20.

§ Published and sold by James Imry & Son from the latest surveys. 1831. Two landing-places are shewn on the Chart.

|| *Sailing Directions for the West Coast of Scotland. Part I. Hebrides or Western Isles.* London: 1874.

Monach Lighthouse, is one mile in circumference, and rises at the West end to 120 feet; the East end is nearly as high, and between the two the land is very low and nearly divided by a remarkable cave or basin, 140 feet long and 34 feet broad, so that from a distance of 5 or 6 miles the island shews two flattish lumps. Towards the West end are 3 or 4 acres of rich soil and coarse grass, but in winter the waves cast their spray over the whole surface; no springs could be found, but there are several pools with brackish water, where the Seals resort in autumn with their young. Rocks dry half a cable off the West and South-West points, but the East side is bold-to: the best landing is on the North or South side of the East lump according to the wind, but it can only be effected with safety during fine weather."

"*Haskeir Aag*, the western of the two islands, may be said to be composed of five bare rocks, with deep water channels between; they are without a blade of grass or any fresh water, and can only be landed on in fine weather. The highest is 83 feet above the sea."

Besides the above, sundry sunken rocks are indicated on the Chart and described in the directions, and it is stated that there is no anchorage in the vicinity, except on a rocky patch, with 5 to 7 fathoms of water, "which lies S. by E. $\frac{1}{4}$ E., two cables from the highest part of *Haskeir* [where] an anchor might be let go in fine weather." This description, though necessarily concise, appears to be very correct, and well conveys the general aspect and situation.

My object in this, as in other similar papers on our Bird-stations, is to describe their physical features somewhat more minutely than has hitherto been done, and to treat of the feathered inhabitants as fully as my materials and opportunities of observation permit.

The accompanying sketch of the group [Plate III.] will give, it is hoped, some idea of its appearance as seen when approaching from the main range of the Hebrides. Of the western aspect I had no opportunity of making a sketch.

My first attempt to land upon the group was made upon the 30th May of the present year (1881). Previous to this, we had enjoyed what was, perhaps, the only week of real summer weather Scotland has seen this year. Even when tempered by the light sea-air which gently wafted our good yacht "*Crusader*" northward from Tobermory—but failed us in the narrow Sound of Harris—the heat was great, and was felt all the more, perhaps, that we

were forced to be inactive, and to spend our time in reading and reclining on deck.

With a fair but very light air of wind, we left our anchorage at Obb in Harris, about 8 a.m. on the 30th May, to thread the somewhat intricate Sound of Harris; the bearings, landmarks, and beacons appearing familiar to me from a previous acquaintance two years before, when, along with Prof. Heddle of St. Andrews, and Capt. M'Ewen, I stood in the very early morning on the deck of the Dunara Castle, making mental notes of the navigation, as we steamed towards far off St. Kilda.

After clearing the westernmost beacon, and avoiding certain sunken rocks, we stood away for the Sound of Shillay, between the two islands of that name and the Isle of Pabbay. The two Shillays are the westernmost of the islands of the Sound of Harris. The wind freshened, and being favourable, we bowled along merrily at about 6 knots an hour. But with this freshening, the dread came that the wind would raise an angry sea on the Haskeir rocks and prevent our landing; and so indeed we found, a few hours later, when having reached close to them, we stood off and on for a time to enable us to judge of our chances. A score or so of the Great Grey Seal (*Halichoerus gryphus*) tumbled off the easternmost points of the main island into the white churning surf, which, in a few short hours, had transformed the silent summer sea into a vast heaving caldron. Seeing that no more could be done that day, reluctantly we gave up, and ran for anchorage to Newton Bay, North Uist. Some days before I had met Mr. MacDonald, of Newton, at Loch Maddy, and he imparted to me certain ins and outs of the Seal Rocks at Haskeir, one of my objects in reaching them being, if practicable, the "annexation" of a good specimen of the Great Grey Seal. Though not successful in this quest, as I afterwards rowed past the places he described, whilst unable to land, I recognised the spots which he had indicated to me with close precision.

On 1st June we left Newton Bay about 7 a.m., and soon hove to near the western rocks of Haskeir Aag. Captain MacGillivray, finding a considerable surf still running, and, being apprehensive of more wind, would not allow our pilot—Mr. MacDonald—to land along with us, *his* duty being on board the yacht; but my friend—U. and myself, accompanied by two sailors—both "Dan" by name—got into the gig and rowed over close to the S.E. side of

Haskeir Aag, leaving the yacht taking off and on to await our return. Alas! the surf was quite too heavy to admit of any landing here, so we had to give up thoughts of a Great Seal from Haskeir. We saw some great grey monsters bobbing about in the white surf where no boat dared venture; one even came within 30 yards of the boat, when one of the "Dans" saluted him, but did no damage. Cormorants were perched and breeding in large numbers, and on No. 3 about 50 pairs of Shags had covered the rounded and sloping top with excrement, whilst in the caves and on the ledges all along the group many more of the latter had their nests.

After reluctantly leaving behind the rocks of Haskeir Aag, we dropped down upon the main island of Haskeir. On the S.E. side the surf was not so heavy, and more shelter was afforded from the Atlantic swell. Rowing past just round the N.E. extremity, where but few Seals were seen, we turned back and easily effected a landing, just below the E. high "lumps," by picking an easy place on the rocks, though we could have landed with almost equal ease at many points along the shore. In a few minutes we stood on the rounded tops amidst forests of most luxuriant sea-pink and bladder-campion.

To Haskeir, which lies about 13 miles from our anchorage of the two previous nights, Griminish Point— $6\frac{1}{2}$ miles off—is the nearest land, and on our voyage back after leaving Haskeir on our first attempt, we distinguished, at a distance of some $10\frac{1}{2}$ miles towards the S.S.W., the pillar of the Monach Islands lighthouse. Although Griminish Point is nearest, most of the natives visit Haskeir from Obb in Harris, and Berneray in the Sound of Harris, and occasionally from Hogary, near Balranald in N. Uist. After Sir John Orde prohibited the men of N. Uist from killing the seals, boats for a time came from Lewis, and, I was told, far more were annually killed then than before. About six or seven years ago, a boat's crew out at Haskeir were obliged to run before an easterly gale for 48 hours, and provisions not holding out they were four days without food, before getting back. For landing on Haskeir the S.E. side is usually the best, as the Atlantic swell is there least felt, but in easterly winds the N.W. side is preferred, and the landing is generally effected at the head of a narrow göe, in which the Seals used to be intercepted and killed with clubs as they sought to make good their escape from their breeding haunt near the summit—a stagnant pool of rain-water or sea-spray, of only a few yards in circumference, situated above the west end of the island.

Once landed on Haskeir on the narrow lower level between the E. and W. "lumps," one can traverse the whole island on foot, with scarcely any climbing at all, except of course on the sea-cliffs, and on a few detached rocks at the eastern extremity which are at times frequented by the Seals at low water, some of which animals, it will be remembered, we saw plunge into the surf two days before.

The higher cliffs of Haskeir are on the N.W. side facing the Atlantic. Two ranges of high cliffs—about 80 to 100 feet—face the west, and run nearly across the island; but the summits of these are accessible towards their eastern extremities. At their base are deep gullies or göes, in one case terminating in a large Cormorant cave, and in the other running right through the island, but bridged over by a natural arch of rock by which one can easily cross and ascend to the summit of the cliff. From seaward two openings through the rock are visible, one being the tunnel above mentioned, the other a small hole caused by the falling in of a mass of loose rock.* About the centre of the island, which is the lowest part—30 to 40 feet elevation—the rock on the N.W. side slopes steeply, evenly, and smoothly seawards, and up this long incline the great waves rush headlong nearly to the summit, making the rock slimy with green seaweed, and most treacherous footing, as I nearly found to my cost. The S.E. side of this central portion is steeper but more broken, and on many parts a landing might be effected during westerly winds. The tops of the higher portions—E. and W.—are clothed with dense hummocks of sea-pink, sea-campion, and other rock-plants, forming admirable ground for the innumerable Puffins which burrow in every conceivable direction beneath. The sea-pink is particularly luxuriant, covering often patches of half an acre or even an acre in extent. Amongst these hummocks also, as well as on the barer and more rocky portions, Eider Ducks breed in numbers. From under a bunch of a dark-green rock-plant—the name of which I do not know—a Rock Pipit fluttered off its nest, which contained four eggs, and an Oyster-catcher ran off her nest, which had two eggs. This nest was quite 80 to 100 feet above the sea, and is the highest I remember having seen. One pair of Wheatears was observed a little above this. At the west end and above the Seals'

* This is not shewn in my drawing, being out of view when the sketch was taken.

pool, before noticed, a colony of Herring Gulls and Lesser Black-backed Gulls had their widely scattered nests, and Eider Ducks, even at this considerable altitude, were breeding commonly. In the various gøes of smaller dimensions than the two before mentioned, Shags, Guillemots, and Razor-bills were breeding, often in perfectly accessible situations, and Rock Doves were also seen. Some of the Razor-bills had laid their eggs in very simple places, under big boulders* or stones on the level or sloping rocks; and by lying down on one's stomach, close to the edge of the cliff, and reaching down, others could easily be taken without a rope. On the lower rocks along the sea-margin, great numbers of Shags sat in groups, and in the surf below Eider Drakes and Ducks, and various rock-birds swam about. One pair of Great Black-backed Gulls had their nest somewhere near the west end, above the Seals' pool, though I could not find it.

My friend U. scrambled over the eastern part of the rock which rises above the lower central portion, above a range of cliffs facing west, the climb being easy, and having evidently been often used before. He found the same birds breeding here as on the other portions, and took a few more eggs. By this time, Capt. MacGillivray began to feel a little anxious, and shewed signs of impatience by blowing the horn. We heard it the third or fourth time and complied, but were deaf to the first two appeals, as we were determined to do the island as thoroughly as possible before leaving. Besides, I was keeping an eye upon the western ocean, and there appeared no increase of wind or swell to prevent our getting off again.

We landed on Haskeir about 12 o'clock, and boarded the yacht again at 3-30 p.m., and in this time I believe we saw all that could be done during a land survey. We also saw the S.E. side well from the boat, and a portion of the S.W. side from the deck of the yacht on the 30th May, but we were not able to narrowly inspect the S.W. shore from the boat, owing to the surf.

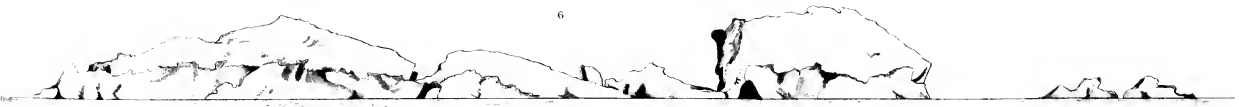
Bidding an unwilling adieu to "the toothed rocks" of Haskeir

* Perhaps worthy of the notice of the Boulder Committee. Such, however, were scarce. I only remember two of any size, and these lay on the lower part of the island, near or on the summit of the sloping rocks, and facing the west. At the time, I neglected to take more careful stock of their situation and appearance, and I do not now feel certain that they were ice-carried boulders.

The Islands of Haskeir and Haskeir Aag, as seen approaching from the S.E.



Continuous with above, and about half a mile distant from 5.



Aag, we ran for Pabby harbour, but landed first on the larger Shillay, where we found little of interest—two nests of Eider Duck, one near the summit of the island, and a colony of Scarts. A few Black Guillemots were seen on the lower rocks, and two eggs procured. There was one large patch of loose stones and boulders and *dèbris* where probably a good many Black Guillemots bred, as we saw a number round the islands adjoining. It is said that Stormy Petrels breed upon the larger Shillay—and there are certainly suitable cairns and loose stones—but we heard or saw nothing of these birds.

We afterwards ran for Taransay harbourage, at the entrance of West Loch Tarbert, passing Coppay Island, which appeared barren and almost birdless.

I shall conclude this paper with a list and a few remarks upon the birds observed on Haskeir. I may mention here also that I have in preparation an account of the Great Grey Seal, which, however, will appear as a separate paper of this series, at a future time, as some trouble is required in its preparation.

LIST OF BIRDS SEEN ON HASKEIR AND HASKEIR AAG.

WHEATEAR.—*Saxicola oenanthe*, (Lin.).—A pair seen.

ROCK PIPIT.—*Anthus obscurus*, (Lath.).—Not very abundant. One nest found, and several scattered pairs of birds seen.

ROCK DOVE.—*Columba livia*, Bris.—Common in the caves and fissures. U. took one egg, and with a bit of rope could have taken more.

PURPLE SANDPIPER.—*Tringa maritima*, Lin.—One seen on the rocks at the landing-place on Haskeir.

TURNSTONE.—*Streptilas interpres*, Lin.—One seen in full summer plumage at the same place as the last.

OYSTER-CATCHER.—*Haematopus ostralegus*, Lin.—A few pairs. One nest I found quite 150 feet above the water, and 30 yards from the highest top of the western half of the island, or perpendicularly perhaps 30 feet. This is the highest situated nest I remember to have seen anywhere. It was placed on the top of a decaying tuft of sea-pink, brown and flowerless. The bird ran from the nest as I came rather suddenly in view of it.

EIDER DUCK.—*Somateria mollissima*, (Lin.).—Very plentiful, breeding at considerable altitudes above the sea, indeed in many

instances close to the summit, and usually in a warm corner sheltered on the north and west, and facing the south and east. This rule appeared to hold good both here and on Shillay and others of the outlying Hebrides. We found some 15 or 20 nests in all, but only helped ourselves moderately. One nest contained 9 eggs, but most of the others from 2 to 4. When startled off the nest the duck has a very nasty habit, which entitles her, according to an old Scotch saying, of having the name bestowed upon her of a very "foul bird." The smell thus raised is very pungent and very abominable. After a good many birds had been disturbed off their nests, we saw both males and females tossing about in the sea, just clear of the surf. With care, I believe an approximate estimate of the numbers breeding on the islands might be arrived at, but our hurried visit did not permit of our doing this.

Obs. ARCTIC TERN.—*Sterna macrura*, Naum.—Captain Elwes, in 1868, found a colony of Arctic Terns of 80 to 100 pairs on the low part of the island, on 30th June, at which time the eggs were mostly hard set. We saw no Terns at all. The usual number laid by this species appears to be two. On the mainshores of N. Uist, they were just beginning to lay, Dan—one of our men—having taken one egg on a rock in Newton Bay, the previous day.

Obs. KITTIWAKE.—*Rissa tridactyla*, (Lin.).—Captain Elwes also found a fair number of Kittiwakes, but of this bird I did not see one.

GREAT BLACK-BACKED GULL.—*Larus marinus*, Lin.—One pair only made their presence known amongst a crowd of Herring and Lesser Black-backed Gulls, but I did not succeed in finding the eggs. They were breeding, however, towards the west and amongst the Lesser Black-backs, above the puddle of water which is frequented by the Seals in their breeding-time.

LESSER BLACK-BACKED GULL.—*Larus fuscus*, Lin.—

HERRING GULL.—*Larus argentatus*, Gm.—These two birds were seen in about equal numbers in a colony, much scattered, however, and the latter also in pairs in the cliffs, and on the tops.

PUFFIN.—*Fratercula arctica*, (Lin.).—Apparently the most abundant species all over the island, tunnelling as usual amongst the sea-pink hummocks, or under the loose stones. With a spade or a pick, hundreds of eggs might easily have been gathered.

GUILLEMOT.—*Uria troile*, (Lin.).—Abundant on all the suitable ledges round the island; the eggs as a rule more safely deposited

than those of the Razor-bill, and more difficult to get at, as I think is usually the case.

BRIDLED GUILLEMOT.—*Uria troile*, Lin., var. *lacrimans* (Gould).—I neglected, in the hurry of disembarking from the yacht, to take my binoculars, and so lost the opportunity of scanning all the further-off ledges for Bridled birds. I only succeeded in making out one amongst six birds on a ledge near to the archway. Though abundant at many west coast stations, this variety seems rare here, and at the Shiant Isles.

RAZOR-BILL.—*Alca torda*, Lin.—Common also, and many eggs in very accessible places, under loose boulders in the dry gøes, or in the rents in the flatter parts, or within easy reach of the tops of the cliffs on the upper ledges.

CORMORANT.—*Phalacrocorax carbo*, Lin.—A few were breeding on the rock—No. 4—of Haskeir Aag.

SHAG.—*Phalacrocorax cristatus*, Faber.—A considerable number upon No. 3 of Haskeir Aag—I should say about 50 pairs.

II.—On Method in Collecting Natural History Specimens. By Mr. J. M. Campbell.

In the course of his remarks Mr. Campbell stated he had often with regret noticed the absence of valuable notes or particulars regarding specimens placed in natural history collections. He said that when natural history is taken up as a subject for study, a collection of specimens or illustrative material becomes a necessity, and in the formation of such a collection much may be learnt by due care in its accumulation. Specimens when taken ought to have locality, date, and any other particulars which may suggest themselves, attached to the objects themselves, or noted in such a manner that they may be “get-at-able”; otherwise the information will be almost worthless. He did not by this sweeping assertion mean to say that those who are what are called “mere collectors” waste their time. They may collect natural objects merely because such are beautiful or pleasing to their sight, and in these circumstances they seem to the non-observer of any rule-of-thumb work as much in the right as one who purchases a fine piece of art-work but pays no attention to the manufacture or the material it is made from. Those who make a collection with the

object of assisting themselves in scientific studies should not be content by merely being in possession of the dried skins or preserved bodies of the animals themselves. These in the end will not only become an eye-sore to their possessors, and a species of white elephant which they will be as anxious to get rid of as they were to get, but which their friends will reject when offered to them.

31ST JANUARY, 1882.

Mr. John A. Harvie-Brown, F.Z.S., F.R.S.E., in the Chair.

The following gentlemen were elected ordinary members of the Society:—Messrs. James Dunlop, Woodfoot Cottage, Nitshill; John Wood, Hurllet; and Frank R. J. Long, 8 Whitevale Street.

Mr. Thomas King exhibited a number of Mosses in fruit, from Innellan, and most of which although common species fruit but rarely; amongst them were *Hypnum splendens*, *H. squarrosum*, *H. purum*, *H. triquetrum*, *H. Schreberi*, *H. loreum*, and *H. molluscum*; also *Hookeria lucens*, (frequent at Innellan), *Bryum roseum*, rare, (Innellan being a new locality) and *Dicranum squarrosum* (from Campsie).

Mr. Thomas Scott sent for exhibition, through Mr. James Steel, a fine series of the remains of fish, crustaceans, &c., from Garvel Park, Greenock. Interesting features in the collection were the remains of *Cancer pagurus* and a *Hyas* which—along with a specimen exhibited from the Raised Beach at Cumbrae—fill up the succession of brachyuran crabs from Permian to recent times. The existence of Hermit Crabs in the Post-tertiary period has hitherto been believed only from the occurrence of shells bearing evidence of having been occupied by those crustaceans. Mr. Scott, in finding the remains of the Crabs themselves, has thus proved the fact of their existence. He accounts for their rarity by the theory that, after death, the carapace became very fragile and readily broken up.

Mr. Steel also exhibited some Mammalian Teeth and Bones found at the Crannoge of Lochlea, near Kilmarnock. The specimens comprised remains of Pig, Deer, and Ox, the latter probably the remains of *Bos scoticus*.

Mr. James Lumsden, F.Z.S., exhibited a brown variety of the

Common Mole, *Talpa europaea*, Lin., from the Loch Lomond district, and made some remarks on the variation in colour of this and other species.

PAPERS READ.

I.—*Meteorological Notes and Remarks on the state of Vegetation in the Public Parks of Glasgow during the year 1881.* By Mr. D. M'Lellan, Superintendent of Parks.

Twelve months ago, when I had the honour of presenting a few notes on the weather during the year 1880, the retrospect was an exceedingly pleasant one. It recalled the finest year for vegetation that we have had for a very long period. The present report is as gloomy as its predecessor was cheerful, but still it possesses features worthy of attention. The year 1881 has proved unfortunate both for the gardener and the farmer. It was ushered in with severe frost and snow, and during the whole of the year both atmosphere and ground continued damp and cold, as will be observed from the statistics of the several months which follow.

January was of exceptional severity both for the animal and vegetable kingdoms. The thermometer was at or below the freezing point on 27 mornings, and registered 315° of frost. Four inches of snow fell upon the 4th, and remained more or less upon the ground until near the end of the month. This covering protected the grass and smaller shrubs, but many evergreens were killed outright, and others suffered considerably. The Christmas rose blossomed towards the end of the month and was the only plant in flower out of doors. The average temperature was 27°, and the prevailing winds were west by north.

February was a variable month, the barometer being specially irregular during the first fortnight. Snow and sleet fell on 9 days, the remainder of the month being dry and cold. The thermometer ranged at or below the freezing point on 13 mornings, the total frost registered being 45 degrees. The temperature averaged 36° and the rainfall was 3.66 inches. The prevalent winds were west by south.

March did not shew much improvement. Snow, sleet and rain fell on 18 days, the total amount of the rainfall being 2.44 inches. The thermometer was at or below the freezing point on 17 mornings, and registered 89 degrees of frost. The average temperature was 35°, and the prevailing winds were west by south-west. The

snowdrop flowered on the 8th, the crocus on the 13th, and heaths, primroses, hepaticas, and the *Daphne mezereum* towards the end of the month.

April proved to be a comparatively cold and dry month, and was favourable for the sowing of seed. The thermometer stood at or below the freezing point on 13 mornings, and registered 41 degrees of frost. The temperature averaged 42°. No rain fell on 22 days, the total amount of the rainfall being 1·33 inches. The prevailing winds were E. by N.E. The plants in flower were the *Scilla sibirica*, *Pulmonaria officinalis*, the daffodil, the hyacinth, and the rhododendron.

May was the most genial month of the year. Sunshine and showers came alternately, and all vegetation made very rapid progress. Towards the end of the month the temperature rose as high as 82° in the shade. There was a very good display of spring flowers, especially tulips and hyacinths. The hawthorn flowered on the 25th, and the laburnum on the 27th, the ash and the oak coming in leaf about the same time. The cuckoo was heard at the Queen's Park on the 25th—a very rare occurrence in any of our city parks. There were 17 days during the month on which no rain fell, the total amount of the rainfall being 3·46 inches. The temperature averaged 52°, and winds prevailed from W. by S.W.

June might be characterised as a moist and variable month. Hawthorns, laburnums, and lilacs were in beautiful flower during the early part of the month, but they suffered severely from heavy hail showers on the 7th. The thermometer registered 4 degrees of frost at Kelvingrove Park on the mornings of the 5th and 6th, and this considerably damaged foliage and flowers. Rain fell more or less on 16 days—the total rainfall being 2·26 inches. The average temperature was 55°, and the prevalent winds were W. by S.

The weather during July was much the same as that of its predecessor, but with an increase in the moisture and a decrease in the sunshine. There were only 11 days during the month on which no rain fell, and the total amount of the rainfall was 3·8 inches. The temperature averaged 58°, and the prevalent winds were S. by W. Owing to the coldness and dampness of the ground, bedded-out plants made no progress and in very many cases disappeared altogether.

August is generally looked forward to by the gardener with high expectation, but this year all hopes were blasted by the continued

rains during the two previous months, and, as a consequence, the display of flowers in all the parks was the poorest for very many years. Rain fell on 14 days, the total of the rainfall being 3·33 inches. The temperature averaged 55°, and winds prevailed from E. by N.

September was rather an improvement upon the last month. There were 17 dry days—the total rainfall being only 1·91 inches. Rain, however, fell every two or three days during the month, and the soil never got an opportunity of becoming thoroughly dry. The average temperature was 54°. For 15 days the winds were from E. by N., and for the rest of the month W. by S.

October proved to be the best harvest month of the autumn. Rain fell only from the 8th to the 15th inclusive, giving 23 consecutive dry days. On the 15th and 22nd the thermometer registered 7 degrees of frost, which killed dahlias and other tender plants. Towards the end of the month there were very high winds. The total rainfall was 2·22 inches, and the temperature averaged 45°. The prevalent winds for 16 days were E. by S. and N. and for 15 days W. by S.

November was the wettest month of the year. Rain fell on 21 days, giving a total rainfall of 5·03 inches. The weather, however, was remarkably mild, the thermometer being below the freezing point only on the morning of the 18th, and registering 6 degrees of frost. The grass was as green during the whole month as in spring, and the Christmas rose flowered on the 16th. The daisy, *Jasminum nudiflora*, *Caltha palustris*, polyanthus, and wallflower were in bloom all the month. The temperature averaged 43°, as compared with 37° in the same month of the previous year. The prevalent winds were S. by W.

During December the same open, moist weather prevailed as in the previous month. There was a moderate rainfall—viz., 3·46 inches—which fell on 16 days. The thermometer was at and below the freezing point on 12 mornings, and registered 53 degrees of frost. The average temperature was 39°, as compared with 36° in December, 1880. The prevalent winds were W. by S. and N.

The highest day temperature during 1881 was upon the 29th day of May, when the thermometer registered 82° in the shade, and the lowest night temperature was on the 16th and 17th January, when it fell to zero, or 32 degrees of frost. On 86 days the thermometer was at or below the freezing point, registering a total of 560 degrees

of frost, as compared with 461 degrees on 87 days in 1880. The average temperature for the year was 45°, as against 46° in the previous year.

As regards the rainfall for 1881, the return is rather interesting. During 1880 there were 224 dry days, and during 1881 205 dry days. The total rainfall for 1880 was 32·09 inches, and for 1881 33·30 inches. This shews an increase of 19 in the number of wet days, but only an increase of 1·21 inches in the total rainfall. The latter may seem somewhat small in comparison with the increase in the number of wet days; but throughout June, July, August and September, rain fell more or less every two or three days, though it was more continuous than heavy.

May was the only favourable month of the summer, and plants bedded out in the various parks during it and June were in good condition, and had a fair start. Continuous rains, however, and want of sunshine during July and August, completely ruined them, and instead of flowering many of them damped off and disappeared. This was especially the case with violas, mignonette, and the majority of annuals, and it cannot be said that any flowering plant really did well. Foliage plants in the carpet beds, however, were fresh and beautiful throughout the whole season, although the true tints of their colours were not brought out from want of sunshine. In our variable and moist climate foliage plants are worthy of more special attention.

Trees and shrubs in spring and early summer flowered most profusely, consequent on the wood and buds being well ripened during the fine summer and autumn of 1880. This was particularly noticeable in the case of chestnuts, elms, limes, and planes. Many of the more tender evergreens were killed, however, by the very severe frosts in January; and others, such as Portugal laurels, rhododendrons, and aucubas, were seriously injured.

It is to be regretted that after such a gloomy retrospect the forecast for the coming year is not much brighter. The past year has left vegetation ill prepared to stand any sudden change, and the open winter we are having is not improving matters. Spring is prematurely coming upon us before winter is gone; and if a severe check should come, as it very probably will come, in the months of March and April, the outlook will be blacker still. But every cloud has a silver lining, and we can only hope that this may influence the weather, and that, when another year comes round, our forecast may for once have been wrong.

Subjoined is the Meteorological Record for the last three years, as kept at the Queen's Park:—

*Copy of Meteorological Record kept at Queen's Park, Glasgow.
Rain gauge above the sea level, 143.95.*

MONTH.	1879.			1880.			1881.					
	Rain-fall.	THERMO-METER.		Dry Days.	Rain-fall.	THERMO-METER.		Dry Days.	Rain-fall.	THERMO-METER.		Dry Days.
		Average.				Average.				Average.		
		Max.	Min.			Max.	Min.			Max.	Min.	
January,	1.00	34	24	25	2.58	38	32	20	4.0	32	22	27
February, .....	.94	36	29	17	2.96	45	36	11	3.66	40	32	19
March,	2.75	40	32	16	2.24	46	33	23	2.44	44	32	13
April,	1.49	45	34	21	3.11	51	37	13	1.33	50	34	22
May,	1.44	54	38	22	1.66	57	40	21	3.46	62	42	17
June,	5.91	60	45	9	2.10	65	46	17	2.26	64	46	14
July,	3.37	61	49	15	4.18	66	49	18	3.80	65	51	11
August,	4.53	64	49	13	.76	69	51	28	3.33	63	48	17
September, ...	3.37	57	44	10	3.14	64	48	19	1.91	61	47	17
October,	2.03	52	38	21	.84	50	34	24	2.22	52	39	23
November, ...	1.52	44	33	24	5.52	42	31	12	5.03	50	37	9
December,	2.48	36	29	22	3.60	40	33	18	3.46	44	35	16
	30.93	43	37	215	32.09	53	39	224	33.30	52	39	205

II.—*The Flannan Isles and their Bird Life*, by Mr. John A. Harvie-Brown, F.Z.S., F.R.S.E. &c., With Two Plates [Nos. IV. and V].

Regarding the Flannan Isles, or as they are also called, "The Seven Hunters," or "Seaforth's Hunters," several authors have written, but none so fully as these islands seem to merit. The difficulty of landing upon their almost precipitous sides, and which can only be accomplished in the calmest and finest weather, and then only with ease upon the two largest, has no doubt interfered greatly with any attempt to survey them thoroughly.

Dean Munro devotes rather more space to them than he usually does, and his account is not without interest. He writes as follows:—

"SEVEN HALEY ISLES.—First, furth 50 myle in the Occident seas from the coste of the parochin of Vye in Lewis, towarts the west northwest, lyes the seven isles of Flanayn, claid with girth, and

Haley isles. Very natural gressing within the saids isles: infinit wyld scheipe therein, quhilk na man knawes to quhom the said scheipe appertenis within them that liues this day of the countrymen; bot M'Cloyd of the Lewis, at certaine tymes in the zeir, sendis men in, and huntis and slayis maney of thir sheipe; the flesche of thir sheipe cannot be eaten be honest men for fatnesse, for ther is na flesche on them, but all quhyte like talloune, and it is verey wyld gusted lykways. The saids isles are noudar manurit, nor inhabit, bot full of grein high hills full of wyld sheipe in the seven isles forsaid, quhilk may not be outrune; they perteine unto M'Cloyd of the Lewis." So much for Dean Munro's quaint account.

Next comes the still more curious account of Martin.* He says, "To the North-west of *Gallan-head* and within 6 leagues of it, lyes the Flannan-Islands, which the Seamen call *North-hunters*." He adds "they are but small Islands, and six in number, and maintain about 70 Sheep yearly." He relates also how the natives of Lewis "having a right to these Islands," visit them every season "and there make a great purchase of Fowls, Eggs, Down, Feathers, and Quills." The natives never attempt a landing in a west wind, and a novice "not vers'd in the Customs of the place, he must be instructed perfectly in all the Punctilio's observed here, before Landing," which punctilios, Martin in his own quaint language proceeds to describe (p. 16). "This superstitious Account," as Martin justly terms it, he had received *viva voce* from two fishermen who had visited the Flannans the previous year.

In connection with the sacred character of these isles, Buchanan writes†:—"There are Seven Islands at Fifty Miles distance above *Lewis*, which some call *Flavanae*, others the *Sacred*, or sanctuary islands." They would appear to be sacred or St. Flann's isles, just in the same way that the Shiants were sacred, being the Virgin Mary's isles. They were, as Dean Munro tells us, "claid with girth and Haley isles," or they may possibly—as suggested by Mr. James Macpherson to me—*in lit.*—have been sanctuary isles in a legal sense as well. Islands far out at sea, and difficult of access, often seem to have been held as holy isles or places of veneration.

Wilson in his "Voyage round the Coasts of Scotland," designates the feeling which induced the early Christians to settle upon these outermost isles, "the pertinacity of devotion." St. Flann was "a

* Martin's Description, &c. (p. 16).

† History of Scotland, 1751.

patron saint said to have flourished in the ninth century. Some regard them (the remains of buildings) as Druidical, and therefore of more ancient date. These small islands are the *Insulæ Sacrae* of Buchanan." *Vide* also Martin (p. 19) where he relates the fact of these and other remote islands being considered "places of inherent Sanctity."

MacCulloch gives Flann as meaning *red* or *blood*; "possibly from the reddish colour of the cliffs of gneiss. It was," he adds, "also the name of some Irish chieftains. He gives a fair description of these isles, which "are seven in number and lie seventeen miles to the north-west of the Gallan Head in Lewis. * * * The annual rent of the whole is £10." He thus describes their coast line:—"These islands are bounded all round by cliffs cut sharply down to the sea, and almost all bearing the marks of recent fracture and separation; an appearance arising from the little wearing which they undergo from atmospheric action, and from the obstinacy with which they seem to resist the growth of lichens. * * * Their average height appears to be about 100 feet."

Talking of their geology, he says,—“The Flannan isles are all composed of gneiss traversed by numerous granite veins of different sizes, and ramified in all directions. * * * Here everything appears as if it had been cut and polished by a lapidary.” He remarks upon the utter absence of lichens, so common in most other islands of the Hebrides, and the consequent ease with which the “disposition of the rocks” can be traced, and the abruptness and sharpness of the rock scenery, indicating, as already noted, recent fracture and separation.

The late Mr. H. Greenwood, who rented Carn House and shootings in Lewis, wrote me that, in June, 1879, his gamekeeper visited the Flannans for eggs, but, unfortunately, the weather was so bad that he had to leave almost as soon as he landed. He procured several Eider Ducks' eggs, and those of some Peregrines, besides a young Peregrine, and some Razor-bills and Guillemots. He told Mr. Greenwood that the Herring Gull bred there.

Mr. H. Heywood Jones, lessee of Morsgail shooting in the Lewis, visited the Flannans in 1880. He landed on Eilean Tigh—the same that we landed upon, and his experiences were somewhat similar as regards the unsatisfactory state of the weather, for it began to blow hard about an hour and a half after landing, so that he was

obliged to leave hurriedly, and it blew a heavy gale for some days afterwards. I shall refer later to Mr. Heywood Jones' notes, which he kindly sent me, along with lists of Lewis birds.

Dr. Heddle and I made two attempts to land upon the Flannans, and it was only with considerable difficulty that we managed to succeed the second time, and then only upon the easiest of access, Eilean Tigh. We had previously, whilst interrogating fishermen and others who had landed on these islands, found that there was considerable difference of opinion as to the situations of the landing-places. Some said there was only one landing-place between the two principal islands; others that there were several, suitable to the direction of the wind. Some reported that the outer islands of the group were never landed upon; others—and one most persistently—that they could all be landed upon, and that a N. wind was the worst for landing, and a W. or S.W. the best.

Coming out of Loch Tarbert, and, after clearing the island of Scarp—whence fishermen go out to the neighbourhood of Flannan for deep-sea fishing—we had a pretty stiff breeze and good tumble of a sea on. In order to avoid the long reefs which lie off Loch Resort, and over which high surf was breaking, we had to tack well out before we could run into our night's anchorage at Loch Thamanabhaidh (pronounced Hāmānāwāi) in Lewis.* The next day we spent fishing, as it was too stormy to attempt the Flannans.

On the 9th June we made a fair start. A gentle summer "airie" took us out of Loch Thamanabhaidh about 7 a.m., but we were becalmed soon after till 11. With another almost imperceptible land-breeze, we came across the track of a large fishing-boat. They had a few Ling, Skate, one Tusk, and an enormous Halibut—about 80 lbs.—and we laid in a stock. Soon after this, we got again into the "doldrums." The men had been cleaning the fish on deck, and Kittiwakes had gathered round us, attracted by the offal. While lying in the sun, I jumped up, with an exclamation, "There's a Skua, and a Pomatorhine, too," rousing my companions—U. and Dr. Heddle—from their novels or their slumbers. I rushed down stairs for a certain implement and put the fact on record beyond cavil. "A bird hit 's history—a bird missed 's mystery." How curious to find the great invasion of Skua Gulls still lingering on our shores and seas far into our now almost arctic

* This may be read in continuation of my paper upon Haskeir and its Bird Life (see page 181), as it takes up the rope's-end where it was then dropped.

summers. The same day we saw others, and next day two more in the small harbour of Carloway, while, on the following one, numbers were seen by us out at sea. Fulmars, too, were not uncommon, and a few Gannets hovered round. I heard a report that a branch colony of Fulmars had reached the Flannans, and our pilot—MacDonald—told me the same thing; but this statement would require accurate and careful investigation, which I was not, at the time, able to give to it.

The Chart of the West Coast of Scotland and the Hebrides (Imry, 1881) gives the following islands of the group. I arrange them from E. to W., as shewn on the chart, but some confusion seems to exist as to their names and relative positions.

East.

Gealtir Mòr.

Gealtir Beg.

Eilean Mòr.

Soraidh.

Rhodorheim.

Eilean an Gobha.

West.

Bronn na cleit.

In all, *seven* islands; but Gealtir Mòr and Gealtir Beg are insignificant rocklets, with scarce enough breeding-ground for a pair of Oyster-catchers. This survey map makes no mention of the second largest island which lies close to Eilean Mòr, called Eilean Tigh, and perfectly known and recognised by the natives of Lewis. The "Directions"* say "*Flannan Islands, or Seven Hunters*, are a group of islands 3 miles in extent, the highest and largest of which, Eilean Mòr, lies W. $\frac{3}{4}$ N., 44 miles from the Butt of Lewis; N.N.E. $\frac{1}{2}$ E., 46 miles from Monach lighthouse; E. by N., $\frac{1}{2}$ N., 38 miles from Boreray, St. Kilda, and $16\frac{1}{4}$ miles from Eilean Molach, the nearest land of Lewis. The group consists of seven islands and thrice as many rocks, divided into three clusters, taking a triangular shape. Eilean Mòr, 282 feet high, and a quarter of a mile in extent, produces rich grass at an early season, so that the sheep left here for pasture are fattened before any in the Lewis. * * * The best landing place is the south-west side of Eilean Mòr; but it should only be attempted in moderate weather." This last statement is at variance, as regards the situation of the landing-place, with the reports of some of the natives, and does not seem to be in accordance with the conclusions we drew after cross-questioning a number of them. As will be seen, we landed without very

* Otters, Admiralty. Part I. Hebrides. Potter: London. 1874.

serious difficulty on the E. side of Eilean Tigh, and the weather could hardly have been designated moderate. Imry's "Directions," however, which profess to be copied or compiled "from recent Admiralty Surveys," as stated on the title page (1875), mention Eilean Tigh "possibly of 50 acres." They also recommend the south-west side of Eilean Mòr as a landing-place.

Approaching the Flannan Islands from the E.N.E. their first appearance strikingly reminded me of Haskeir, but a little later this view quickly changed, and it was seen that the group was of more circular or triangular shape, unlike the long single strait ridge which the Haskeir island and rocks present.

Gealtir Mòr, translated *the big white (bright or clear) land*, and Gealtir Beg, *the lesser white land*, are only small spray-washed rocks, not a cable's length from the larger masses of Eilean Mòr, and Eilean Tigh, which latter is nearer to them than the former.*

Eilean Mòr—*the big island*—is the highest and largest of the group, and has a fine precipice facing E.S.E. and a deep göe from top to bottom, with what appears at a distance a feasible but difficult landing-place on the left or S. side of the göe, and another equally difficult, still more to the S., and beside a small triangular-shaped cave. These, however, are *not* landing-places, though they appear possible from the sea, and the recognised landing-place is on the N. side.

Eilean-an-Tigh—*the island of the house*—is the second largest; and is next to the two Gealtirs in position from the Lewis. Upon it are the remains of an old house, standing at the inner extremity of a large göe, which cuts into the full height of the cliffs—about 120 feet?—from the west side, and of which we could see the further dark cliff-top above the top of the nearer and somewhat lower cliff facing it.

The island is a roundish "lump" with a fine green sloping top facing E.S.E. I am now describing the aspect from the sea, but will say more of it later after landing. One more point, however, should be noted now, and that is, the long peninsula which juts out towards the E.S.E. and which, however, is better seen to be a peninsula when approached from a more southerly direction.

As we kept on along the N. side of Eilean Mòr, passing two

* The best map I have seen of the group is a very careful one in Muir's "Characteristics of old Church Architecture of Scotland," p. 178.

or three göes where apparently there were fewer birds than on the E.S.E. side, the outer portion of the group began to open out, but before speaking of them Soraidh,—farewell island—comes next to be mentioned. It is composed of three main “lumps,” and two smaller semi-detached residences of sea-fowl at either end. These are separated by apparently deep water channels, and the landing appears to be difficult on any of them. They form rounded “lumps,” rather than stacks, with precipitous sides. Soraidh is the furthest south of the group, and hence, perhaps, has received the name from mariners leaving the islands.

Besides the above, between Eilean Tigh and Eilean Mòr there is a stack—a square comparatively low mass some 60 or 80 feet in height—in mid-channel, and beyond appears an island of somewhat similar shape to another of the Western Islands, and which forms a stack close to the W. side of Eilean Mòr, but has no name on the Chart, though from its size, it appears to have equal claims with the outlying skerries of Gealtir.

The next which come into view are the following:—Rhodorheim, probably an adaptation of *Rudha dòruinn*, meaning *anguish point*, lies most to the northward of the western group. Bronn na cleit—the protuberance (or belly) of the reef—which agreeably with its name rises in peculiar shape and abruptness from the centre of what from this view appears a long reef, is really three detached islands, and many skerries, of which Bronn na cleit is the westernmost. Eilean an Gobha—the smith's island—is the southernmost of the western group. These three open out past the end of Eilean Mòr, and, as I have said, appear at first like one large island. Penetrating the lower end of Rhodorheim, is a small tunnel in the shape of an erect parallelogram, bridged over by apparently a square block of rock, as shewn in my sketch, [Plate IV.] and rising from the sea passage beneath is a small pinnacle of rock in the centre.

There are thus, therefore, six islands, two named rocks, and numerous skerries, which really constitute the group.

In Maps.

Correct Gaelic.

Meaning.

Flannan Isles.	Eilean Flannan	St. Flannan's Isle.
Seven Hunters.	or	The Flannan
Seaforth's Hunters.	Eilean an Flannan.	Islands.

Easternmost of the group lie the skerries of

Gealtir Mòr	|	Gealtir Mòr.	|	The Big White
and				(bright or dear)
Gealtir Beg		Gealtir Bheag.		Land.

Next and more to the north lies

Eilean Mòr.		Ant Eilean Mòr.		The Big Island.
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Next it on the left is

Eilean Tigh.		Eilean an Tigh.		Island of the House.
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At some distance off, southward, are several rocks constituting the Isle of

Soraidh.		Soraidh.		Farewell Island.
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which is the most southern of the group. Then about a mile further west lies the western group. The northern island is

Rhodorheim.		Rudha dòruinn.		Anguish Point.
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Between this and Eilean Gobha appears

Bronna Cleit.		Bronn na cleit.		The Protuberance(or belly) of the Reef.
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But this, however, is really the westernmost of the group. To the south then comes

Eilean Gobha.		Eilean an Gobha.		The Smith's Island.
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and between Bronn na cleit and the other two islands are innumerable reefs and skerries lying in a narrow sound, perhaps 150 yards in width.

Writing to me concerning the names of these several islands, Mr. James Macpherson says:—"There is no reason to doubt Martin's assertion that the island (or islands) derives its name from St. Flann. The martyrologies record no less than half-a-dozen Saints of the name from which to choose. *Flann* is a word that I have never heard used for *red*, although the dictionaries give it in a very restricted form. *Gealtire* (a coward) appears to me to be a very absurd name for an island. The nearest approach to the word is *Geal*, literally *white*. This is often used in a much more extended sense, indicating intense fondness and affection, and applied to an inanimate object, might also mean veneration—*vide* Martin's notice on the inherent sanctity of the islands. *Gealtire*

may also mean fair and fertile, as opposed to black, bare, and barren rock."*

"Soraidh," continues Mr Macpherson, "is a very appropriate name, though the termination *ay* or *ey* has a suspicious sound. I read in your writing *Rhodorheim*, and I give the only Gaelic form which occurs to me, which is almost similar in sound. There can, I think, be little doubt as to the correctness of the name of Bronn na cleit. * * * 'Hebridean names are very puzzling, there are so many elements of corruption.'"

Our view was, of necessity, a hurried one, as we had shortly to put about, the wind springing up fast from the southward and rapidly freshening, and the S. sky looking dark and "dirty." We ran for it and made Loch Carloway early in the morning. On June 10th we fished, as it continued stormy. In the harbour, as already noted, two Pomatorhine Skuas were busy. Some boys, questioned, said they had never seen such birds here before, and wondered what they were, although some men affirmed that they were always seen about these seas in summer; but did these fishermen not confound them with Richardson's Skua? Are these barren birds, or young birds not yet breeding? All I have seen, however, this summer appear to have reached the adult stage, and the peculiar tail-feathers were fully developed. Going out again to the islands, we saw more, and one followed the vessel for miles, flying on ahead and then resting on the water, until we again came abreast of it.

We interviewed Mr. Macaulay, postmaster and fisherman at Carloway, who has often visited, and often landed on the Flannans, and we arranged that he should accompany us as pilot and guide next day if the weather turned out to be suitable. But during the afternoon it blew harder than ever, and by night he said it would be impossible to land, and that it would take two or three days to lull the new swell, which being from N.E. by N. would blow and roll right into the S.E. landing-places, known to and approved of by him. Two cross seas had got up the day before, from N. and S., and now there was a newer swell blending with the old N. one, and coming from N.E. by E. Mr. Macaulay said that it would be no use, but we arranged to pay another visit,

* In the case in question, this last cannot be the meaning, as both Gealtir rocks are mere skerries *showing white if there is much surf on them*; and thus, it appears to me, they probably deserved the name of *the white land*.

and go as close round the islands as possible. This we did, with the unexpressed hope that "after all we might manage to land." On the 11th June, therefore, about 8 a.m., we again laid on a course for the Flannans, with light airs of wind, and it was 3 p.m. before we reached off the nearest isles, and then stood away past Eilean Mòr by the northward, with a heavy swell from N.E., and a fresh breeze. Captain MacGillivray would not stand closer to the lee shore than half a mile, though with a steam yacht we could of course have run in much nearer. Indeed a sailing yacht is not at all suitable for visiting those far isles. We noticed, as we passed, a colony of rock-birds near the eastern extremity of the peninsula of Eilean Tigh, and several considerable colonies on Eilean Mòr, and we saw the landing-place on the latter, and how utterly impracticable it was to-day.

The average height of the whole group is about 100 feet, but Eilean Mòr reaches an altitude of 280 feet, and has an area of grass of some 80 acres; whilst Eilean Tigh is computed to have about 50. Only three sheep were visible on the former.

We then tacked through the sound between the two groups, in a channel about $1\frac{1}{2}$ miles wide, and ran close under the cliffs of the windward shore of Eilean an Gobha, so that we could hear the loud mutterings of the rock-birds, and could easily identify the species with our binoculars. On Rhodorheim—the most northerly—two Wild Geese were distinctly made out, standing in profile against the sky. The gneiss rock was curiously seamed, especially on Eilean an Gobha and Bronn na cleit, by numerous felspar and quartz veins; and on the summit of Eilean an Gobha, above a round-edged göe, a huge boulder about 15 tons in weight, or possibly much more, lay a few feet from the edge of the cliff. Numerous rocks and skerries lie off the isles of Rhodorheim and Eilean an Gobha, and between these and Bronn na cleit, and are visited by Seals and innumerable Scarts.

After sailing southwards, clear of Soraidh, we tacked again to try to effect a landing on Eilean Tigh. On Eilean Mòr, on the grass slope, we saw the remains of the chapel of St. Flann, and on Eilean Tigh those of the dwelling-house formerly mentioned, at the head of the western göe. On Soraidh, on the S. side, were several colonies of rock-birds, with a few Kittiwakes. We got into the gig, taking a few provisions, in case of landing and not getting off easily, and approached the reputed landing-place

on the S.E. side, which is sheltered by the projecting spur, or peninsula, and a skerry of some altitude. We then ran in on the curl of the surf, between the skerry and Eilean Tigh, into an embayed piece of smooth water; but here found no landing practicable, so pulled out again by rapid, strong rowing on the slack of the waves, and lay off the only apparently feasible landing-place, to watch the surf. After a time, our men backed the boat in, and, watching the wave, gave U. a chance, and he landed easily. Next rise I landed, carrying the bag and Dr. Heddle's hammer; but he remained in the boat, as the waves now again resumed their turbulence. U. and I climbed up and spent about an hour, or less, on Eilean Tigh, and traversed the whole top surface.

We took a few eggs of Razor-bills, Puffins, Eider Ducks, Oystercatchers, &c., and could have taken many more had time permitted, but any change in the tide might, within a few minutes, alter the conditions of our getting off. We got off comfortably; but Dr. Heddle, in landing to chip off a bit of a quartz vein, and, having leather-soled boots without nails, instead of india-rubber-soled shoes, slipped and came upon his knee, hurting it rather severely.*

Hereafter the breeze sprung up briskly, and we had a splendid run for the Sound of Harris, pleased, but not fully satisfied, with our experiences of the Flannan Isles.

It now only remains for me to give a list of the birds which were clearly identified, and to refer you to the accompanying sketches of the different aspects of the group from different points of view, as outlined by me from the deck of our yacht, and afterwards enlarged and shaded in Indian ink.

LIST OF BIRDS OBSERVED AT THE FLANNAN ISLES.

ROCK PIPIT.—*Anthus obscurus* (Latham).—Common on Eilean Tigh, and probably on the other islands also.

PEREGRINE FALCON.—*Falco peregrinus*, Tunstall.—I saw nothing of this bird, but Mr. Greenwood mentions it as breeding there a year or two ago.

OYSTER-CATCHER.—*Haematopus ostralegus*, Lin.—A few pairs observed, and eggs taken on Eilean Tigh.

KITTIWAKE.—*Rissa tridactyla* (Lin.).—Scattered colonies on

* Query: As the "Punctilios" of Martin were not adhered to on our first landing, was this not just retribution upon our heads?

N. side of Eilean Mòr and on the skerry near the landing-place on Eilean Tigh, and doubtless others we did not see.

GREAT BLACK-BACKED GULL.—*Larus marinus*, Lin.—A few pairs, or a single pair, on all the islands, I believe. Seen upon Bronn na cleit, Eilean Gobha, and Eilean Tigh.

LESSER BLACK-BACKED GULL.—*Larus fuscus*, Lin.—A few on Eilean Gobha and Bronn na cleit, and scattered over the whole group; a colony on Eilean Tigh.

HERRING GULL.—*Larus argentatus*, Gmel.—A good many observed on Bronn na cleit and Eilean Gobha.

POMATORHINE SKUA.—*Stercorarius pomatorhinus* (Temm.).—One of these handsome birds I shot during the passage out to the islands; two more were seen in the harbour of Carloway; and during the summer others were seen at different parts of the western seas.

FULMAR PETREL.—*Fulmarus glacialis* (Lin.).—Several Fulmar Petrels were seen in the neighbourhood during my visit, and one close to the islands. Numbers are seen at times off Coppay Island in the Sound of Harris, but this is no proof, of course, of their breeding anywhere nearer than St. Kilda.

RAZOR-BILL.—*Alca torda*, Lin.—The most abundant species of the true rock-birds on Bronn na cleit, but also very plentiful in the göes of all the islands, and in most of the suitable places.

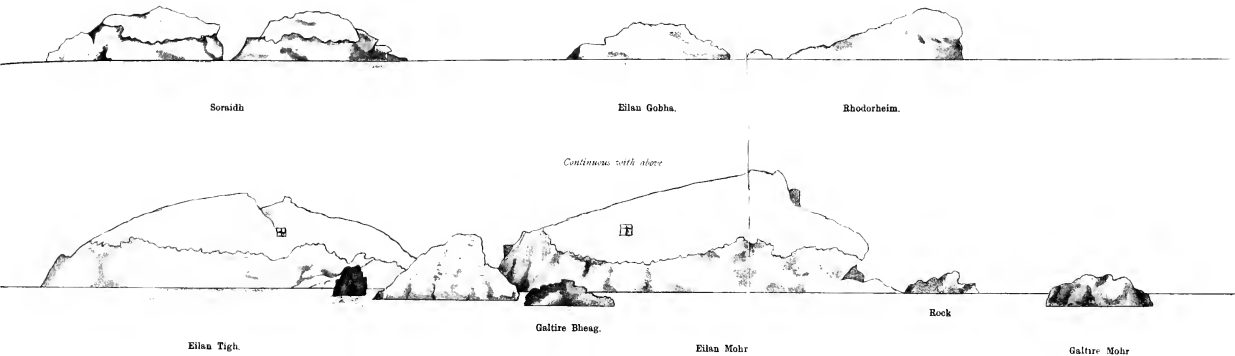
GUILLEMOT.—*Uria troile* (Lin.).—Common in the göe-cliffs, especially in the western göe of Eilean Tigh, and next to the Razor-bill in numbers. On the south side of the stack, which lies in the channel between Eilean Tigh and Eilean Mòr—as seen from seaward on the N. side—and on the cliff-face of the eastern promontory of Eilean Tigh.

BRIDLED GUILLEMOT.—*Uria troile* (Lin.), var. *lacrimans* (Gould).—I only saw one bird as it flew past at Bronn na cleit, but a closer inspection of the cliff-faces might, no doubt, disclose more.

PUFFIN.—*Fratercula arctica* (Lin.).—Comparatively scarce on Eilean Tigh, yet common enough in scattered colonies. They occupied the sea-pink tufts closest to the slopes, but the firm fine grass turf was little disturbed or tunnelled by them. In the large göe facing the west, amongst the debris and cairns and mixed green tufts, they were fairly abundant, and also under the stones of the old dwelling-house or hut. But on the rounded slopes of Eilean Mòr, the rotten turf, as seen by me across some 200 yards of water, bore evidences of much larger numbers.

The Flannan Isles, as seen from the East, approaching from Carloway, or nearly as seen from Harris.

NOTE.—Brona Cleit not shown, as it is hidden behind Rhodorheim.



Western Group of the Flannans from N.E., opening past Eilan Mohr.



Eastern Group of the Flannans from N.W., returning from the Western Group

B.



Eilan Mohr.

Eilan Tigh.

4



Continued with 3 li.

Soraith

EIDER DUCK.—*Somateria mollissima* (Lin.).—One nest found on Eilean Tigh. Probably dispersed over the islands in some numbers, as they were seen in the water at various places.

CORMORANT.—*Phalacrocorax carbo* (Lin.).—The only ones seen were high up on the pinnacles of Bronn na cleit, whence about three or four pairs flew off at the report of the gun.

SHAG.—*Phalacrocorax cristatus* (Faber).—Common in all the suitable places.

IV.—*Ornithological Jottings from the neighbourhood of Loch Lomond, for 1881.* By Mr. James Lumsden, F.Z.S., M.B.O.U.

The year 1881 has been one of considerable ornithological interest in the Loch Lomond district. Although an arctic winter and a wintry summer deprived us of many of the more delicate species, we have, perhaps owing to the same causes, had more than the usual number of rare visitors.

SLAVONIAN GREBE.—*Podiceps auritus* (Lin.).—As already reported at a former meeting, a Slavonian Grebe was shot on the Loch, near Luss, by Colonel Colquhoun.

GLAUCOUS GULL.—*Larus glaucus*, Müll.—An immature Glaucous Gull was obtained at the head of Glen Luss early last spring. It was in the company of some other gulls when killed, but the gamekeeper who shot it thinks they were not of the same species. In my List of the Birds of Loch Lomond, published in the *Proceedings* of this Society, I stated that this species had been once obtained in the district, but qualified the statement by giving my authority for it—viz., Rev. F. O. Morris, in his "History of British Birds." With the exception of this doubtful specimen recorded by Mr. Morris, and by him alone, the bird has never before been met with in the Loch Lomond district. Although not uncommon nearly every winter on the East coast, this species is not often seen in the West, and still more rarely in any of the inland districts. It is a northern species, and breeds chiefly within the Arctic circle.

TAWNY OWL.—*Syrnium aluco* (Lin.).—On the 22nd of April, I found a nest of the Tawny Owl *on the ground* at the foot of a large larch tree on the banks of the river Fruin. The nest, which was only a hollow between two of the roots of the tree, contained three eggs. From two the young birds were almost out, and the

third was chipped. So like the colour of the tree was the old bird, that I would most likely not have noticed her had she not got off the eggs as I passed within ten yards of the spot. Like a thoughtful housewife she had prepared for the expected increase of her family, for her larder contained a half-grown rat and a shrew mouse. On the 24th I again visited the nest, and found all the young birds out, and as lively as could be. Their appetites seemed to be good, and a supply of eight young rats was waiting for their next meal. Three days later the rats were all gone, and there was nothing in the nest but a mouse with its head eaten off. The birds continued to thrive, but some one having discovered the nest, they were taken away as pets, and one of them is still alive, preying on the mice in a hay-loft of a farm near at hand. Instances of the Tawny Owl breeding on the ground are very rare, the usual place for the nest being a hole in some large tree. I have since, however, been told by a friend, who lives not far from Loch Lomond, that one bred on the ground at the foot of a spruce fir not far from his house, in 1879. We have all heard of birds changing their breeding habits from necessity, but in both of those cases there were trees of exactly the kind in which Owls delight to build close at hand; and it would be interesting could we tell what logical reasoning had induced the bird of wisdom to leave the safety of the tree for the danger of a nest on the ground.

COMMON BUZZARD.—*Buteo vulgaris*, Leach.—The following note, recently communicated to the *Field* by Colonel James Colquhoun, son of the author of "The Moor and the Loch," is of interest:—"On a precipitous rock at the head of the rugged Glen-Finlas, on Loch Lomond side, a Common Buzzard has yearly built its nest from time immemorial. Not having a good specimen of this bird in our collection, I straggled down last spring (1881) to the nest, which is simply a lilliputian eyrie. Having shot the old hen, I found that in place of eggs (as I had expected) there were three young ones in the nest. Thinking that the old male bird would not attempt to rear the brood, and in order to preserve the pair in the same case, I three times made the rough ascent to the nest in company with the head keeper, but not even at two o'clock in the morning was the wary bird at home. In the meantime, my father wrote to me certainly to give the male a chance of bringing up the nestlings. On returning to them two days afterwards one of the young birds had disappeared, its remains shewing that it must

have been devoured by its cannibal kin. The remaining pair of young birds, however, seemed hale and hearty, and were so well cared for by the widower, that they left the nest in full plumage and perfect condition about the end of June."

TUFTED DUCK.—*Fuligula cristata* (Leach).—In the *Proceedings of the Royal Physical Society*, vol. iv., p. 73, Mr. A. B. Herbert reports having found a nest of the Tufted Duck "on a rocky island in an inland lake in Fifeshire." At the February meeting of this Society in 1879, Mr. R. J. Long reported a nest having been got in Perthshire, and exhibited the birds and eggs. Those two instances, are, so far as I know, the only recorded cases of the breeding of this species in Scotland. I am now able to record that at least two pairs of Tufted Ducks bred last spring on a small loch not far from Loch Lomond. Three pairs of birds were identified by me on the loch on the 29th of April, and in June I saw *at least* two broods of young birds. I have neither eggs nor birds to shew as proof, and perhaps on that account some sanguinary naturalists may doubt my word. I did not see the nests, as they must have been on one of the small islands of the loch, and then inaccessible, but I can answer for the birds, which I saw and identified *beyond doubt*. I trust therefore this case will be admitted as an authentic record, although I produce no tangible proof.

SHELDRAKE.—*Tadorna cornuta* (S. G. Gmel.).—In some notes on the Birds of Loch Lomond, which I read to the Society in December, 1879, I stated that a young Sheldrake had been shot on the Loch in 1877. Since then I have never heard of or seen the species wild in the district; but on the 14th of June last, a dead bird of this kind was picked up by a man on the shore, near Arden. The man who found it said he had seen it alive on the loch some days before. It had no shot marks, and was in very poor condition. It is quite possible it might have been an escaped tame bird, but it had not the appearance of one that had been in confinement.

CORN CRAKE.—*Crex pratensis*, Bechst.; and **WATER RAIL.**—*Rallus aquaticus*, Lin.—More than usually abundant this season; the latter, which is rather rare in the district, having been shot on several occasions.

SPOTTED CRAKE.—*Porzana parva* (Scop.).—Two Spotted Crakes were shot by Sir George H. Leith Buchanan on the 10th of October. This species is seldom met with in any part of Scotland,

although specimens have once or twice been got on the banks of Loch Lomond, as before recorded in the *Proceedings* of the Society.

GRAY PHALAROPE.—*Phalaropus fulicarius* (Lin.).—I have now to record the occurrence of the Gray Phalarope, for the first time, in our district. On the 14th of December, Mr. Robert E. Findlay of Boturich, picked up a dead specimen of this species on the shore near Boturich Castle. On dissection it proved to be a male, and its stomach was found quite empty. Like many other northern birds, the Gray Phalarope is much more common on the East of Scotland than on the West. As a breeding species it has its home in the Arctic regions, and it has never been met with in this country except in winter, and in its winter plumage. Its summer plumage is of a rich chestnut colour.

GREAT GRAY SHRIKE.—*Lanius excubitor*, Lin.—As before recorded, the Great Gray Shrike has several times occurred on the shores of Loch Lomond, but it is by no means a common species. Within the last two months I have seen two specimens in the flesh from the district. One, killed at Arden on the 30th of December, was a male, and its stomach contained the feathers of a Golden-crested Wren.

GANNET.—*Sula bassana* (Lin.).—Gannets are seldom seen on fresh water, and I was therefore much surprised, when told by Sir George Leith Buchanan a few days after the violent gale of last October, that he had seen a Gannet on the Loch. But sure enough it was one, for a few days afterwards I got within 100 yards of it, or rather it came within 100 yards of me as I was standing on the shore. With my glass I could see that it was a fine old bird in full plumage, the yellow on the head being very distinct. It has often been seen since then, both by Sir George and myself, but neither of us have ever seen it feeding. One stormy day I watched it for a long time, and several times it rose high in the air as if about to dive, but as often it seemed to change its mind, for it never entered the water.

This ends my Jottings for 1881, and rough and meagre as they are, I hope they may be of some interest to the members of the Society. I have taken the Loch Lomond district as my special charge, for I feel convinced if we are ever to have a perfect knowledge of the bird-life of our country, it is only by having many workers, and by each worker having a special district. In this way scraps of information, which would otherwise be passed over,

are secured, and these, when published, in due time become of value.

28TH FEBRUARY, 1882.

Mr. John Kirsop, F.S.A. Scot., Vice-President, in the Chair.

Mr. Thos. Scott, 7 Caddlehill Street, Greenock, was elected a corresponding member, and Messrs. Donald Farquhar, 32 Govanhill Street, and John Lockhart, 271 Bath Street, were elected ordinary members of the Society.

Mr. Thomas King exhibited cones of the Douglas Pine, *Abies Douglasii*. Ldl., grown at Innellan, and made some remarks on the growth of this and other allied species.

Mr. Robert Mason exhibited cones and a section of the wood of the Cedar of Lebanon, *Cedrus Libani*, Loud., and made some interesting observations on the geographical distribution of the species.

Mr. Thomas Scott reported the finding of the English Sage, *Salvia verbenaca*, Lin., at Batteryfield, Greenock. This plant is not indigenous in the West, and Mr. Scott considered it to be a probable garden escape. He illustrated his remarks with specimens of the same species from Burntisland.

The Chairman exhibited a collection of Botanical Plates illustrating the Flora of Japan, also a snout of a Sawfish, *Pristis*, sp., the siliceous anchoring fibres of a *Hyalonema*, and some other objects of interest.

Mr. John Young, F.G.S., exhibited several cones of *Lepidostrobus* from the Bathgate coalfield, and pointed out the resemblance to a recent species figured in one of Mr. Kirsop's plates. He also made some remarks on different species of recent and fossil cones.

Mr. J. J. King exhibited specimens of the Long-tailed Blue Butterfly, *Lycaena boetica*, Lin., taken at Ardrossan, and of the Crimson-speckled Tiger Moth; *Deïopeia pulchella*, Lin., taken at Whitevale—the former in July, 1881, and the latter in January last. In referring to their occurrence in Britain, Mr. King thought that probably they had been accidentally introduced.

Mr. J. M. Campbell exhibited living specimens of the Sharp-backed Emys, *Graptemys pseudogeographica*, Less., from Belize, and of the Blood-spotted Swanka, *Swanka cruentata*, D. et B., from

Truxillo, and made some remarks on these and other species of aquatic reptiles.

Mr. J. B. Low, M.A., exhibited a species of *Gorgonia* from Jamaica, on which Mr. John Young, F.G.S., made some remarks.

PAPERS READ.

I.—*Some Notes on Goniocypris mitra.* By Mr. Thomas Scott, of Greenock, Corresponding Member.

The study of the Fresh-water Ostracoda is often a means of spending a leisure hour both pleasantly and profitably. Notwithstanding that water of questionable purity is often their habitat, they in many instances appear to enjoy life so thoroughly, and to be so much at home, though in confinement, that it is often a decided relief, after the toils of the day, to sit quietly and watch their busy life, either swimming about in their own peculiar way, or running in and out of the soft mud, or over the aquatic vegetation. Some of them no doubt appear to be of a more meditative turn, and love ignoble ease rather than the busy hurry-scurry life of their neighbours, but this difference only adds to the interest with which we view them. One great fault of theirs (of course it is taken for granted that, like other creatures of Earth, they are not faultless), is that they are cannibals. I do not exactly mean to say that they will attack a healthy neighbour and make a meal of him, but that they do eat up a sickly one I have seen proved by ocular demonstration.

It is only within comparatively recent years that this interesting order of the crustacea has been wrought out with anything like systematic thoroughness, and I need scarcely say that the worker who has done more than any other to increase our knowledge of these organisms is the respected member of this Society, Mr. David Robertson.

One result of the increased interest taken in the Ostracoda has been the addition of not a few fresh-water species. Among these additions is a form which was got in some parts of England, and some years ago a station in Scotland was also found for it, viz., a loch near Edinburgh. The specimens from both England and Scotland were not perfect enough, however, to allow of a satisfactory knowledge of the structure and habits of the organism being arrived at, but it otherwise appeared to all intents and purposes to be an Ostracod, and from its peculiar three-angled bishop's-mitre-like form was named *Goniocypris mitra*.

Towards the latter end of last September (1881) I dredged a part of the Glasgow and Paisley canal a little east of Elderslie, and when examining the material brought up, I was pleased to find what appeared to be this rare form. I submitted specimens to Mr. Robertson, who identified them as *Goniocypris*, thus adding a new station for it for Scotland.

A friend, who happened to be with me when dredging, knew something about where the Swan Mussel, *Anodonta cygnea*, was found in the canal, and as we were in the neighbourhood of where it was known to be, proposed searching for it. We secured a few specimens, and wishing to learn something of their habits I kept mine alive. About two months afterwards they began to take on an unhealthy appearance, and so that I might examine their structure, I killed one of them. In cutting it up I observed a mass of granular-like substance, covered by a thin membrane, and lying close to the branchial plates. Placing some of this granular substance on a slide, and looking at it with my botanical lens, I was surprised to find objects closely resembling *Goniocypris mitra*, and more careful examination proved the two to be identical, and that *Goniocypris* was the ova or fry of *Anodonta cygnea*.

I communicated to Mr. Robertson what I had observed, as I knew he would be glad to know the true nature of this organism, and he has, with his usual kindness, informed me that this discovery, as he is pleased to call it, will be acknowledged in the monograph of the Ostracoda, now in preparation.

II.—*Notes on the Seal and Whale-fishery of 1881.* By Mr. Thomas Southwell, F.Z.S., Corresponding Member.

I am mainly indebted to Capt. David Gray, of Peterhead, and Mr. David Bruce, of Dundee, for the following particulars of the Seal and Whale-fishery of the season of 1881. Hoping they may prove of interest to the naturalists of that portion of the United Kingdom to which this branch of commerce is now entirely restricted, I beg to submit them to the members of the Natural History Society of Glasgow.

The Newfoundland Seal-fishery has hitherto, so far as Great Britain is concerned, been confined to the port of Dundee, from whence the vessels sail for St. John's about the first week in

February, and having made up their full complement of hands clear out from that port on the 10th March. They are allowed to take Seals as soon after that date as they can come up with them.

The close time terminates on the 2nd April. The main take of Seals is speedily over, but some of the vessels continue to shoot old Seals, or go south to Iceland to look for Hooded Seals, till the 20th May, when they take their departure for the Whale-fishery, for which purpose they proceed to Davis Straits, or to the ice between Greenland and Spitzbergen. The Newfoundland vessels, if successful in getting a cargo early, land their produce at St. John's, and make a second trip to the ice before also going north to the Whale-fishery.

From Dundee, last season, there were six powerful steamers at the Newfoundland sealing, and 139,885 Seals were taken. This was considered a successful season so far as the Dundee vessels were concerned, but I believe the total catch was not more than an average. The export of Seal-skins from Newfoundland and Labrador for the year ending 31st July, 1881, was 447,903.

In the Greenland fishing there were nine steamers from Dundee, and three steamers and two sailing vessels from Peterhead. These fourteen Scotch vessels took 24,084 Seals, but they formed only a small part of the total fleet, of which the ships of other nations, more particularly the Norwegians, form a part.

The weather proved very unfavourable, and many fewer Seals were captured than would otherwise have been the case. The ice was driven out to sea by heavy northerly gales, and the young Seals were washed from their resting-places, and otherwise so scattered that it was impossible to find them. Captain Gray's Log indicates a constant succession of gales from the N. and N.E., with fogs and snow. He met with Seals first on the 5th April; on the 8th he killed his first Seals; between 5 A.M. and 10 P.M. on that day, counting old and young, 1353 were secured by him; on the 9th, 1164; on the 10th, 439; and on the 11th, 97 were captured.

With regard to the close time which came into operation in 1877, Captain Gray assures me that it is working beneficially, although slowly, in improving the fishing, but that it will require many years to remedy the mischief produced by the unfair and cruel manner in which the Seals have been killed off, more particularly since the introduction of steam.

The state of the ice during the past year has been most unusual,

if not unprecedented. Captain Gray in a communication to the Royal Geographical Society (*Proceedings Roy. Geog. Soc.*, vol. iii. p. 741,) says, that for the last two years there has been very little southerly drift, probably owing to the severity of the weather. This caused the lanes and pools of open water rapidly to be covered with bay ice, thus keeping the ice closed, and preventing the wash of the water from cutting into it and causing its rapid disruption and consequent disappearance. In the chart accompanying Captain Gray's communication the ice, in the months of April and May, 1881, is shewn to extend in a N.E. direction from the east point of Iceland to Bear Island, where it takes a rapid bend to the E.S.E., reaching within $2\frac{1}{2}^{\circ}$ of the North Cape.

On the 23rd May, Captain Gray was imbedded in the floe-ice, with only a small hole of water to be seen here and there, and with 300 miles of ice to force a passage through before he could hope to reach the Spitzbergen "land-water" which formed his destination. Should the prevailing winds this winter in these latitudes be northerly, Captain Gray is of opinion that in the spring the ice will be met with approaching the Faroe Islands on the west and the coast of Norway on the east. I am not aware that there is any record of so remarkable a "south ice" year as that of 1881. Notwithstanding this barrier, the "Eclipse" was in the "land-water" on the 3rd June, saw her first whales on the 5th, and on the 7th made her first capture.

The Seal which occurs in such enormous packs in the Greenland seas is known by the sealers as the Saddleback or Harp Seal (*Phoca groenlandica*, Fab.). At all times restless and gregarious in its habits, this species migrates to the ice in the Greenland seas in countless numbers to produce its young; this takes place with great regularity, and the sealers know almost to a day when the old Seals will be found upon the ice. The young are almost all born by the 1st of April, and on the 3rd the slaughter takes place. Captain Gray gives a very charming picture of the interesting habits of the Seals when on the ice tending their young. He says, "Towards night the old Seals take the water to feed, returning to their young in the morning, and lying on the ice with them the whole day. From what I saw, the young one draws upon its mother for nourishment at least once every hour, apparently to the old one's great relief. It is very interesting to watch them together, they seem to be so attached to one another. When an

old one takes the ice, even supposing there may be eight or ten young ones besides her own upon the same piece, she never takes her nose from the ice, but runs along until she catches the scent of her own. When she comes to it, there is a great display of kissing and other demonstrations of affection. It usually occurs, when there are a number of young ones lying together, that some of them will draw in about, to see if they can get a share of this attention. The old one immediately throws up her head and scolds very significantly, and if this has not the effect of driving them off, she will use her teeth and claws very freely until she gets quietness. The young one will now poke its mother on the side with its nose until she turns over to it, when it immediately fixes on the teat; but if it has any difficulty in finding the place, the mother will direct it by scratching it back with her fin, or hitching herself forward, and there the cub will remain for half an hour, the very picture of enjoyment. The supply seems to be so abundant that the milk can be seen flowing past the mouth of the young one. After it is satisfied it will roll about on its back, walloping its fins, or crawl away under the lee of its hummock to have a sleep. It occasionally happens that an old one loses its young for a short time, and her state of distress is very apparent; running over all the pieces round about, screaming until she finds it. I have often watched the mother enticing her pup away from the neighbourhood of a ship. What patience she displays before she can get her young one to take the water, and then coaxed away little by little to what she considers a safe distance." Later in the season, the Greenland ice is invaded by large numbers of Seals from the Labrador ice, on the breaking up of which they travel northward, still along the margin of the ice, resting as they go, till they reach latitude 76°; they then make for the south end of Spitzbergen, and even pass on to the shores of Novaya Zemlya.

Between Iceland and Greenland the Hooded Seal (*Cystophora cristata*, Erxleben) is met with in considerable numbers in the month of June after the Labrador ice has disappeared, and since 1877 they have been hunted with considerable success. These chiefly fall to the Norwegians, though some of our ships also take a part in the pursuit, but this locality has of late years offered another inducement to the whalers which I shall mention shortly. The sealing voyage over, most of the vessels return to port and refit for the whaling voyage, to either the Greenland seas, lying

70° and 80° N. latitude, and 20° W. and 10° E. longitude, or to Davis Strait.

In the past season twelve Dundee ships went to the Davis Strait fishing, capturing 48 Whales; one went to Greenland for 5 Whales, and two of the Peterhead vessels took 23 Right Whales, also in the Greenland seas. The total number of vessels employed in the Seal and Whale-fishing, was fifteen from Dundee and five from Peterhead; but as will be seen above, they did not all go to the Northern fishery.

When the whaling was first prosecuted at Spitzbergen, or Greenland as it was then called, the Whales were so plentiful and easy of approach that they only required to be killed; there was very little skill in whaling in those days. In 1697, 188 vessels killed 1959 Whales. The island of Spitzbergen was like a fair all through the brief summer, and the various nationalities engaged in the whaling all had their stations on the shore. To these they brought the blubber and tried it out, employing carriers to take home the oil and bone. This did not last long, however, and the scared Whales soon left the shore and had to be followed farther afield. At a later period, the Danes had settlements on the west coast of Greenland, from which for many years they pursued the Whales from the shore as they passed on their spring migration. These stations, I believe, are now of very little importance, and are chiefly of service for collecting the native produce of Seals and Walruses. There is no reason to believe that the Greenland Right Whale was ever found much south of its present habitat, and its greater scarcity is probably due to actual extermination. In the early days of the fishery from Peterhead, 20 or 30 was no uncommon take for one vessel, and in 1814 seven vessels brought home 163 Whales, Capt. J. Suttar, of the "Resolution," heading the list with 44 fish. Such catches are never heard of now. 20 Whales for one vessel is a very successful voyage; in 1880 the average was about 8, and in 1881, 5 whales per ship. The consequence is that the captains give their attention to much smaller game than formerly, and do not disdain to secure White Whales to help to fill up. The demand for "porpoise" hide renders these creatures very acceptable, as their skins fetch a good price in the market.

Of late, however, quite a new feature has sprung up in the Whale-fishery—I allude to the pursuit of the Bottle-nose Whale (*Hyperoodon rostratus*). The whalers have long been in the habit

of taking an occasional Bottle-nose, and many years ago the "Chieftain," of Kirkealdy, caught 28 of them off Frobisher Strait; but it was not till 1877, when the "Jan Mayen," then of Peterhead, having missed the Seals, succeeded in taking 10 Bottle-noses, that their pursuit attracted much attention. Since that time, however, they have been more sought for, and now most of the smaller vessels hunt for them every season, while some of the larger vessels, in the interval between the finish of the Seal-fishery and the commencement of the whaling, go south to the north-east coast of Iceland for the same purpose. In 1880 Captain Gray, of the "Eclipse," killed 32 of these Whales, and in 1881 he secured 39, and but that his hands were new to the work, he might have obtained a still larger number. They yield about a ton of oil each, but, of course, no bone.

The occurrence of this species in large numbers in the northern seas is of great interest. On our coasts it is generally met with in late autumn, probably on its return south from its summer quarters. It is then almost always solitary, or the adult female is accompanied by its young one. It has long been a question whether there are one or two northern species of *Hyperoodon*; in some skulls the maxillary crests being developed to an extraordinary degree, and flattened out in front. This form of skull is supposed by some to belong to a distinct species, which has been called *Hyperoodon latifrons*, but the creature which owns it has never been examined in the flesh by a competent naturalist; by others the peculiar maxillary development is believed to be a sexual peculiarity existing only in the adult males. It is doubtful whether the adult male of *H. rostratus* has ever occurred on our coasts, and there is no evidence of a female of the *latifrons* type having been met with. Until a female of the *latifrons* form is met with, or an adult male of the *rostratus*, the matter must remain doubtful; now, however, that these creatures are captured in such abundance, and the attention of Capt. Gray has been called to the matter, we may hope for a speedy solution of the question. Capt. Gray met with a "herd" of Bottle-noses on the seventh day out from Bressay Sound, and saw them almost daily afterwards; most of his captures were made in about latitude 68° N., and longitude 3° to 8° West. Of the 39 individuals which he captured in 1881, the sexes of 19 were noted—8 being males, and 11 females. The whole of these 39 were taken between the 19th April and the 20th May.

It is difficult to predict the future of the Whale and Seal-fisheries, but already the number of vessels sailing from Peterhead has been reduced from twenty-eight in 1859 to four or five, and the trade is gradually concentrating itself in the port of Dundee, which, with its fleet of fifteen vessels, is the only other town of the United Kingdom which still takes part in this peculiar industry. At the commencement of the present century most of the principal ports in the southern division of the kingdom sent out their one or two whalers, and it would be a work of great interest if anything like a complete history of the rise and final extinction of the Whale-fishery in such ports as Hull and Whitby could be written; I commend this task to the consideration of the members of the Yorkshire Naturalists' Union.

[NOTE.—Since this paper was read, Capt. Gray has conclusively proved the supposed *Hyperoodon latifrons* to be the adult male of *H. rostratus*. See Flower, *Trans. Zool. Soc.*, 1882, pp. 723-726, and Southwell, *Trans. Norf. and Norw. Nat. Soc.*, vol. iii., pp. 476-481. J. S., 7th July, 1883.]

28th March, 1882.

Mr. John Kirsop, F.S.A.Scot., Vice-President, in the Chair.

The following gentlemen were elected ordinary members of the Society:—Messrs D. A. Boyd, 225 West George Street; William Watson, 245 Main Street, Rutherglen; and Kenneth John Morton, High Street, Carlisle.

Mr. J. B. Murdoch drew the attention of the members to the forthcoming Fisheries Exhibition in Edinburgh. In the course of his remarks he referred to the prizes to be given for essays on various natural history subjects in connection with the exhibition, and hoped that some of the members would be able to enter the competition.

On the motion of Mr. John Young, F.G.S., seconded by Mr. J. B. Murdoch, it was unanimously agreed to place on record the regret of the members at the death of Dr. Rankin of Carlisle, a corresponding member of the Society, and long known as a cultivator and promoter of natural, geological, and archaeological science.

On the 21st of this month died Dr. Daniel Reid Rankin, of Carlisle, a member of the Faculty of Physicians and Surgeons in

Glasgow, and a corresponding member of the Geological Society of Glasgow. He was also a corresponding member of this Society, and contributed to the *Proceedings* several palaeontological papers of interest.* He took a lively interest in geology generally, but had an especial interest in that of his own district, and his fine collection of fossils was almost entirely local, some of the specimens being very rare—indeed, unique. About 1880 he presented it to the Hunterian Museum of the University. When the celebrated Agassiz was in Scotland he visited Carluke to see Dr. Rankin's collection of fish remains, naming several of those new to science after their possessor and discoverer. In 1843 a Sketch of the Geology of Carluke, by Dr. Rankin, was published in the *Transactions* of the Highland and Agricultural Society. He was also an archaeologist of some note, and wrote a very interesting history of Carluke, but which, however, was printed for private circulation only, and its circulation confined to his friends and acquaintances. In all movements which had for their object the moral and intellectual advancement of the people of his native parish, Dr. Rankin was a leading spirit—his efforts being untiring in connection with the Parish Savings Bank, while he originated the Useful Knowledge Society, which also has been productive of good results. He was possessed of conversational powers of a high order, and had a very keen appreciation of humour. In his dress he was rather peculiar, wearing a surtout of antique cut, Hessian boots, and hair flowing over his shoulders. He was born on 8th April, 1805, and, therefore, at the time of his death, was within a fortnight of completing his seventy-seventh year. He was the son of Mr. James Rankin, shoemaker, Carluke, and practised as a surgeon in his native parish for half-a-century—his patients being mostly the better-class people of the parish; while to the poor his advice was given gratuitously. As a kindly representative of the old school—few of whom yet survive—Dr. Rankin will be much missed in the district of Carluke, and amongst the circle in which he moved.

* The titles of these papers are subjoined. It is the more necessary that they should be pointed out here from the fact that, owing to the author's retiring disposition, they were published without his name.

“Notes and Observations on Injured or Diseased Crinoids,” vol. iii., p. 91.

“Notes and Observations on Injured and Diseased Crinoids; also some Short Notes on Fossils,” vol. iii., p. 333.

“Notes and Observations of Adventitious Structures on Crinoid Stems. By a Corresponding Member,” vol. iv., p. 73.

Mr. David Robertson, F.L.S., F.G.S., sent for exhibition a fine specimen of *Fusus antiquus*, Lin., var. *alba*, from the Isle of Man, and remarked that what is most interesting in these varietal forms is the fact that although they may be locally common they are generally confined to circumscribed areas. Dr. Jeffreys, in his "British Conchology," says that this variety of *Fusus* seems to be confined to the Cheshire coasts. The specimen shewn was taken by trawlers off the Isle of Man, where the species is sold in the fish market, together with the smaller typical species, as food, and is said to be greatly esteemed by the inhabitants. Mr. Robertson exhibited another varietal example, *Pecten opercularis*, Lin. var. *lineata*, which, although frequently met with off the shores of Hastings, is by no means common, whereas the typical form is abundant all round our coasts; also a curious turreted variety of *Littorina littorea*, common on the muddy flats of Belfast Harbour, and met with rather plentifully in Loch Carron, though otherwise it may be considered a rare shell. In conclusion, Mr. Robertson remarked that many of these varietal forms can be traced to the conditions of their habitat, but others cannot be so accounted for, as in the case of *Pecten opercularis*, var. *lineata*, that beautiful variety holding good while associated with the typical form, which shews no tendency to blend with the variety. Perhaps the solution of the problem of divergence may be found in the organisation of the animal itself.

Mr. J. M. Campbell exhibited specimens of the Natterjack Toad, *Bufo calamita*, Laur. and a closely allied species, *Bufo viridis*, D. et B., the former from England and the latter from Venice. He also exhibited a specimen of the Pope or Ruffe, *Acerina vulgaris*, Cuv. et Val., a fresh-water fish allied to the perch, and found in the rivers and canals of England. Mr. Campbell made some remarks as to their habits and geographical distribution.

Mr. J. M. Campbell also exhibited a fine specimen of the Eagle-Owl, *Bubo ignavus*, Forst., on which he read the following remarks:—

This noble bird, the largest of the owls, is of rare occurrence in Britain, and I am therefore glad to be able to record its occurrence in Scotland. It is a native of the northern parts of the Old World, and is occasionally found in Northern Africa. Its food consists of large game, such as fawns, hares, and grouse; but mice, rats, and moles form no inconsiderable part of its diet. It is a well-known

species, and is often kept in confinement—no menagerie with any pretensions to size or quality being complete without one or more specimens of the Eagle-Owl. Like many other birds of prey in a similar state, it will, with a moderate amount of care and attention, live to a good age; and it has also been bred and reared in aviaries, notably at Norwich, and elsewhere.

In England, the Eagle-Owl has been obtained in Kent, Sussex, and Devonshire, and at Hampstead, near London, and is said to have occurred in the counties of Suffolk, Norfolk, Oxford, Derby, York, and Durham, and also at Swansea, in Wales. In the autumn of 1873 a male was shot by Mr. Reynolds, of Hermitage Farm, Bridgenorth; was stuffed by Mr. Edwards of Wolverhampton; and, in April, 1874, was in the possession of Messrs. Cooke, naturalists, Liverpool. In July, 1876, two farm servants caught one on the edge of Rombald Moor, near Ilkley, Yorkshire.

According to Newton, the only record of the appearance of this species in Ireland “rests on an unsatisfactory statement, quoted by Thompson, to the effect that once, after a great storm, four such birds paid a two days’ visit to Donegal, but were not seen again.”

In Scotland, notices of the occurrence of the Eagle-Owl are very few. Pennant records an example killed in Fifeshire in the last century. Sibbald states that it inhabits the Orkneys, where it is known as the “Stock-Owl,” and a specimen, recorded by Baikie and Heddle, was obtained on Sanday in 1830. Saxby states that, in Shetland, it was “at one time oftener to be seen than at the present time,” but had not been observed for several years until the autumn of 1863, when one was seen in Unst. In March, 1871, Saxby himself saw one in Balta, sitting on a stone. It flew off when he approached, but was afterwards observed on the small island of Hunie, a little to the southward, in which also rabbits abound. Mr. Robert Gray mentions, on the authority of Mr. Angus, the capture of one in Aberdeenshire, in February, 1866. There is no British-killed specimen in the National Collection in London.

This specimen, which I am enabled, through the kindness of the Messrs. Eggleton, bird-stuffers, Glasgow, to exhibit, was trapped on the estate of Colonel Malcolm, of Poltalloch, near Ardrishaig, and was seen by me in the flesh on the 23rd inst. It is a male, in fine condition, and its dimensions are as follows:—Total length, 2 feet $1\frac{5}{8}$ inches; girth, 1 foot 9 inches; stretch of wing, 5 feet $3\frac{1}{4}$ inches;

length of wing, 2 feet 4 inches; length of wing from carpal, 1 foot $6\frac{1}{2}$ inches; tail, $10\frac{1}{2}$ inches; beak, over the culmen, $1\frac{3}{4}$ inches; gape, $1\frac{7}{8}$ inches; leg, 3 inches; foot, $3\frac{1}{2}$ inches; weight, 4 lb. $6\frac{1}{2}$ oz.; colour of the irides, yellow. Of course, like all our hawks, eagles, and owls, the Great Eagle-Owl is under ban, and is killed as vermin by keepers and game-preservers, so that its occurrence will be less frequent from year to year; and there is little probability that it will ever be recorded as a species found breeding (unless in captivity) in either Great Britain or Ireland.

The Chairman exhibited a Horn of a Rhinoceros and a large collection of Polished Agates and other minerals, together with a small collection of Fossils from the Paris Basin, on which he made some appropriate remarks.

Mr. Peter Cameron exhibited slides illustrating the microscopic structure of the tongues of several species of South American Wild Bees and several specimens of other American Hymenoptera.

PAPER READ.

Additional Notes on the Birds of the North-west of Perthshire.

By Mr. William Horn, M.A., Oxon., Advocate.

Since my paper on the birds of this district was printed—see *Proceedings*, vol. iv., page 54—I have received a good many additional notes, chiefly from Mr. Duncan Dewar, gamekeeper at Remony, recording the occurrence of rare birds near Loch Tay. I am now able to add seven new birds to the list formerly printed, as well as to give additional instances of the occurrence of several birds not common in the district. I am also indebted to Col. D. Hay's paper on the Birds of the Tay and its tributaries, published in the *Scottish Naturalist*, 1879-80-81.

WHITETHROAT.—*Sylvia rufa*, (Boddaert).—Very common about Dunkeld, according to Mr. Brooke, of Cardney, whose authority is quoted by Col. D. Hay.

GREAT GREY SHRIKE.—*Lanius excubitor*, Linnaeus.—A specimen was obtained by Mr. D. Dewar, on the 15th November, 1880. It was shot on a hedge at Remony, and the contents of the stomach were the remains of a large sparrow, claws and legs being nearly intact. A male bird, in splendid plumage, measured $10\frac{1}{2}$ inches from point of bill to tip of tail.—*Oban Times*, 18th December, 1880.

BRAMBLING.—*Fringilla montifringilla*, Linnaeus.—In the last

week of December, 1880, Mr. D. Dewar shot a Brambling at Remony. It is a rare bird in the district.

MARSH HARRIER.—*Circus aeruginosus* (Linnaeus).—Col. D. Hay thinks it possible that this species may still exist in some of the wilder parts of Rannoch Moor. He saw one lately in the hands of Mr. Malloch, Perth, in the flesh, shot in this district.

ICELAND FALCON.—*Falco islandicus*, Gmelin.—In the beginning of the summer of 1880 an Iceland Falcon was shot by a keeper in Glen Dochart, and sent to Mr. D. Dewar to stuff.

DOTTEREL.—*Eudromias morinellus* (Linnaeus).—Two out of a flock of three were shot by Mr. Dewar on Stron Chorm on 1st October, 1880. They were male and female, and were the first seen by him for twenty-five years.

BLACK GUILLEMOT.—*Uria grylle* (Linnaeus).—One was shot on Loch Tay, by Mr. Dewar, on the 7th November, 1881, and was sent to me for identification.

Obs. CRESTED GREBE.—*Podiceps cristatus* (Linnaeus).—Col. D. Hay remembers seeing a pair obtained near Dunkeld, which, he believes, were shot on Loch Ordie.

Obs. RED-NECKED GREBE.—*Podiceps rubricollis*, Latham.

Obs. HORNED GREBE.—*Podiceps cornutus* (Gmelin).—Two Grebes were shot by Mr. Dewar on Loch Tay during the winter of 1880-81, and from careful drawings and measurements made by him, they belonged, I have no doubt, to the above-mentioned species.

LITTLE GREBE.—*Podiceps minor*. (Gmelin).—One was shot at Killiechassie, on the Tay, by Mr. J. C. Shairp in 1879. Often seen on the long, still pools of the Tay at Logierait.

STORMY PETREL.—*Procellaria pelagica*, Linnaeus.—One was picked up dead by Mr. Dewar's son on the shore of Loch Tay, having been driven against a hedge by the storm on 12th December, 1881.

25TH APRIL, 1882.

Mr. John Kirsop, F.S.A.Scot., Vice-President, in the Chair.

Mr. William A. Rattray, 3 Mansfield Place, was elected an ordinary member of the Society.

On the motion of the Chairman the Society unanimously agreed to put on record their regret at the death of Dr. Charles Darwin, F.R.S., the eminent naturalist.

Mr. D. A. Boyd exhibited specimens of *Ruppia maritima*, Lin., sub-sp. *rostellata*, Koch. Mr. Boyd stated that in a small marsh on the seashore, directly below the farm of Chapelton, West Kilbride, he had observed last summer, in several of the stagnant pools among the turf, considerable quantities of a submerged aquatic plant which at first sight resembled one of the smaller species of *Potamogeton*. On a closer examination, however, he found the plant to be the above species, which is rare in the West of Scotland, and had not, so far as he had been able to learn, been hitherto reported from the district. In the New Statistical Account of Scotland (1845), vol. iv., p. 671, the late Rev. Dr. Landsborough, a well-known Ayrshire botanist, includes *Ruppia maritima* in a list of the rarer plants found in the parish of Dundonald. In the census of the British Flora, contained in Watson's "Topographical Botany," vol. ii., p. 407, *Ruppia maritima* has been reported from 48 of the 112 "counties" in Great Britain, of which 15 are Scottish, and include, on the West coast, Kirkcudbright, Ayr, Westerness, Cantyre, South Ebuades, and Hebrides. It must be kept in view, however, that in these reports *Ruppia maritima* is treated as a single species, and no reference is made to the two sub-species, *spiralis*, Hartmann, and *rostellata*, Koch, into which it has been divided. The former is reported from 6 "counties," of which Kirkcudbright is the sole Scottish representative; while the latter is reported from 21 "counties," 7 of which are Scottish, and include Kirkcudbright, Cantyre, and South Ebuades on the west. Of these 21 "counties," only 7 were vouched "by the cited names of personal authorities." The seventh edition of the "London Catalogue of British Plants" does not record any further addition to these numbers.

Mr. Boyd also exhibited a teratological specimen, shewing phyllody of sepals in *Primula vulgaris*, on which he made some remarks.

Mr. Mason exhibited several miscellaneous specimens, amongst them being mounted specimens of *Gnaphalium leontopodium*; malformed fruits of the Walnut, *Juglans regia*; fruits of the Nutmeg tree; also a Scorpion, *Scorpio ajer*, and several specimens of Coleoptera from Penang; which he had from time to time received from members of the Society.

The Chairman exhibited a large Fossil Nautilus, and also a

Concretionary Nodule of carbonate of lime, which had been found in the bed of the Clyde. Remarks were made on these specimens by Mr. John Young, F.G.S.

Mr. James Steel exhibited (on behalf of Mr. Thomas Scott, Greenock), the following land shells found at the Cloch, viz., *Acmaea lineata*, *Pupa ringens*, *Vertigo edentula*, and *Helix lamellata*. He also exhibited a specimen of *Helix virgata*, found at the Central Railway Station, and supposed to have been accidentally conveyed there amongst vegetables or other articles brought from England.

PAPERS READ.

I.—*Notes on the Mammalia of Buchan.* By Mr. William Horn.

In the following list of Mammals which occur in the district of Buchan, I have enumerated in all thirty-four species. Besides my own notes, I have been very much indebted to Mr. Duncan, gamekeeper at Brucklay Castle, who, in addition to giving me all the information he could, procured some notes from Mr. Thomas Edward, of Banff, and as both have spent the best part of their lives in the district, and are close observers of nature, I could scarcely have had better assistance. Most of the mammals are rapidly decreasing in numbers, while some are extinct. More than thirty years ago the Fox was very numerous in all the covers in Buchan, a dozen having been seen in quest of prey at one time, at a breeding place of the Black-headed Gull. The Polecat and Badger were by no means rare, but are now all but extinct. The Hedgehog and Squirrel were formerly unknown in the district, and old men remember the first appearance of the former, saying that "the prickly beast was thought to be uncanny." After a severe winter, such as we had last year (1880-81), the Hedgehog is always less numerous than usual, many being frozen to death, or suffocated in their winter quarters. The Squirrel has only recently made its appearance, but is spreading so fast that it bids fair soon to overrun all the well-wooded parts of the district.

My list is very incomplete so far as marine mammals are concerned. Many varieties of Seals and Whales have, at different times, been caught or stranded on the Buchan coast, but I find it is very difficult to get anything like reliable information regarding them. For any notes which I have received on this subject I am indebted to the Fishery and Coastguard officers at Fraserburgh and Penman, through Mr. Barclay of Aberdour House.

ORDER I.—CHIROPTERA.

Family: Vespertilionidæ.

1. Long-eared Bat. *Plecotus auritus* (Lin.).—Not so common as in the south of Scotland, but occasionally met with. More of a country than a town species.

2. Common Bat. *Vesperugo pipistrellus* (Schreber). Not so common as they used to be.

3. Daubenton's Bat. *Vespertilio Daubentoni*, Leisler. Quite familiar to Thomas Edward, of Banff, who says that he would rather call it the Water Bat from its habits. It is the only Bat he ever saw skim the water when catering for food, like the swallow. It was first correctly identified as a Scottish species by Mr. William Macgillivray, who took it in Aberdeen Cathedral in 1840,* and John Macgillivray captured eighty individuals in two clusters in the same building.† The capture of this Bat has been reported several times from other parts of Aberdeenshire. Specimens, which were not collected near Aberdeen, were deposited in the British Museum by Mr. John Macgillivray. One was taken in 1861 in the church of Peterculter, some distance up Deeside from Aberdeen.‡

ORDER II.—INSECTIVORA.

Family: Erinaceidæ.

4. Hedgehog. *Erinaceus europæus*, Lin.—The Hedgehog is increasing rapidly in Buchan, where it was quite unknown fifty years ago.

Family: Talpidæ.

5. Mole. *Talpa europæa*, Lin.—Like the Hedgehog, the Mole has increased in numbers during the last few years, and this is all the more to be wondered at, considering the endless war raged against it by farmers. White specimens sometimes seen. Local name *Mouldiewort*.

Family: Soricidæ.

6. Common Shrew. *Sorex tetragonurus*, Herm. Rather common. Local name *Thraw Mouse*. Mr. Edward says, in a letter to Mr. Duncan, gamekeeper, Brucklay Castle, that in his opinion the

* *Edin. Phil. Journ.*, vol. xxxi., p. 205.

† *Ann. and Mag. Nat. Hist.*, vol. viii., p. 230.

‡ "Bell's British Quadrupeds," 2nd ed., p. 64.

wholesale destruction for some years back of Hawks, Owls, Polecats, Weasels, etc., is enabling all kinds of field mice to increase.

7. Lesser Shrew. *Sorex minutus*, Lin.—Mr. Edward says that he once met with a small Shrew, which, at the time, he thought belonged to this species, but that he never was able to satisfy himself as to the fact. He found it in the Den of Auchmedden. Mr. John Macgillivray first identified it as a Scottish species, and considered it to be as abundant as the Common Shrew near Aberdeen.* Rev. G. Gordon records its occurrence in Morayshire.†

8. Water Shrew. *Crossopus foliatus* (Pallas). — Mr. Duncan tells me that he has often seen this species on the hills about Aberdour, and that he once saw one attack a frog. Mr. Edward at one time thought that he had discovered two species of Water Shrew at the burn of Melrose, Gamrie, and that of King Edward at Castleton, as well as at other places. The one was jet black all over, while the other had a white breast and belly. He is led now to think, however, that they are one and the same species.

ORDER III.—CARNIVORA.

Family: Canidae.

9. Fox. *Canis vulpes*, Lin.—The Fox was very common about sixty years ago, I am informed by Mr. Edward, but now it is so rare that many country people do not know it. The Old and New Statistical Accounts of Scotland include the Fox in the list of animals found in most of the parishes of this district.‡ As no hounds hunt this part of the country, foxes are generally shot when seen.

Family: Mustelidae.

10. Common Weasel. *Mustela vulgaris*, Erxleben.—By no means rare, but not nearly so common as it used to be. In Smiles' Life of Thomas Edward will be found some interesting anecdotes, showing the fearless and pertinacious disposition of this animal.§

11. Stoat or Ermine. *Mustela erminea*, Lin.—About as numerous as the last-named species.

12. Polecat. *Mustela putorius*, Lin.—Formerly very common, and still occasionally killed among the cliffs on this rock-bound

* *Ann. and Mag. Nat. Hist.*, vol. viii., p. 23.

† "Mammalia of Scotland," by Mr. E. R. Alston, p. 10.

‡ "Old Stat. Acct. Scot.," vol. xvi., and "New Stat. Acct.," vol. xii.

§ Smiles' "Life of Edward," p. 111.

coast. It is included in the lists of mammals in most of the parishes of Buchan, contained in the Old and New Statistical Accounts of Scotland. Mr. Duncan tells me that he often used to kill them, but not for the last fifteen or twenty years, say not since 1860. He heard lately of one being killed near Roseheart, but he thinks it must have been a brown Ferret. I was informed by Mr. Barclay, factor on the Brucklay estates, that one was killed near Peterhead within the last two years (in 1879 or 1880).

13. Badger. *Meles taxus* (Schreber).—Very rarely met with now. Rev. Dr. Moir, in the Old Statistical Account (1792), says, that he once saw a Badger killed in the parish of Longside, only a few miles from Peterhead. Mr. Duncan says there used to be Badgers killed in the Den of Auchmedden, and that he has killed them there. He killed one at Glasslaw, near Aberdour, about 1860, and it is preserved in the collection at Brucklay Castle.

14. Otter. *Lutra vulgaris*, Erxleben.—Tolerably common; sometimes seen at the Loch of Strathbeg and on the banks of the rivers Deveron and Ugie. There is little doubt, however, as Mr. Edward says, that if it were not for the sea, and the shelter they find along this rocky coast, they would soon be exterminated.

Family: Phocidae.

15. Common Seal. *Phoca vitulina*, Lin.—Several species of Seals have been found at different times on this coast; but Mr. Edward says that the Common Seal is the only one he can name with certainty.

ORDER IV.—CETACEA.

Family: Balaenopteridae.

16. Common Rorqual, or Razor-back. *Balaenoptera musculus* (Lin.).—This species, commonly called the Finner among the fishermen, is occasionally stranded on the coast of Buchan. One was washed ashore at Penman about fifteen years ago, say 1866 or 1867, and another was towed into Peterhead in 1871, a portion of its skeleton being preserved in the Museum of the University of Aberdeen.*

Family: Physeteridae.

17. Common Beaked-Whale. *Hyperoodon rostratus* (Chemnitz).

* *Proc. Nat. Hist. Soc. Glasgow*, vol. iv., part i., Alston's "Mammalia of Scotland," 2nd ed., p. 17.



—Occasionally seen off the Buchan coast during the herring fishing, on the authority of Mr. James Couper, the Fishery officer at Fraserburgh.

Family: Delphinidae.

18. Narwhal. *Monodon monoceros*, Lin.—Last summer, I am informed by the Fishery or Coastguard officer at Penman, a White Whale was seen disporting itself in the bay at Penman, and that Col. Garden Campbell, of Troup, fired several shots at it. It disappeared, however, and was seen about an hour afterwards by the salmon fishers at Aberdour, making in the direction of Fraserburgh. This is the only White Whale known to have been seen on this coast.

19. Killer or Grampus. *Orca gladiator* (Lacépède).—Very common on this coast during the herring-fishing. Several have come ashore at Penman of late years. One measuring twelve feet in length came ashore at Nethermill about twelve years ago, and one at Gamrie three years ago.

20. Pilot-Whale. *Globicephalus melas* (Trail).—Mr. Couper, of Fraserburgh, tells me that the Pilot-Whale is frequently seen during the fishing season off this coast.

21. Porpoise. *Phocoena communis*, F. Cuvier.—Seen in great numbers while the herring are off the coast.

ORDER V.—ARTIODACTYLA.

Family: Cervidae.

21. Fallow-Deer. *Cervus dama*, Lin.—The Fallow-deer thrives well in the extensive woods at Pitfour House, and strays often to neighbouring places. One stayed for some time in the woods about Brucklay Castle a year or two ago.

22. Roe-Deer. *Capreolus capraea*, Gray.—Pretty numerous at Pitfour, where there are large woods, and generally a few at Brucklay Castle. A stray pair occasionally may be seen at other places, such as Rattray House, in the parish of Crimond.*

ORDER VI.—GLIRES.

Family: Sciuridae.

23. Squirrel. *Sciurus vulgaris*, Lin.—Until lately the Squirrel was quite unknown in Buchan. In Mr. J. A. Harvie-Brown's very interesting paper on the distribution of the Squirrel in

* New Stat. Acct., vol. xii., p. 706.

Scotland,* it is stated that the Squirrel first appeared at Lathers, parish of Turriff, about 1865-66, and about 1867 at Fyvie and Delgaty, in the parishes of Turriff and Fyvie. Two Squirrels, I am informed by Mr. Duncan, have been shot since then upon the Aberdour portion of the Brucklay estates, in a deep wooded glen called the Den of Glasslaw, but they have not yet been seen at Brucklay Castle; where there are extensive woods. Aberdour is close to the sea, and adjoins the estate of Troup, where a few are also reported to have appeared.

Family: Muridae.

24. Black Rat. *Mus rattus*, Lin.—Up to April, 1839, the common species at Brucklay was the Black Rat. About this time Mr. W. W. Cameron, vermin-killer, Inverurie, says that he first observed the Brown Rat to be at all common. After this, along the coast-line of the Buchan district, he only occasionally killed a Black Rat, and that, generally, an old male. Now there is not one to be seen near the coast, but he believes that in old houses in the interior it may be still found. Mr. Duncan tells me that when he first came to Brucklay in the year 1837, the Black Rat was very common, and that another lad and he used to go into the byre, and with a stick kill them by the half-dozen. Now he never sees any.

25. Brown Rat. *Mus decumanus*, Pallas.—Too common everywhere. Rev. G. Gordon dates the first arrival of the Brown Rat in Morayshire at 1814,† and it would appear to have arrived in Buchan at about the same time, for in 1832, when Mr. W. W. Cameron first visited Brucklay, there were a few Brown Rats, and they would take some time to spread inland from the sea-port towns.

26. House-Mouse. *Mus musculus*, Lin.—In spite of the war waged against it by cats and traps, the House Mouse is common wherever there are houses. Mr. Edward says that musical individuals are not uncommon in this species, and that he has kept them himself and derived much amusement from them.

27. Wood-Mouse, Long-tailed Field-Mouse. *Mus sylvaticus*, Lin.—Common in fields and gardens, but occasionally visits stacks and even houses.

28. Harvest-Mouse. *Mus minutus*, Pallas.—Mr. Edwards says

* *Proc. Royal Phys. Soc. Edin.*, vol. v., 1880, p. 162.

† *Zoologist*, 1844, p. 424.

that it is long since this animal was first taken near Gamrie. Mr. W. Macgillivray first records the capture of this interesting little animal in Aberdeenshire.*

29. Common Field-Vole, Short-tailed Field-Mouse. *Arvicola agrestis*, De Selys.—Exceedingly common in fields and gardens.

30. Red Field-Vole, Bank-Vole. *Arvicola glareolus* (Schreber).—Not so common as the last-named species. Is found chiefly in old natural grass and marshy pastures.

31. Water-Vole or Water-Rat. *Arvicola amphibius* (Lin.).—I have never myself seen any but the black variety of this species here, but Mr. Cameron, who has had a large experience in trapping vermin of all kinds, says that brown ones are occasionally met with. He has seen some with the black tinted with brown, and has found a young brown one in the same litter with three black ones. Mr. Duncan also says that he sees them of a brownish hue.

Family: Leporidae.

32. Common Hare. *Lepus europæus*, Pallas.—Very numerous until the passing of the late Act of Parliament, which gave farmers the right to kill ground game.

33. Mountain Hare. *Lepus variabilis*, Pallas.—The White Hare is occasionally found on the few hills in the district of Buchan, but is not known to breed in the district. It is probably driven down by the snowstorms in winter from the higher hills in Banffshire.

34. Rabbit. *Lepus cuniculus*, Lin.—Extremely abundant along the coast in the sandy hillocks covered with bent grass, as well as in the large woods at Pitfour, Brucklay, etc. In one year upwards of 12,000 Rabbits were killed in the policies round Pitfour House.

II.—*Notes on the Fossils found in a thin bed of impure Carboniferous Limestone at Glencart, near Dalry, Ayrshire.* By Mr. John Young, F.G.S., Vice-President.

In a former paper read before this Society at the meeting of 24th September, 1878, and printed in the *Proceedings*, vol. iv., p. 5, "On a group of fossil organisms termed Conodonts," I called attention to an interesting and peculiar deposit at Glencart, near

* "Naturalists' Library," vol. xxii., p. 257.

Dalry, which had been recently discovered by Mr. John Smith, of Kilwinning, and in which he had obtained Conodont remains, as well as numerous sponge spicules of various forms, besides the shells of a small but very interesting group of univalve and bivalve molluscs, many of which, from the peculiar manner in which they have been preserved, were found in a very perfect condition. Since that period I have several times visited Glencart with Mr. Smith and various members, obtaining a quantity of the rotted material in which the organisms are found, and during intervals of leisure I have carefully examined it.

In the following notes I intend to point out—first, the geological position of the Glencart strata, and the conditions under which the fossils are found; and second, the genera and species I have been able to obtain during my researches so far as they have gone. I have not yet, however, had time to investigate the whole of the finer material of the deposit for the smaller organisms it contains, though I expect to do so ere long.

The thin stratum at Glencart, which has yielded the fossils in question, was accidentally exposed during the cutting of a branch railway to an ironstone pit. The strata passed through belong to the Upper Carboniferous limestone series of the Ayrshire coalfield, in which lie the Highfield and Linnspout limestones of the Dalry district. From quarries formerly opened in these upper limestones and their accompanying shales many fine fossils have been obtained, and plenty of material still exists in the old weathered shale-heaps, from which microzoa and other larger organisms may be obtained in abundance. The outcrop of limestone strata at Glencart, in which the fossils were found, lies on the south side of the railway, which, near the pit, has been excavated to the depth of from eight to ten feet, exposing several thin beds of varying mineral composition, all more or less weathered, or highly rotted, especially those which seem to have been originally slightly calcareous. In one of these weathered calcareous shale-beds Mr. Smith observed numerous small, irregularly-formed cavities, varying in size from a boy's marble to that of a man's closed hand. These were partly filled with a greyish-white soft plastic clay, not unlike some of the commoner varieties of pipe-clay, and not differing very much in colour from the rock itself in which the cavities were found. At the time he was on the outlook for fossiliferous weathered shales which might be washed for microzoa,

and fortunately he was tempted to collect a quantity of this unpromising-looking clay from the cavities. After being dried and washed it was found to be moderately fossiliferous, containing a group of sponge spicules of varied forms new to our Carboniferous strata, as well as various small molluscan remains and Conodonts, several also new. These sponge spicules and shells are of a fine creamy-white colour, and, as formerly stated, are generally in an excellent state of preservation. Indeed, if one did not know the genera or species to which they belong, he would never suppose that they had been obtained from so old a formation as that of the Carboniferous limestone, for they look more like a group of organisms from recent Tertiary strata, such as those of the Paris basin.

In explanation of the peculiar conditions under which they are found, it has been conjectured that the cavities now filled with clay were originally calcareous nodules, which had been segregated in the calcareous shale by the drawing together of the lime of the deposit into nodular masses through chemical attraction while the rock was still in a soft condition, and after the same manner in which it is believed nodules of clay-ironstone, and nodules of flint were formed.* These calcareous nodules would enclose the organisms lying in the stratum wherever they were segregated, while the lime present in their composition would, perhaps, tend to the better preservation of the organisms than in other portions of the bed. Be this as it may, we now find that it is only the organisms enclosed within the walls of the cavities originally filled by the nodules which are now well preserved; those found in other portions of the stone being all in the form of casts, or so firmly combined with the rocky matrix that they cannot be extracted.

In the lapse of time these beds were brought to the surface of the ground through denudation of the overlying strata, the calcareous matter was probably removed by the passage through the beds of water containing carbonic acid, so that the lime originally forming the nodules was entirely dissolved away, leaving behind only the clay formerly combined with it, and the organisms at the same time were left in such a state of freedom in the argillaceous

* Recently, I have found calcareous nodules, enclosing similar fossils, in a bed of shale in the upper limestone series of the same neighbourhood, and probably on the same geological horizon, but there the strata have not suffered from the same corroding action as that which has robbed the Glencart beds of all their lime.

matrix that they can now readily be separated from the clay by washing.

Similar calcareous nodules, enclosing fossils, are not uncommon in the limestone strata of our Scottish coalfields, but I know of no strata containing them which has been acted upon in the same peculiar manner as that observed at Glencart. It might have been supposed that, as the shells of the mollusca in the Glencart nodules were originally calcareous, they would also have been acted upon by the carbonic acid which has removed the lime, but such is not the case, as the shells retain their form and all their original fine markings. The reason why they have been so wonderfully preserved, under such, apparently, unfavourable conditions, is to be found in the fact that the lime which originally entered into their composition has been replaced by other mineral elements, such as silica and alumina in part, with probably a little sulphate of barytes, and which have resisted the action of the carbonic acid. There is every reason to suppose that this mineral change was effected on the shells prior to the strata being acted upon by the waters containing the dissolving ingredients. The causes which led to these changes in the mineral composition of the hard parts of the organisms may be both difficult to trace and to clearly explain; but it may, perhaps, have been due to heat derived through igneous action, which, we know, was contemporaneous in this district of country with much of the strata belonging both to the lower coal and ironstone series, and those of the upper limestone group. The Geological Survey officers, in the Memoir explanatory of sheet 22 of the Ayrshire coalfield, notice both beds of trap tuff and sheets of basalt, which alternate with these two divisions of strata in the Dalry district.

In the section at Glencart there is found overlying the bed containing the nodular cavities, a thin band of a grey siliceous deposit which has a flinty or horny texture. This stratum, which appears to be a true hornstone, has been, I am inclined to think, deposited chemically by heated waters, which held the silica in solution, and which had their origin in a spring, probably issuing from some of the fissures connected with the volcanic vents then active in the neighbourhood. The changes now observable in the mineral composition of the fossils were, in all likelihood, effected during this period, and it is also probable, that at some after period, springs charged with carbonic acid,

also the result of igneous action, dissolved the calcareous nodules and robbed this section of strata of the whole of its lime, though whether this took place in times previous to, or subsequent to, the denudation of the overlying strata, is now very difficult to say. There can, however, be no doubt that it was this agent which, at one time or other, deprived them of their lime, and left the strata in the same rotted condition as that in which we now find them.

In the quarries around Beith and Dalry, other beds containing rotted limestone are not uncommon, but in them the rotted material is found filling vertical fissures and horizontal partings between the several layers of the unaltered rock through which surface water has percolated in recent geological times; and they are all of a quite different character from those beds seen at Glencart.*

List of Fossils from the rotted clay filling the nodular cavities in the limestone at Glencart.

GENERA AND SPECIES.	REMARKS.
SPONGIDAE.	
<i>Holasterella conferta.</i> Carter.	Common, and in fine preservation. Other forms of spicules indicate the existence of Sponges belonging to the Renierid and Lithistid groups; while other trifid, fork-like, and acerate spicules appear to be related to Sponges of the genus <i>Geodia</i> .
OSTRACODA.	
<i>Bairdia subelongata.</i> Jones & Kirkby.	Rare; generally in the form of casts.
" <i>submucronata.</i> " "	Do. do. do.
<i>Beyrichia radiata.</i> " "	Do. do. do.
POLYZOA.	
<i>Fenestella multiporata.</i> M'Coy.	Rare; in the form of casts.
<i>Rhabdomeson gracile.</i> Phill.	Do. do.

* On our last visit to this interesting section, we found that the beds had become very much obscured, partly through the rapid weathering of the exposed portion of the strata, and partly by the removal of that portion of the bed in which the nodular cavities existed, this having been effected in the extension of the railway to another pit in the same locality. We were, therefore, unsuccessful in obtaining any of the fossiliferous rotted clay, nor is it likely to be again obtained, except by cutting through the beds at this spot in a new line of section.

BRACHIOPODA.

- Productus latissimus*. J. de C. Sow. Fragments of this species and other Producti occur somewhat rarely in the nodular cavities, but generally too imperfect for correct identification.
- Streptorhynchus crenistria*. Phill. Rare; in fragments.

LAMELLIBRANCHIATA.

- Avicula*. Sp. ? Small form; rare; undetermined; probably a variety of *A. gibbosa*. M'Coy.
- Aviculopecten*. Sp. ? Rare; in fragments.
- Cardiomorpha oblonga*. Sow. Rare.
- Cypricardia*. Sp. ? A small form, in fine preservation; moderately common.
- Nucula lineata*. Phill. Common; finely preserved; small in size; some valves perforated by a boring mollusc.
- Ungulina*. Sp. ? One small perfect valve; genus new to our strata. Recorded by M'Coy, from the Irish Carb. limestone.
- Venus*. Sp. ? Rare; finely preserved.

GASTEROPODA.

- Dentalium priscum*. Goldf. Moderately common.
- „ *inornatum*. M'Coy. Moderately common; some perforated by a boring mollusc.
- Euomphalus serpula*. De Kon. Rare; generally in fragments, but well preserved; species new to our strata.
- „ *carbonarius?* Sow. Rare.
- Elenchus antiquus?* M'Coy. The two species here noted are rather rare, and are of small size. They are doubtfully identified with M'Coy's species, as the tooth in the pillar lip is more strongly developed in the Glencart specimens.
- „ *subulatus?* M'Coy.
- Eulima Phillipsiana*. De Kon. Rare. There is another shell with smooth, flat whorls which I doubtfully refer to this genus provisionally.
- „ ? Sp. ? Moderately common; small, but finely preserved.
- Loxonema scalaroidea*. Phill. Rare; generally in fragments.
- „ *rugifera*. Phill. Rare; small, but finely preserved.
- Macrocheilus acutus*. Sow. Rare. There are other two small forms referable to this genus not yet determined, and which are probably new.
- „ *imbricatus*. Sow. Rare. The following species are all well preserved.
- Murchisonia angulata*. Phill. Rather rare.
- „ *elongata*. Portl. Common.
- „ *quadricarinata*. M'Coy. Do.
- „ *striatula*. De Kon. Common. Besides the species here noted, there are other three that are left undetermined, and which are probably new.
- „ *Urei*. Flem. Rare.
- Naticopsis variata*. Phill. Rare. This species is new to our strata.
- „ *tabulata*. Phill. Rare.
- „ *elliptica*. Phill. Rare.

<i>Niso Smithiana</i> .*	J. Young.	Rare; genus new to Carboniferous strata. The specimens shew distinctly the perforated columella.
<i>Pleurotomaria acuta</i> .	Phill.	Rare. This species is new to our strata.
„	<i>Frenoyana</i> . De Kon.	Rare.
„	<i>granulata</i> . De Kon.	Rare; not formerly recorded from our strata.
„	<i>interstitialis</i> . Phill.	Do. do. do.
„	<i>Yvanii</i> . Lév.	Rare; one other small species (common) left undetermined, probably new.
<i>Trochus biserratus</i> .	Phill.	Rather rare.†

HETEROPODA.

<i>Bellerophon Dumontii</i> .	D' Orb.	Rare.
„	<i>decussatus</i> . Flem.	Common; small in size; finely preserved.
„	<i>Urei</i> . Flem.	Do. do. do.
<i>Porcellia armata</i> .	De Verneuil.	Rare; fragment of shell.

CEPHALOPODA.

<i>Orthoceras attenuatum</i> .	Flem.	Rare; generally found in fragments.
„	<i>cinctum</i> . Sow.	Do. do. do.
„	Sp. ?	Rare. A very small, slender species, smooth, with central siphuncle, and perfect to the point of the shell.
<i>Cyrtoceras Gesneri</i> .	Mart.	Rare; a fragment of the shell.

PISCES.

<i>Cochliodus</i> .	Sp. ?	Various fragments of palatal teeth, referable to the genera noted, have been found, as well as various forms of Conodont teeth, and small vertebral bones. These, however, require careful investigation before they can be identified with any of the described forms, as probably many of them are new.
<i>Helodus</i> .	Sp. ?	
<i>Poecilodus</i> .	Sp. ?	

* I have much pleasure in naming this species of *Niso* after Mr. John Smith, the discoverer of the deposit at Glencart, and the following short description will serve to distinguish the species:—

Description—Small, acutely conical; spire composed of from eight to nine smooth flat whorls, suture small, mouth oval, pointed above, outer lip thin, axis of columella perforated. Length, two and a half lines; width of last whorl, one line.

Remarks—Prof. De Koninck has seen specimens of this shell, and is quite satisfied as to the correct identification of the genus, of which only one Carboniferous species is known.

† Several forms of calcareous operculae are found along with the above group of Gasteropoda.

III.—*Notes on the Flora of West Kilbride and Ardrossan.* By Mr. D. A. Boyd.

The botany of the valley of the Clyde has of late years received so much attention, that probably little remains to be done in the way of adding to the list of flowering plants and higher cryptogam which grow in the neighbourhood of Glasgow. The district which lies along the shore of the Firth, between Fairlie and Ardrossan, and which, prior to the opening of the Fairlie railway a few years ago, was comparatively isolated and inaccessible, seems, however, to have been in this respect somewhat neglected. With the exception of the lists compiled by the late Rev. Dr. Landsborough, a well-known Ayrshire botanist, no attempt appears to have been made to preserve a record of the rarer plants which have from time to time been observed in the parishes of West Kilbride and Ardrossan; and as the district is probably known only to a few of the members of the Society, the following notes on its Flora may contain some information which has not hitherto been brought under their notice. The natural conditions of this district, as regards climate and soil, are undoubtedly favourable to the growth of a great variety of plants, especially those of a maritime distribution; and to these conditions a passing reference may be made, as their influence is of considerable importance.

The climate of West Kilbride, especially the portion of the parish which extends along the sea-shore, is very mild; and in winter the frosts are less severe than in inland districts. A range of hills which runs along the line of the coast from above Greenock to Ardrossan, affords considerable protection from east winds. At Seamill, which is one of the mildest spots on the whole coast, several half-hardy shrubs, such as *Escallonia*, grow luxuriantly in the open air. From Ardrossan southwards the country is, for some distance, bleak and unsheltered, and therefore less favourable to plant life.

The soil of the district is on the whole light and sandy, and in favourable seasons the crops come to very early maturity. A portion of both parishes on the eastern side is uncultivated, consisting of hilly moorland. The whole district is well watered by numerous streams which descend from the hills, passing through wooded glens. There are no lochs of any size, although the moors are generally moist and boggy.

On referring to one of the larger maps it will be observed that the coast line consists of a series of sandy bays, of which the most important are Hunterston Bay between Fairlie and Portincross, and Ardnail Bay between Portincross and Seamill. As the prevailing rock is red sandstone, the shore is generally sandy; but where, as is frequently the case, the sandstone is interrupted by trap dykes forming points and promontories which have withstood the action of the sea, the shore is turfy and abounds in salt marshes.

At Fencebay, below Fairlie, a wide expanse of muddy sand is left uncovered at low tide; and here, as observed by Dr. Walker Arnott, *Zostera nana* grows in great abundance, "covering hundreds of acres." At the mouth of the Glen Burn *Petasites vulgaris* grows sparingly under the shade of some alder trees. Although too abundant in the neighbourhood of Glasgow, and indeed common in neighbouring parishes, this plant becomes less frequent towards the sea-shore, as is also the case with *Trollius europaeus*, *Arenaria trinervis*, *Potentilla Fragariastrum*, and several others. A short distance further along the shore *Ranunculus sceleratus* grows plentifully on the wet sand; and on drier spots above high-water mark a few plants may be observed of *Eryngium maritimum*, which is sparingly distributed over this part of the coast. The shore between Hunterston and Portincross is particularly rich in maritime plants, among which are *OEuanthe Lachenalii*, *Salicornia herbacea*, *Suaeda maritima*, *Salsola Kali*, *Scirpus maritimus*, *Blysmus rufus*, and most of the common plants of the sea-shore. In the stagnant pools among the turf towards Portincross *Ranunculus sceleratus* again occurs in abundance and attains a considerable size.

Portincross is a very attractive place on account of its picturesque surroundings and old weather-beaten castle, while to the botanist it is no less interesting as the richest spot in the whole parish. Along the steep wooded bank at the foot of the cliffs will be found *Agrimonia Eupatoria*, *Cotyledon Umbilicus*, *Anagallis tenella*, *Juniperus communis*, *Asplenium marinum*, *Aspidium angulare*, and many plants which are not common in other parts of the district. *Scotopendrium vulgare* is here very luxuriant in the genial shade, its fronds attaining a great length. One or two plants of *Osmunda regalis* formerly grew on this bank but were discovered and carried off by collectors. On the rocks at the iron gate, locally known as "the Throughlet," the beautiful *Geranium sanguineum* grows in abundance with *Silene maritima*, *Ligusticum scoticum*,

Allium vineale, *Arena pubescens*, and *Koeleria cristata*. A short distance beyond Portincross *Spergularia marginata* and *Juncus maritimus* are to be found growing on the edges of some brackish pools.

The sandy shore from Portincross to Seamill yields a large proportion of the common ammophilous plants; and the adjacent sandy fields contain many note-worthy species, among which may be noticed *Teesdalia nudicaulis* and *Ornithopus perpusillus*, which are very abundant in a sandy field directly below Yonderfields farm; *Vicia lathyroides*, which is also common; *Trifolium striatum*, a plant rarely met with in the West of Scotland but which occurs plentifully between Yonderfields and Seamill; and *Scirpus Savi*, which grows on the moist sides of ditches in several places. *Ononis arvensis* and *Scutellaria galericulata* are both found in Ardnail Bay, but seem to be scarce in the district.

At Seamill *Senecio coronopus*, *Teesdalia nudicaulis*, *Trifolium striatum* and *Carum verticillatum* occur; but the latter plant is much more abundant in damp pastures in the upper portion of the parish. *Botrychium Lunaria* makes its appearance every year in a grassy field on the west side of the village. A solitary tuft of *Senecio saracenicus* grows on the side of the Kilbride Burn about half a mile above the village; and at Crosbie Castle, two miles farther up the stream, the wooded banks are white in early spring with the flowers of *Galanthus nivalis*. *Cotyledon Umbilicus* is abundant on the roadside near Tarbert Hill; and *Peplis Portula* occurs sparingly in a small marsh on the east side of the hill. In the wood behind Chapelton Farm *Asplenium marinum* grows on the face of the sandstone rock, and *Aspidium aculeatum* and *A. angulare* in the shade; while in the salt marsh directly below the Farm two rare plants are to be found: *Ruppia costellata*, which is abundant in several of the turfy pools; and *Lepturus filiformis*, which grows near the centre of the marsh. A short distance farther along the shore, *Eryngium maritimum*, one of the most beautiful plants of the sea-side, grows luxuriantly on the dry sand.

From Chapelton to Ardrossan, a distance of three miles, the road runs along the sea-shore, and at Glenfoot the stream which divides the parishes of West Kilbride and Ardrossan is crossed. The banks of this stream for some distance upwards are gay in spring with the flowers of *Narcissus Pseudo-narcissus*, which however is becoming less abundant year by year. *Alyssum calycinum* was

gathered a few years ago in a field at the foot of the road which leads to Montfode Farm. *Senecioia Coronopus* and *Melilotus parviflora* grow on the Inches below Ardrossan Railway Station; and on the rocks at the Castle Hill a few stunted plants of *Asplenium Ruta-muraria*, which is scarce in the district, were observed a few years ago. *Lychnis respertina* grows abundantly on the sides of the Fairlie railway above the junction near Ardrossan Station. *Sedum villosum*, *Hippuris vulgaris*, and one of the *Utriculariæ*, occur sparingly in a marsh at the foot of Knockewart Hill on the east side of the parish, but have not been noticed elsewhere.

The following list contains a summary of the rarer plants which have been recorded as occurring in the Parishes of West Kilbride (including Lesser Cumbrae) and Ardrossan:—

- Ranunculus sceleratus*, L. Shore between Fencebay and Portincross.
Glaucium latum, Scop. "West Kilbride," *Landsborough*: Lesser Cumbrae.
Alyssum calycinum, L. Montfode, Ardrossan.
Camelina sativa, Crantz. Shore at Seamill, &c., occasional; "Ardrossan," *Lands*.
Teesdalia nulticaulis, Br. Seamill; Yonderfields, abundant.
Senecioia Coronopus, Poir. Seamill; Inches, Ardrossan.
Lepidium Smithii, Hook. Yonderfields, West Kilbride.
Lychnis respertina, Sibth. Fairlie Railway near Ardrossan.
Sagina subulata, Wimm. Tarbert Hill, West Kilbride.
Spergularia marginata, Syme. Portincross; Chapelton, West Kilbride.
Hypericum calycinum, L. "West Kilbride," *Lands*.
Lavatera arborea, L. " " "
Malva moschata, L. " " "
Geranium sanguineum, L. Portincross.
Melilotus parviflora, Lam. Inches, Ardrossan.
Trifolium striatum, L. Seamill to Chapelton, abundant.
Ornithopus perpusillus, L. Common.
Vicia sylvatica, L. "West Kilbride," *Lands*.
V. lathyroides, L. Sandy pastures, &c., West Kilbride.
Hippuris vulgaris, L. Marsh at Knockewart Hill, near Ardrossan.
Cotyledon Umbilicus, L. Roadside at Tarbert Hill; Portincross.
Peplis Portula, L. Marsh, east side of Tarbert Hill.
Eryngium maritimum, L. Shore near Fencebay; Chapelton.

- Ciruta rivosa*, L. "Ardrossan," *Lands*.
Carum verticillatum, Koch. Seamill, &c.: "Ardrossan," *Lands*.
Sium latifolium, L. "West Kilbride," *Lands*.
Oenanthe Lachenalii, Gmel. Portincross: Chapelton, &c.:
 "Ardrossan," *Lands*.
Ligusticum scoticum, L. Portincross.
Anthriscus vulgaris, Pers. "West Kilbride," *Lands*.
Dipsacus sylvestris, L. "Ardrossan," "
Anthemis arvensis, L. Montfode, Ardrossan.
Senecio saracenicus, L. Kilbride Burn.
Vaccinium Vitis-Idaea, L. "Ardrossan," *Lands*.
V. Oxycoccos, L. " "
Lycopus europaeus, L. " "
Mertensia maritima, Don. "West Kilbride," *Lands*.
Pinguicula lusitanica, L. " " "Ardrossan," *Lands*.
Lysimachia thyrsoïdica, L. "Ardrossan," *Lands*.
Anagallis tenella, L. Portincross; Yonderfields; "Ardrossan," *Lands*.
Ruppia rostellata, Koch. Chapelton, West Kilbride.
Zostera nana, Roth. Hunterston shore.
Narcissus Pseudo-narcissus, L. Glenhead.
Galanthus nivalis, L. Crosbie woods.
Allium vineale, L. Portincross.
Juncus maritimus, Sm. Portincross.
Blysmus rufus, Link. Fencebay; Portincross.
Scirpus Sarii, Schultes. Yonderfields, West Kilbride.
Carex dioica, L. Common.
C. vesicaria, L. "Ardrossan," *Lands*.
Arena pubescens, L. Portincross; Seamill.
Koeleria cristata, Pers. "
Lepturus filiformis, Trin. Chapelton, West Kilbride.
Hymenophyllum unilaterale, Willd. "West Kilbride," *Lands*.
Asplenium marinum, L. Hunterston: Portincross; Chapelton.
Aspidium angulare, Willd. " " "
Botrychium Lunaria, Sw. Seamill; Ardrossan; Saltcoats.

ABSTRACT STATEMENT OF ACCOUNTS,—SESSION 1880-81.

To Cash in Bank, per last Account,	£56 16 8	By Rent, ... ..	...	...	£5 0 0
„ Cash in Treasurer's hands, per last Account,	0 2 7	„ Postages, Carriages, &c., ... ..	...	...	13 1 1
„ 150 Members' Annual Subscriptions, at 5s.,	37 10 0	„ <i>Proceedings</i> —Paper and Printing, ... ..	...	...	81 18 0
„ 27 New Members' Entry-money, at 10s.,	13 10 0	„ Magazines and Books, ... ..	...	...	4 0 0
„ 4 Members' Arrears, at 5s.,	1 0 0	„ Cash in Bank, per Book,	14 14 2
„ 1 Life Member,	5 5 0	„ Cash in Treasurer's hands,	1 3 7
„ <i>Proceedings</i> , &c., Sold,	3 15 1				
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GLASGOW, 14th October, 1881.—Compared with Vouchers and found correct.

(Signed) ARCHD. ROBERTSON.
J. MANFORD.

PROCEEDINGS

OF THE

NATURAL HISTORY SOCIETY OF GLASGOW.

SESSION 1882-83.

THE THIRTY-FIRST ANNUAL GENERAL MEETING,
SOCIETY'S ROOMS, 207 BATH STREET.

SEPTEMBER 26TH, 1882.

Professor John Young, M.D., F.G.S., President, in the Chair.

The Treasurer submitted his Annual Financial Statement, which shewed a balance in favour of the Society of £54 10s. 1d.

The Secretary read the report of the Council on the business of last session.

REPORT OF THE COUNCIL.

The Council have to report that the number of members added to the roll during last session was as follows:—Honorary members, 2; Corresponding members, 3; Ordinary members, 25. After deductions for deaths, resignations, and removals, the total numbers at present are—Honorary members, 9; Corresponding members, 29; and Ordinary members, 260, or an increase of 13 over last session.

The usual monthly meetings were well attended, the average gathering numbering about 46. The papers read and specimens exhibited were fully up to the average in point of interest.

Early in the session the agreement between the Society and the Town Council, "in regard to the formation and development of collections of plants and invertebrates" to be kept in Kelvingrove Museum, was duly approved of by the Society, and signed on its behalf by the President, Treasurer, and Secretary.

During the session the Society lost by death three of its number among them Dr. Pinkerton, who, although not generally known to the members, having joined during the session, gave promise of good work for the future. Regret has also to be expressed at the death of Dr. Rankin of Carlisle, a corresponding member, who had always taken a warm interest in the welfare of the Society, and had contributed various papers to its Proceedings.

The last sheets of the *Proceedings* for the session 1880-81 are in the press, and it is expected they will be on the table at next meeting.

The meeting of the British Association which was held this year at Southampton was attended by Mr. John Kirsop, F.S.A. Scot., V.P., as a delegate from the Society.

In conclusion, the Council beg to express their warmest thanks to those members who have contributed to the work of the past year, and to express the hope that a like spirit will pervade the session now about to begin.

The Librarian reported:—That during the past winter 71 volumes were issued to members, and during the summer session 98 volumes, or in all, 169 volumes, as compared with 52 issued during the previous session. During the year about 260 volumes, or parts of volumes, were added to the Library, only 25 of which were purchased. The additions this year have been much larger than usual, as some of the arrears due to the Library have been made up, and thanks are due to the donors and to the Societies which have made exchanges. The Committee are pleased to be able to intimate that the Catalogue is now ready for publication and only awaits the sanction of the Council to have it printed. The Library contains 455 bound volumes which are in circulation, besides a large number of valuable works that, owing to their unbound condition, it is not advisable to lend out.

Mr. Robert Turner, Secretary for the Summer Session, read the following

REPORT OF THE SUMMER SESSION 1882.

9TH MAY, 1882.

The first meeting was held in the Society's Rooms this evening—
Mr. Peter Cameron in the Chair.

The evening was entirely devoted to the exhibition of miscellaneous microscopic objects, the instruments and specimens being provided by several members. Mr. Thomas King and Mr. J. C. Christie each exhibited a series of beautiful slides. Mr. P. Cameron shewed numerous examples of insect preparations mounted by himself on a new system, which admits more readily of the slides being kept in entomological cabinets beside the insects to which they relate. Mr. Robert Turner exhibited some slides illustrative of the potato disease. A magnificent collection of rock-sections, prepared by the late Mr. Pratt, attracted much attention. Living objects were shewn by Mr. J. Sommerville—who devoted himself to the exhibition of some of the infusoria—and by Mr. W. Goodwin, who had specimens of *Nitella* in which cell-circulation was going on actively.

23RD MAY, 1882.

Mr. John Broom in the Chair.

Mr. T. Boyle reported that the first excursion of the season had been made on the 6th instant to Possil Marsh, thence along the canal to Cadder Wilderness, and over the Kelvin to Balmore and the Torrance of Campsie. The weather was fine, but considering the mildness of the past winter, it was noted that vegetation was not in a forward state.

Mr. R. Turner reported that the second excursion had been made on the 20th instant to Vaut and Castlecary Glens. The weather was bright and breezy, but the strong east wind was unfavourable for the collection of insects. Among the plants observed were *Paris quadrifolia*, *Polypodium Dryopteris*, *P. Phegopteris*, *Ophioglossum vulgatum*, *Symphytum tuberosum* and *Stellaria nemorum*. Several leaf-fungi were gathered, *OEcidium Violae*, *Uredo confluens*, *Uromyces intrusa*, &c.

Mr. D. A. Boyd read a paper entitled "Notes on the Flora of West Kilbride and Ardrossan," postponed from the April meeting—[See vol. v., part ii., page 241].

Mr. R. Turner read a paper on "The Flora of the Edinburgh district," giving a list of the plants he had found, and referring especially to the striking contrast between the character of this flora and that of Clydesdale.

13TH JUNE, 1882.

Mr. W. J. Milligan, V.-P., in the Chair.

Mr. R. M'Kay reported that an excursion had been made, jointly with the Geological Society, on the 3rd inst., to Benbowie, near Helensburgh. About the base of Benbowie Hill *Trollius europaeus* was observed to be abundant and in full flower, and several species of *Carex* were gathered. *Asplenium viride* was found near the top of the hill, *Valeriana pyrenaica* by the roadside, and the moss *Fortinalis antipyretica* (in a fruiting state) in some pools.

Mr. D. A. Boyd exhibited specimens of *Trifolium striatum* from West Kilbride; Mr. C. Sherry, a fossil ammonite found in the soil of the Royal Botanic Gardens; Mr. P. Ewing, the rare moss *Orthothecium rufescens* from Tyndrum, and *Helleborus viridis* from Newmilns; Mr. Noble, a series of rock-specimens collected by him on the Malvern Hills; and Mr. Gregorson, a very beautiful patch of *Marchantia polymorpha* covered with male receptacles.

Mr. J. Broom gave a geographical sketch of the Avon Valley, Linlithgowshire—a subject possessing a special interest from the fact that the next excursion of the Society was to be made to that district, where a meeting had been arranged with the Edinburgh Naturalists' Field-Club.

Mr. W. Goodwin read a paper on "Diatoms," explaining their structure and life-history.

27TH JUNE, 1882.

Mr. Peter Cameron in the Chair.

Mr. D. A. Boyd reported that an excursion had been made on the 17th instant to Manuel, Linlithgowshire, where the members of the Society had met those of the Edinburgh Naturalists' Field-Club, and proceeded, under the leadership of Mr. J. Broom, to Carrubber Glen. Among the plants observed were *Linaria vulgaris*, *Neottia Nidus-avis*, *Hieracium aurantiacum*, *Geranium lucidum*, *Campanula latifolia*, *Epipactis latifolia*, *Origanum vulgare*, *Geranium sylvaticum*, *Doronicum pardalianches*, *Knautia arvensis*, *Carex sylvatica*, *Melica nutans*, *Melica uniflora*, *Milium effusum*, *Ranunculus auricomus*, *Vicia sylvatica*, *Asplenium Trichomanes*, *Asplenium Ruta-muraria*, *Cystopteris fragilis*, *Astrantia major*,

Aquilegia vulgaris, *Corydalis lutea*, *Chelidonium majus*, and *Chenopodium Bonus-Henricus*. A visit was made to Manuel Mill, where there are some venerable yew-trees of great girth. Mr. J. J. King captured in the burn and milldam at Manuel, among others, the following water-beetles:—*Haliphus ruficollis*, *Brychius elevatus*, *Hyphydrus ovatus*, *Hydroporus inaequalis*, *H. lepidus*, *H. rivialis*, *H. septentrionalis*, *H. Darisi*, *H. depressus*, *H. assimilis*, *H. palustris*, &c.; *Colymbetes bistriatus*; *Ilybius fuliginosus*, *Elmis aeneus*, *E. parallelopipedus*, and *Limnius tuberculatus*. Of water bugs he collected in the milldam, *Corixa Geoffroyi*, *C. praevusta*, *C. striata*, *Velia currens*, &c.

Mr. J. Renwick exhibited *Lepidium Smithii* and *Mimulus luteus* from Skelmorlie; and Mr. C. Sherry, a number of Alpine plants, collected on the hills above Ardlui, Loch Lomond.

Mr. P. Cameron reported that he had recently observed, at Ballantrae, *Vicia sylvatica* and *Echium vulgare*, growing in abundance on the banks of the Stinchar.

An exhibition of microscopic objects, illustrative of Botany, followed. Mr. Goodwin shewed a series of beautifully finished slides of Diatoms, and several living species of *Pleurosigma*, the movements of which were watched with much interest. Messrs. Cameron, Coutts, T. King, and White also exhibited many interesting objects.

1ST AUGUST, 1882.

Mr. John Kirsop, V.-P., in the Chair.

Mr. P. Ewing exhibited some rare mosses and lichens collected on Ben Laiogh; Mr. D. A. Boyd, some interesting flowering plants from Killin; Mr. J. Broom, *Sedum reflexum* from Prestonpans, *Verbascum Thapsus*, and other plants from Manuel, and a curious doubleheaded monstrosity of *Leontodon Taraxacum*; Mr. C. Sherry, some abnormal forms of *Trifolium repens* and *Drosera rotundifolia*. Mr. Thomas King shewed specimens of *Lactuca muralis* from Innellan—the first recorded instance of the occurrence of this plant in the Clyde district; Mr. R. Turner, a series of Swedish plants, rare or unknown in Britain; Mr. J. Coutts, slides of recent polyzoa, beautifully mounted; and Mr. J. Kirsop, a species of cockchafer from Barrhill, Ayrshire.

Mr. P. Cameron delivered an address on "Microscopic manipulation and mounting," in which he gave full instructions as to the instruments required, and the best mode of procedure, with many useful and practical hints as to the preparation, at a small cost, of implements which would serve all ordinary purposes in microscopic dissection and examination. He exhibited a handy form of dissecting microscope which he had constructed at a trifling expense, and which he had found of great service in making preparations of insects.

15TH AUGUST, 1882.

Mr. P. Cameron in the Chair.

Mr. J. Steel reported that the members had made the fifth excursion of the season on the 12th instant, to Bute. Proceeding in a steam-launch from Craigmore, they dredged along the coast for four hours. The day was fair, the weather favourable, and the trip a most enjoyable one; but from a scientific point of view the results were not very satisfactory. Few living molluscs were brought up; but ordinary and brittle starfishes, and sea-urchins were got in considerable abundance. Diatoms were not wanting in the mud, but foraminifera were almost entirely absent. Among the molluscs found were *Scrobicularia prismatica* and *Turritella terebra*.

Mr. D. A. Boyd exhibited a few rare plants collected on the West Kilbride shore of the Firth, below the farm of Chapelton. One of these, *Lepturus filiformis*, was not known to occur in the Clyde district till a few years ago, when it was discovered by one of the members, Mr. Thomas Scott, of Greenock, growing in abundance in salt marshes on the shore above Gourcock; another, *Scirpus Sarii*, though distinctly a West Coast plant, is only very local in its occurrence.

Dr. James Stirton, F.L.S., exhibited a species of lichen, *Stereocaulon*, from the Tararua Mountains in New Zealand. The pale-bluish bodies known as cephalodia, which are seated on its main stem, have so far been a puzzle to scientific men, their exact function in the economy of the plant being unknown, and some even holding the opinion that they are distinct parasitic organisms. He then exhibited a lichen usually classed with the genus

Sphaerophoron, but which, from certain distinct peculiarities, he considered should more properly be ranged under a new sub-genus, and which he had named *Thysanocaudon Pinkertoni*, the specific term being given in honour of the late Dr. Pinkerton, an esteemed member of the Society. On this species, also, pale-bluish cephalodia are observed in great abundance. He then shewed, and described at some length, specimens of all the known kinds of the lichen-family *Sphaerophoron*. One of these, *Sphaerophoron compressum*, is probably the most cosmopolitan of all lichens, being found alike in the Old World and the New, at the Antipodes and at home, on the tops of lofty mountains and at sea-level, in icebound lands and in the tropics. He brought before the meeting examples of this lichen from Dunoon and from New Zealand. He exhibited specimens of *Sphaerophoron australe* from the southern hemisphere, and also from this country, the latter collected by the late Mr. M'Kinlay. In a patch shewn *S. compressum* and *S. australe* were growing together, and from this circumstance, in connection with others, Dr. Stirton said he had come to the conclusion that the latter was not a true species, but merely a form of the other.

Mr. D. Gregorson read an interesting paper on "Ben Ghnuis," Arran. He described its situation and rugged grandeur, and referred to the magnificent prospect to be had in clear weather from its summit. Besides treating the subject from a geological aspect, he made many interesting remarks with regard to the animals and plants observed on the mountain. The Tawny Owl is not uncommon, and is sometimes troublesome and aggressive. The flora includes *Saxifraga stellaris*, *Alchemilla alpina*, and other mountain plants. Both *Drosera rotundifolia* and *Drosera anglica* are found, and he had noted as a curious fact that they did not there grow together, but in separate belts or patches.

Mr. P. Cameron exhibited a collection of insects, arranged on an admirable principle, so as to shew together the food-plant, the larva, the imago, the cocoon, and dissections of the various organs.

29TH AUGUST, 1882.

Mr. John Young, F.G.S., in the Chair.

Mr. Thomas King reported that on Saturday, the 26th, the members had made an excursion to Torrance Glen, East Kilbride.

Circæa luteotiana grew luxuriantly in some parts of the glen. The ripe, ruby-like, somewhat insipid fruit of *Rubus saxatilis* was gathered. *Polypodium Dryopteris* was not uncommon. Among the mosses found was *Hookeria lucens* in fruit. The abundance of agarics and other large fungi drew, however, most attention. Of such plants the following were collected:—*Agaricus vaginatus*, *A. rubescens*, *A. rutilans*, *A. terreus*, *A. laccatus*, *A. epicanthus*, *A. fascicularis*: *Lactarius insulsus*, *L. blennius*, *L. quietus*, *Russula nigricans*, *R. adusta*, *R. heterophylla*, *R. foetens*, *R. emetica*, *R. fellea*, *Cantharellus cibarius*, *Boletus flavus*, *Polyporus botulinus*, *Hydnum repandum*. Several leaf-fungi were observed, *Puccinia Saniculae* being especially plentiful. The Chantarelle and the Hydnum were collected for cooking purposes. Several of the members explained to the meeting the modes of cooking they had adopted, and expressed their satisfaction with the two kinds made use of, as pleasant and wholesome articles of diet.

Mr. T. Boyle exhibited a piece of grey chalk obtained in boring the Channel Tunnel, and containing a profusion of foraminifera. Mr. P. Ewing exhibited a white-flowered form of *Centaurea nigra*, some other abnormal plants, and a curious gall growing on a *Hieracium*, that of an insect of the genus *Aular*. Mr. D. Gregorson shewed specimens of *Carduus acanthoides* from Scotstoun; and Mr. Thomas King, a series of rare mosses which he had collected on the Ochils, on the 22nd of August, including *Leskea rufescens*, *Encalypta ciliata*, *Bryum julaceum*, and *Diphyscium foliosum*.

Mr. Thomas King read a paper on the Equisetaceae. He explained their structure and the morphological significance of the different parts, and described the way in which the branches are disposed in whorls at the nodes. The sheath is generally considered as being formed of leaves united at their base, but Sachs regards it as simply a leaf-sheath toothed at its margin. He described very fully the internal structure of the stem, and referred to the fossil representatives of the family.

In the discussion that followed, the Chairman, Mr. Young, described some interesting fossils lately discovered in Liddesdale, which are considered to belong to the same group of plants.

Mr. R. Turner read a paper on "Spring Rambles in Sussex." He described the Chalk formation as observed at Lewes, and entered more fully into the geological features of the cliffs at Hastings, which belong to the Wealden series, exhibiting fossils and rock-

specimens from the district. He also spoke of the early spring flora of Sussex, shewing specimens which he had collected there of some plants unknown in Scotland.

SEPTEMBER 12TH, 1882.

Mr. Peter Cameron in the Chair.

Mr. Thomas King reported that the members had made an excursion to Troon on the preceding Saturday, and the profusion of rare plants found had been a sufficient reward of their journey. Most of these were introduced plants, growing on the ballast heaps; but some were undoubted natives. The resemblance of the flora to that of similar places on the East Coast is very striking. The following list will prove what a rich field Troon is:—

Ranunculus sceleratus, *Cakile maritima* (specimens of extraordinary size), *Diplotaxis muralis* (plentiful—not given in Henedy's "Flora") *Lepidium Draba* (not in Henedy's "Flora"—seems to be spreading in Scotland), *Senecio coronopus* ("very rare"—Henedy), *Senecio didyma* (not in Henedy's "Flora," and not mentioned by Hooker as occurring in Scotland; a native of South America), *Sagina maritima*, *Spergularia rubra*, *Malva rotundifolia*, *Erodium cicutarium*, *Vicia hybrida*, *Potentilla reptans*, *Ligusticum scoticum*, *Carduus tenuiflorus* ("very rare"—Henedy), *Convolvulus arvensis* (plentiful, "very rare"—Henedy), *Lycopsis arvensis* (a weed in station garden), *Anagallis caerulea*, *Atriplex Babingtoni*, *Salsola Kali*, *Polygonum Raii* (plentiful), *Phalaris Canariensis* (not native), *Poa rigida* (not given in Henedy's "Flora"), *Hordeum murinum* (plentiful by wayside—not given in Henedy's "Flora"), *Psamma arenaria*. Of molluses, *Bulinus acutus* was very common on the sandhills, and *Helix caperata* was found in abundance and in very fine condition.

An exhibition of microscopic objects, illustrative of zoology, followed. Mr. Sommerville and Mr. Goodwin shewed living objects, while several other members had some beautiful slides on exhibition.

23RD SEPTEMBER, 1882.

The last excursion of the season was made this day to the Bridge of Weir. The weather was unfavourable, and after a few hours

spent in the woods, during which many fungi and mosses were gathered, the members took tea in the Ranfurly Hotel.

During the summer session there was a good attendance at both meetings and excursions. The largest attendance on any evening was about fifty, the lowest nineteen, the average of the eight meetings being 30 members.

Mr. Peter Cameron, Convener of the Museum Committee, reported as follows:—

The Committee are not yet in a position to announce that any material has been placed in the custody of Mr. Paton and his assistant Mr. Campbell, as it was considered best not to hand over specimens to the Museum until a fairly representative collection was brought together. Considerable progress has, however, been made in arranging specimens in various branches; and it is expected that before the New Year more or less extensive collections will be fully mounted, named, and catalogued. In Mosses the work is so far advanced that the specimens only require cataloguing, so that by November the Committee hope to deposit in the Museum a collection which will be fairly complete as regards the British species, and which will contain the greater part of the Scottish Mosses. The Committee have also to report that the botanical members arranged, and to some extent, critically examined, two Cabinets of plants which belonged to the old Botanical Society of Glasgow, and which now form part of the Kelvingrove Museum collections, having been presented to that institution by the few surviving members of the above-named Society.

The reports were all unanimously approved of.

The Chairman, Professor Young, before retiring from office, gave a short address on the Progress of Zoology in Scotland.

The following Office-Bearers for the session were then elected:—
 President, John A. Harvie-Brown, F.Z.S., F.R.S.E. &c.; Vice-Presidents, John Kirsop, F.S.A. Scot.; Professor John Cleland, M.D., F.R.S.; and Robert Mason; Secretary, John M. Campbell; Treasurer, Robert J. Bennett; Librarian, J. J. F. X. King; members of Council, John Young, F.G.S.; Thomas King, Robert Turner, George J. Combe, Peter Cameron, M. C. Duff, J. B. Murdoch, F.S.A. Scot., Richard Mackay, and Peter Ewing.

Mr. Peter Cameron read a note of alterations, proposed by him, in the Society's Rules. These were unanimously remitted to the Council for consideration and to be reported on at a future meeting.

OCTOBER 31ST, 1882.

Mr. John A. Harvie-Brown, F.R.S.E., F.Z.S., M.B.O.U., President, in the Chair.

The following were elected ordinary members of the Society:—
 Dr. Alexander Hamilton Howe, F.R.A.S., &c., Hullerhirst, Stevenston;
 John Brand, 6 Gayfield Street; George G. Mackenzie, 111 Cathcart
 Road; James Noble, 29 Stanley Street; Miss Adelaide Broadhurst,
 Park School, Lynedoch Street; and Miss Josephine M'Kean, Park
 School, Lynedoch Street.

The Chairman then gave the following address:—

ADDRESS BY MR. JOHN A. HARVIE-BROWN, F.R.S.E., F.Z.S.,
 M.B.O.U., PRESIDENT.

Gentlemen,—My first pleasing duty is to thank you cordially for the honour you have just conferred upon me by electing me your President. My second, in accepting the honour, is to express the hope that I may be able to carry out the Presidential duties to your satisfaction, though I had honestly hoped that some other member of our Society, with more general natural history tastes and less marked specialities than I possess, would have been proposed and elected to the honourable position.

I propose to-night to glance at the work done by our Society during the past two sessions, 1880-81, and 1881-82. Necessarily I must limit this part of my address to an almost bare enumeration of the titles of papers. Thereafter I propose to throw out some hints for consideration regarding future work, indicating certain headings in vertebrata as worthy of attention.

At the meeting in October, 1880, Mr. Peter Cameron read a paper on "A Simple Method of Mounting Objects for Microscopic Examination," and Mr. Mahony contributed an interesting paper "On Shell Mounds in the North of Ireland." At this meeting Mr. Thomas King read a record of the proceedings of the summer session just concluded, shewing the work done at the various

meetings and excursions of the season—chiefly botanical—and giving summaries of the various papers read.

At the second meeting, also in October, Mr. R. J. Bennett gave us his annual "Apiarian Notes," for 1880, and Mr. A. S. Wilson read a paper "On Mimicry, or Protective Resemblances among Animals," a subject of vast interest, as has been abundantly shewn by the writings of the greatest naturalist of the age—the late Dr. Charles Darwin.

At the November meeting, Mr. C. W. Arnott Stewart contributed an interesting account of the habits of the Australian Lyre-bird. Prof. J. Cleland described a collection of Human Skulls from Calcutta, while our valued Secretary, Mr. J. M. Campbell, gave us a record of the occurrence of the White-beaked Dolphin, near the Bell Rock, in September, 1880.

At the December meeting, the exhibition of the Indian Human Skulls at the previous meeting was now supplemented by an elaborate paper on the subject by Prof. Cleland.

At the January (1881) meeting, Mr. John Young read a paper upon the genus *Synoeclesia*, a Carboniferous polyzoon, and described a new species; Mr. D. McLellan gave us his Annual Report on the state of the Public Parks, with Meteorological Observations for 1880; and Mr. Thomas King gave a practical exposition of the Structure of an Orange. Mr. Thomas Southwell, F.Z.S., corresponding member, contributed a paper "On the Natural History of the Cetacea," while I, myself, read "Ornithological Notes for 1880-81."

At the February Meeting, Mr. T. Southwell gave us a record of the occurrence of the Atlantic Right-Whale on the east coast of Scotland.

At the March meeting the papers read were "On some of the rarer plants found in the neighbourhood of Greenock," by Mr. Thos. Scott; "A contribution to the study of the British Carboniferous Chitonidae," by our valued corresponding member, Mr. Robert Etheridge, jun., and an amusing essay, "On the Study of Ornithology," by Mr. James C. Christie, which gave occasion for a somewhat animated discussion on cruelty to animals.

At the last meeting of this, the thirtieth session, in April, papers read were "On St. Abbs Head and its Bird Life," by myself; "On the Birds of the East of Sutherland," by our newly-elected Life Member, and well-known ornithologist—Mr. T. E. Buckley; and "On the Mammalia of North-west Perthshire," by Mr. Wm. Horn.

At the first meeting of the 31st session, in September, 1881, Mr. R. J. Bennett read his "Apiarian Report" for 1881, and Mr. Thomas King read a paper on the cultivation of the Potato in its native country, Chilé. The report of the summer session was submitted by Mr. R. Turner, and our thanks are due to him for the careful and elaborate way in which he has drawn it out. It refers chiefly to botanical discoveries and records of excursions, and contains abstracts of the papers read.

At the October meeting, our valued late President—Dr. John Young—delivered an able address upon "The Relations of Natural History to Medicine."

The papers read at the November meeting were Mr. J. M. Campbell's "Notes on a short Sun Fish," caught in the Firth of Clyde; and Prof. Cleland's "On the Viscera of the Porpoise and White-beaked Dolphin."

At the December meeting I gave a locally descriptive paper on "The Islands and Rocks of Haskein, and their Bird Life," while Mr. Campbell read "Remarks on Method in Collecting Natural History Specimens."

At the January (1882) meeting, of papers read there were Mr. D. McLellan's "Meteorological Notes for 1881, and remarks on the Vegetation of the Parks;" "Ornithological Notes from the Loch Lomond district for 1881," by Mr. James Lumsden; and "On the Flannan Isles and their Bird Life," by myself.

At the February meeting Mr. Thomas Southwell, F.Z.S., of Norwich, corresponding member, contributed a paper "On the Seal and Whale-fishery of 1881," and Mr. Thomas Scott, "Notes on *Goniocypris nitra*."

At the March meeting Mr. W. Horn read "Additional Notes on the Birds of the North-west of Perthshire."

At the concluding meeting of the 31st session, in April, Mr. W. Horn gave a paper on the "Mammalia of Buchan;" Mr. J. Young, "Notes on the Fossils found in a thin bed of impure Limestone, at Glencart, near Dalry;" and Mr. D. A. Boyd, "Notes on the Flora of West Kilbride and Ardrossan."

Besides the papers enumerated, there were, at each meeting, numerous exhibitions of specimens, many of exceeding interest and value, and frequently introduced by notes which, though not so characterized, might, with all propriety, have been described as "papers." These, as well as the papers I have mentioned, ranged

over many branches of natural history, mammalian, ornithological, ichthyological, reptilian, entomological, palaeontological and botanical, and shew the wideness of the field over which our members are at work.

I may now be allowed to indicate what may be admitted as part of our legitimate future work, restricting, however, my remarks to one branch of the vertebrates which appears to me to be that most deserving of attention, and, at the same time, the least attended to.

I think there can be little doubt amongst naturalists that of all the divisions of the vertebrata, Fish are at present the most deserving of special study. A much larger field is here opened to scientific workers, and also to field naturalists, than in any other division of the animal kingdom, while, perhaps, less is known about fish, even of our fresh-water species, than about the members of any other group.

I have myself paid some attention to our *Salmonidae*, more especially during the past two seasons, and have realized what an immense field remains fallow and unworked. Vast strides, it is true, have been made in our knowledge of the salmon and common trout, and many other species, both from an economical and from a scientific standpoint; witness the successful labours of Sir J. G. Maitland at the Howietoun Fisheries, and those of other breeding establishments, and the scientific work of Dr. Francis Day, Dr. Günther, and others. Witness, also, the importance attached now-a-days to exhibitions illustrative of everything connected with fish and fisheries; such as the Norfolk and the Edinburgh Exhibitions *have* been, and the Great International Fisheries Exhibition of London *will* be in 1883.

I have a hope, therefore, that what I am about to lay before you may sufficiently interest some of our members so as to set them thinking and working, both in the field and in the study, to do something in this fertile field of enquiry and to keep moving with the times. Although I had some idea of many of the questions respecting fish and fisheries still awaiting solution, yet I have not trusted myself to speak as one having authority, and I therefore asked my friend, Dr. Francis Day, of Cheltenham, to roughly sketch out the more salient points. The following notes are therefore mainly his; and the thanks of our members are due to him for the hints which, I trust, will prove

valuable starting points, and will be quickly and promptly taken up by such of our workers as can find time and opportunity to follow them up.

Amongst subjects almost too numerous to include or catalogue, relating to the Natural History of Fish, and which still require attention, the following are perhaps somewhat prominent:—

a. Local Lists—care being taken to distinguish the species, and to append the vernacular name or names. If more names than one are known the reasons of the difference should be indicated, and whether they are due to age, size, colour, sex, season, &c. Thus in *Salmo salar*—our common salmon—we find various names at different ages and seasons, and these varying at different localities and on different rivers; and it is desirable to collect lists of names in order to clear up much still-existing confusion. We find varieties of trout also in certain localities bearing distinctive local names, such as the “Fossac” of the west coast of Sutherland, a trout which has betaken itself to the tidal waters and the mouths of rivers. Much might be learned too, I believe, from the Gaelic names of British fishes, if such could be collected by a Gaelic scholar. The English Dialect Society are at present preparing a glossary of fish names. Could we not have a Gaelic one?

b. The Breeding of Fish.—Where are the eggs of each species deposited? Under gravel (ex. salmon), in strings (ex. perch), in mud (? carp and roach), in nests (ex. stickleback), attached to the valves of dead shells (ex. lepidogaster), floating on the sea (ex. cod), &c., &c.

c. The Number of Eggs deposited by each species, and whether dependent on size, or age of fish; at what season they are deposited.—I may state here that in a certain inaccessible loch in Sutherlandshire, I have killed trout in June and July full of highly-developed ova, and these were far from uncommon. The loch is directly fed from streams containing much melted snow in most seasons, and after severe winters—such as 1879-80, and 1880-81—large masses of snow lie unmelted, or slowly melting through, or far into, the summer. Have the ova been retarded in their development in these trout by the temperature? Hence arise the queries—How long do eggs of various species remain prior to hatching? What are the effects of temperature, and of accidents to the fish, on their hatching powers? What are the effects of changes of water, either as to quality, depth, &c.? What are the results of rapid vicissi-

tudes of temperature? Our ignorance of these matters is still profound.

d. Enumerate the Enemies to Fish Eggs. Do they consume them, injure them, poison them (as in the case of pollution)? Do injuries to the embryo, or accidents at the time of fecundation, have any effects, and, if so, what are they?—During the past year or two I have collected a good many deformed trout, keeping them in spirits. In one loch in Islay occur the deformed trout usually known as *tailless trout of Islay*. All the trout in this loch possess this peculiarity, which is simply an anchylosing or welding together of the tail-rays, and has been anatomically treated of by Dr. Traquair of Edinburgh.* In another loch, in Kirkeudbright, exactly the same deformity occurs. Both these lochs are about 1600 feet above the sea, and cannot be subject to any pollution. In a stream in Lanarkshire again, the same deformity occurs, and is extended to the back fin. This stream runs directly from numerous lead mines, and the trout grow fat and rich in flavour. This is suggestive of arsenic poisoning. In the river Carron this deformity has begun to appear—or a modified form of it—within the last few years, or if it existed prior to this has only lately assumed noticeable proportions. The Carron is much polluted by paper mill refuse—esparto grass, and chemicals.

e. Is the Distribution of Fish affected by mammals or birds carrying fertilised ova from one locality to another?—Thus a trout might swallow fertilized salmon or trout eggs, and a bird of prey might catch this trout and carry it to some secluded tarn, loch, or stream, to prey upon it; and if the fertilized ova fell into the water, might not the young fish be born and populate the water previously barren? So, perhaps, might ova be carried in the fur of water-animals. May not the land-locked true salmon found in certain lochs of New Brunswick—*Salmo gloveri*—have been thus introduced? In this place I may instance the very rapid increase that is possible in lochs and streams which have become stocked with trout for the first time, having had considerable experience of this, by personal experiments in Sutherland. In 1878 our angling party stocked a chain of barren lochs with about 6 or 8 dozen small burn trout. The following year the burn connecting these lochs swarmed with the fry. Trout grew from $\frac{1}{4}$ lb. to 1 lb. the first

* Proc. Royal Phys. Soc. Edin.

year, and up to $4\frac{1}{4}$ lbs. the second year. By 1882, these lochs all abounded with trout, but so small as to be not worth catching. The original food supply was marvellously plentiful, tadpoles and fresh-water shrimps abounding, hence the rapid growth. The spawning ground was equally fine and extensive, hence, assisted by the absence of natural enemies, came the increase in numbers; and hence also the reaction, the too rapid increase of the fish, and rapid deterioration in size, from the consequent decrease of food. Another loch we stocked had poor spawning ground, but a fine extent of good feeding. Here, between 1878 and 1882, trout grew from $\frac{1}{4}$ lb. to $4\frac{1}{2}$ lbs., or larger, whilst a fair average is still maintained—viz., about $\frac{1}{2}$ lb.

In a loch near Durness, where formerly there were no fish,—situated at the head of the burn which finally falls down into the dark depths of the Smoo Cave, which was fishless above the fall, but contained trout below it and in the cave, and in the stream of 30 or 40 yards between it and the sea,—there are now abundance in both loch and burn. This year I got 29 trout, $7\frac{3}{4}$ lbs., out of burn and loch together. Six trout were caught about 6 years ago below the fall, carried up and placed in the burn, by a native—Mr. MacNeil Campbell, of Smoo. The crofters, while working at their peats, have seen the fish rising on the loch; but the above basket was the first ever taken out by anybody. I may have more to say upon this subject at another time, and there are some curious facts relating to peculiar coloration which are deserving of special treatment. One more instance I will relate. Our party stocked the upper water of a limestone burn, formerly fishless, above a certain fall, by putting in about a dozen trout from below the fall. This was in 1880. In 1882 they had become fairly plentiful, and reached a fair average size, but did not grow so rapidly as others introduced to larger sheets of still water. This experiment appears to me to have a bearing upon a question, as to relative growth of fish in rapidly running water, and in still dead reaches, ponds, or lochs. The feeding in this case was undeniable, and quite equal to that in some of the lochs referred to above.

f. Observations upon Fish Life-history, and the changes from the period of their birth to that of maturity.—In other words, the history of the development of each species.

g. Observations upon Fish kept in Aquaria, rate of growth, variations caused by changes to distant localities (as trout to the

Antipodes).—I can instance the almost marvellous change upon trout taken from a peaty burn and put in water coming from granite and limestone, and the silvery beauty of the trout of Loch Crasspul, near Durness, where the water is blue, and the bottom pure white sand. The results of fish being kept in large and small pieces of water should be noted; effects of running streams through fish-ponds upon the rapidity of growth; the fecundity or sterility of fish in ponds; observations on transport of living fish. On this I may remark how invaluable is a piece of water-weed taken from the place minnows are caught, and placed in the minnow can, and how unnecessary and often deleterious it is to change the water if the weed is used. I have kept minnows alive for weeks and months in aquaria, never changing the water. I have carried minnows north, and kept them alive for 10 days in an ordinary minnow-case. Ten thousand young fish came alive to the Edinburgh Fishery Exhibition from Russia.

h. The Migrations of Fish, more especially of marine forms, whether diurnal, seasonal, or for breeding purposes; whether due to atmospheric changes, or consequent upon presence of food, &c.

i. The Food of Fish.—All fish should be opened to find what they have been feeding upon, some being carnivorous, others herbivorous.—But feeding often changes, and is due to circumstances. Some fish feed at the bottom, some at midwater, some at the top. Here is a large field of observation for the angler-naturalist.

Besides the above there are innumerable headings, a few of which only can be mentioned here. Some of these are:—How do fish live below ice? The effects of sound and of electricity upon fish; tenacity of life in certain forms; insensibility to pain; recovery from injuries; attraction by light; production of sounds; affection by extremes of cold and heat, and the nature of their suspended animation.

The vastness of the material for the study of the British Fishes alone is, it will thus be seen, a rich field in itself, to the exclusion of all the other vertebrates. I had hoped to have found space to speak of the Reptilia and Mammalia, but must leave these groups out for the present. Ornithology I have not touched upon, because it is my own speciality, and you may perhaps hear more about it at some other time.

In conclusion, I may again impress upon you my belief that

Ichthyology is undoubtedly the branch most clamant for attention at present. With Dr. Francis Day's assistance I have endeavoured to give you new fields to conquer, new steps in the ladder of science to surmount, and have called your attention to what and where to observe, and how to record some unravelled points in this field, and I hope some fruit may be borne in the future from these young shoots, to our own profit and to the advantage of the Society.

Mr. W. Craibe Angus exhibited a very fine specimen of the Pine Marten, *Martes sylvestris*, Nilsson, killed near Arrochar, on which he made the following remarks:—

I am indebted to Mr. MacCulloch for the opportunity of shewing in the flesh this very beautiful example of the *Martes foina* of MacGillivray, which may be regarded as one of the rarest of British mammals. It was received by Mr. MacCulloch from Mr. Glen, of Stronafyne, Arrochar, from whom I have the following notes on its capture:—

On a morning in December 1882, while Mr. Glen was on his rounds in Glenloin, at the head of Loch Long, attended by his shepherds and their helps, he was startled by the barking of the dogs, which were struggling to get under a pile of branches and rubbish in proximity to a cairn much frequented by foxes and swarming with rabbits. On their approach, the Marten was discovered boldly facing the dogs, and making a snarling, hissing noise. While thus engaged, one of the shepherds felled it by a blow on the head with his staff.

Some thirty years ago, another example was killed by a fox-hunter on Saccoth, the farm adjoining Stronafyne. My informant states that before leaving last spring he observed tracks or foot-marks, which an examination of the well-rounded foot of the Marten enabled him to identify. He is therefore of opinion that these animals still exist in the locality, and that the cairn referred to was a breeding place of the species last season. It is gratifying to add that he has heard of no depredations of the Marten among domestic animals, so that here at least there can be no reasonable excuse for its extermination.

The present specimen is a male, which, I think, has been bred this year. Its length is 19 inches, and the tail measures 10 inches, with the fur extending $4\frac{1}{2}$ inches beyond the point. The teeth

are pure white, and the claws sharp and not worn as I have seen them in adults.

This mammal is of great elegance and beauty. When in action its movements are so rapid that motion alone is visible, the form not being distinguishable. It is a swift runner, a good swimmer, and can spring a great distance. An old keeper in Mar forest informed me that he had often seen the Marten swim across the Dee and return with rabbits to its young, but that it crossed the mountain streams at a bound.

In repose, the great beauty of the species consists in the relation of its bushy tail to the length of the legs. The hind legs are $3\frac{1}{2}$ inches longer than the fore, and the tail, including the fur, about 4 inches longer than the hind legs. The head is triangular, and the nose protrudes considerably beyond the lips. The head and fore parts would look weak, if not insignificant, but for the colouring of the throat. In the example before us, which does not differ greatly from four others from Aberdeenshire which I have examined in the flesh, the throat is of a rich orange yellow brown, harmoniously blending with the flesh tints of the lips and inner surface of the ears; and this, I am satisfied, is in part effected by a change of colour, and not wholly by a change of fur. The change is here almost complete, but the throat being dotted with greyish brown—the colour in the cub state—it is sufficiently incomplete to shew the transition. The colouring is richest in midwinter, and then in some measure resembles the colouring of the breast of the Merganser. In examples killed in summer I have seen the throat faded to a dry silvery white; while two adults, killed in winter, had the teeth broken and irregular, and the throat colouring silvery brown, thus corresponding with the description of the Buck Marten of British authors.

I am satisfied that these variations, considerable though they be, depend upon the season, and the age of the individual; also that they are not greater than in the fox, and other mammals that might be named; and that the Pine and Beech Marten are the same species. This opinion has been confirmed by a litter of cubs I saw in Glentanner, in which the throat was hardly lighter than the general colouring of the body.

The outer fur, which is of considerable length and of a deep lustrous brown, is lighter on the line of the back and crown of the head, and becomes darker towards the nostrils. The legs, tail, and

lower parts are darkest, and the general variation is chiefly produced by shadows. The inner fur is short, thick, and of a greyish tint at the roots.

The stomach of the Arrochar specimen contained flesh, but this was so far digested that it could not be identified. The Mar forest keeper, already referred to, kept a Marten in confinement, and fed it chiefly on porridge and milk. It was easily tamed and became very affectionate.

Mr. James Steel exhibited specimens of *Succinea oblonga*, Drap., obtained plentifully on heaps of limestone shale at Auchenskeith, Dalry, in July 1880, and on these he made the following remarks:—

The day was very hot, the sun beating on the heaps with uninterrupted vigour from morning till night; and it surprised me very much to see such small animals alive and in good health under such conditions, there being no moisture nearer them than the Dusk Water, fully a quarter of a mile off. This locality is of some interest, as the general habitat given is “dry ditches near the sea-coast;” and Dr. Jeffreys says,* “Mr. Waller discovered this shell among turf-bogs at Finnoe, Co. Tipperary,” but mentions no other inland locality. The only Scotch locality, where the species is said to have been found by Mr. Kenyon, is indefinitely stated as “near Glasgow,” there being no date. Dr. Jeffreys also states that this shell is very local in England.

Mr. John Kirsop, F.S.A. Scot., exhibited a small collection of recent Gasteropod shells, including specimens belonging to the allied genera *Patella*, *Fissurella*, *Parmophorus*, *Calyptraea*, *Crepidula*, *Pileopsis*, *Hipponyx*, *Chiton*, *Chitonellus*, *Dentalium*, &c. Mr. John Young, F.G.S., described the geological range of these molluscs, and referred to the occurrence of several of the genera in the carboniferous limestone strata around Glasgow.

The Secretary (Mr. J. M. Campbell) exhibited specimens of the European Pond Tortoise, *Emys Europaea*, Schn., from Prussia; Eggs of Ringed Snake, *Natrix torquata*, Ray; and Epiphragm of Roman Snail, *Helix pomatia*, L., on all of which he made some remarks.

Mr. J. C. Dougall exhibited a fine specimen of the Golden Eagle, *Aquila chrysaëtus*, L., killed at Strachur, Loch Fyne, on 27th September last.

Mr. Robert Mason read some notes on *Anacharis alsinastrum*. This plant, which was introduced from America, has spread very

* “British Conchology,” vol. i., p. 155.

rapidly over all the country. Mr. Mason described the methods by which its distribution might be effected, and gave instances of the annoyance caused by the rapid growth of the weed, choking up what might otherwise be open pools or lakes; and in the course of his remarks he referred to the operations at present going on for its removal from Hogganfield Loch, near Glasgow.

28TH NOVEMBER, 1882.

Professor John Cleland, M.D., F.R.S., Vice-President, in the chair.

The following gentlemen were elected Ordinary Members of the Society:—Messrs. Seton M. Thomson, Kinnaird House, Stirlingshire; James Brown, Bendarroch, Garelochhead; John Rhind, 82 Hill Street, Garnethill; William Buchanan, 34 Steeple Street, Kilbarchan; and George Douglas Gordon, 394 Duke Street.

Mr. David Robertson, F.L.S., F.G.S., exhibited some *Foraminifera*, new to Britain. Mr. Robertson stated that in looking over some of his old mountings of *Foraminifera* he had found a few which, from various causes, had not been determined. By the kind assistance of Mr. H. B. Brady, F.R.S., he was now able to exhibit the following species, all of which were new to Britain:—

<i>Miliolina contorta</i> , D'Orb.	<i>L. aperta</i> , Sequenza.
<i>M. Auberiana</i> , D'Orb.	<i>Polymorphina sororia</i> , var.
<i>M. venusta</i> , Reuss.	<i>cuspidata</i> .
<i>M. labiosa</i> , D'Orb.	<i>P. rotundata</i> , Borneman.
<i>Lagena Rizzae</i> , Sequenza.	<i>P. lanceolata</i> , Reuss.

The Chairman exhibited as specimens of *spina bifida*, illustrating laws of growth, the skulls and vertebral columns of three newly-born infants. After explaining fully the causes which had led to the divergence in the specimens from the normal character, he remarked that there were always two factors in growth: first, the influence which is internal and transmitted by heredity; and secondly, the influence of external surroundings, sometimes of an accidental description, yet very constant in action.

Mr. John Young, F.G.S., exhibited a large and finely preserved specimen of a recent Echinoderm, allied to *Echinometra*. The specimen, which had been taken in the Red Sea, measured ten inches in diameter across the spines. Mr. Young stated that it had recently been presented to the Hunterian Museum.

PAPERS READ.

I.—*Apiarian Notes in Argyllshire in 1882.*

By Mr. Robert J. Bennett.

In this paper the author, after referring to the past season, commented on the qualities of the recently introduced Cyprian bees, which he hoped would improve the stocks in this country. He then gave a detailed account of the work done by the bees during the past summer, and in conclusion strongly condemned the practice carried on by some unscrupulous bee-keepers of adulterating the honey with sugar.

II.—*Experiments with Chilian Seed-Potatoes.*

By Mr. Thomas King.

Last year I read before the Society a paper by Mr. John King, Corresponding Member, residing in Chile, entitled "The cultivation of the Potato in its Native Country." In that paper the writer clearly shewed that the potato disease has never been known in Chile. This naturally gives rise to the question—Why is the disease present here and absent there? Two answers may be given to this question: first, the potato disease fungus, *Peronospora infestans*, has never been introduced into Chile, and so the potatoes there have had no opportunity of becoming diseased; or second, the potatoes, if attacked by the disease in that country, are able to resist it. As bearing on the first alternative, I will read the following extract from the *Gardeners' Chronicle*:—"The exotic origin of the fungus which destroys our potatoes has never been doubted, and all known facts point to the neighbourhood of Peru as its home. The potato fungus attacks other Peruvian and Chilian plants, such as the tomato, the petunia, and the schizanthus." If this be so, we must adopt the second alternative, namely, that Chilian potato plants, though attacked by the disease, do not fall victims to it. Taking this for granted, we may now ask—Why do Chilian potatoes possess a disease-resisting power which European potatoes do not? That is a question which has not yet been satisfactorily answered; but before making the experiments I am about to describe, I was of opinion that the true cause was to be found in the difference between the methods of cultivation pursued in

Britain and Chile respectively. Speaking generally, in Chile the potatoes are planted whole and a considerable distance apart. They are not heavily manured, and are carefully dried in the sun before being stored for the winter. Under this treatment they have continued quite healthy up to the present time. As regards their treatment in Britain, I was of opinion that our modes of cultivation and storing, continued through many years, had so enfeebled the constitution of the potato plant as to render it an easy prey to the potato-disease fungus. I therefore thought that if we were to get some perfectly sound tubers from Chile, they would produce a disease-resisting crop here; and, accordingly, I wrote to my brother a year ago, asking him to send me some potatoes—not wild ones, but a good cultivated variety. Now, as Chile extends a great distance north and south, it has many different climates. I therefore obtained the seed-potatoes from Llanquehue, in the south, where the climate somewhat resembles our own. In the southern hemisphere, however, the seasons do not occur at the same time as with us; and at Llanquehue potatoes are dug in the month of May, while here they are only planted in March or April. The seed-potatoes were not therefore obtained in the best condition, as they had to be taken up when half grown, and after all they arrived here too late. They were small red potatoes—some round, others long, many rather unshapely, but all quite free from disease, and very clean as if grown in a loose soil. No name was sent with them; but I believe they were of the variety called “Borajilla,” or borage-leaved.

Some of my acquaintances, living in the country, kindly planted small quantities, and reported on them at the end of the season. Some were put into the ground during the second half of May, and others not till the beginning of June, so that they cannot be regarded as having had a good chance. They grew luxuriantly, however, producing great tall stems with broad flat leaves. One terminal leaflet I measured was eight inches long by six broad.

I will now give some details regarding the different lots. I had received about twenty-four stones altogether; and of these Mr. Robert Howie, farmer, Netherauldhouse, Pollokshaws, planted ten stones. The ground—the common clay soil of the district—had been intended for cabbages, and was already drilled up in twenty-eight inch drills. The potatoes were planted whole, and at a distance of fourteen inches apart. They grew vigorously both above

and below ground. The drills, however, were too narrow, as the underground shoots came through the sides into the furrows between. The summer proved very unfavourable to the potato crop; and in the month of July I was disappointed to see, even on the leaves of the Chilians, the peculiar flocculence of the *Peronospora infestans*. As to the yield of these ten stones, it is very small, being about two and a half bags of fairly good potatoes, and half a bag of diseased ones.

A stone of the seed was sent to Mr. Robertson, Dublin, a gentleman who has taken much interest in the cultivation of the potato; and now, at the end of the season, he writes:—"The Chilian potatoes have turned out an entire failure, and they have done the same with a neighbour of mine."

Mr. William Lindsay, Farmer, Craighends, Fenwick, planted a stone on peaty ground that had not been cropped within the memory of man. They sent up strong, rank stems, with great broad leaves; but, when the shaws were at their best, a storm of wind came on which broke them down. Mr. Lindsay writes that, leaving out the tubers too small to plant next year, the crop is about equal to the seed.

I also sent some to my brother, Mr. Robert King, Wolverton, Buckinghamshire, and he gave them to friends. He writes that the weight of the crop is about twice that of the seed; and that the potatoes are small, have rather deep eyes, are of a pretty, clear, pinkish red colour, and are quite free from disease. He adds:—"All say they have not had a fair chance, as they were planted too late, and being late had not well-selected ground."

Mr. John Barbour, Farmer, Risk, Lochwinnoch, planted whole about a stone and a half on good soil of a somewhat peaty nature. The crows took away some of the seed, but the yield is about seven stones. The tubers are very pretty, but soft and small, the largest being about seven inches in circumference. In an unpicked sample of a hundred I counted only seven diseased ones. Other small quantities planted around Glasgow have given similar results.

As a consequence of these experiments, I feel less certain than I did a year ago either as to the cause or the cure of the potato disease; but I am now satisfied that we cannot expect to get rid of it by the simple expedient of importing sound seed. We must not, however, consider the trials as finished till next autumn, at the earliest; for, as we have seen, the seed was planted six weeks too late and dug

before it was ripe. This, together with the unfavourable weather, may have lowered the vitality of the plants, and so have predisposed them to the attacks of the fungus.

9TH JANUARY, 1883.

Mr. John Kirsop, F.S.A. Scot., Vice-President, in the chair.

The following gentlemen were elected Ordinary Members of the Society :—Messrs. Alexander Yuill, 259 Hope Street ; Robert Philson, 41 Robertson Street ; and George R. Lawson, A. T. & C. Bank, Golspie.

Mr. Richard M'Kay exhibited a collection of Mosses, prepared by the Museum Committee for the Kelvingrove Museum ; and, in handing over the collection, he read, on behalf of the Museum Committee, the following statement :—

The Sub-Committee for Mosses, in submitting the mounted collection which they have prepared, trust that it may prove the nucleus of a complete one, so far as British species are concerned.

Its value from a scientific point of view may be held to depend mainly on the number of representative specimens it includes, and on the way in which these have been manipulated, so as to afford the utmost possible facility for public reference. The Committee are confident that, considering the limited period during which they have been at work, the number of species and varieties—544 in all—comprised in the collection constitutes a decided success—a first adventure towards supplying our Glasgow Museum with satisfactory herbaria of British plants. This reference collection of Mosses can hardly fail to be of great service to all who wish to study these beautiful little plants ; and the very fact of its existence ought to increase the number of such students, and stimulate and incite those who have already set themselves to the work. There is another matter of some interest from a personal point of view, and one not wholly without an educational bearing as well. Many of the specimens have been gathered by men who have won immortal names for themselves in this and kindred departments of Botany, —men such as Dr. Greville, Dr. W. Wilson, Professor Dickie, and Professor Schimper ; others by some who may not have obtained such widespread fame, but whose work speaks of their desert,—several of these of our own city and Society, who, having gone from

among us, have left memories "that smell sweet and blossom in the dust," as Roger Hennedy and Alexander M'Kinlay, whose work and worth were well known to all Clydesdale naturalists. Of the others who have had a considerable share in gathering the specimens in the collection we may mention G. E. Hunt, G. Davies, Dr. J. B. Wood, J. Shaw, George Stables, J. Sadler, Dr. Carrington, T. Lyle, J. Norvell, and W. Galt. In these names there is a guarantee of accuracy which the Committee feel cannot but give confidence to students, while the recollection of the good work such botanists have done can hardly fail to kindle enthusiasm and revive lagging zeal. The members of the Committee, besides their work of examination and arrangement, contributed not a few specimens; while the mounting of the whole collection, and the preparation of the catalogue were undertaken by one of their number, Mr. Richard M'Kay. A large proportion of the specimens—268 in all—was gathered by one man alone, Alexander M'Kinlay; and for these, as well as for many others, the Committee are indebted to Dr. Stirton, who kindly placed a very extensive series of duplicates at their disposal. A few specimens from abroad have been included till such a time as they can be replaced or supplemented by British ones. In conclusion, the Committee earnestly trust that their work may be the means of furthering the study of these beautiful forms of vegetation, and of thus widening the area in which an ever-fresh pleasure may extend itself into human life, bringing with it increased knowledge and broadened comprehensions of Nature.

Mr. Thomas King exhibited the following species of *Hypnum* in fruit, a condition in which they are not often found:—

<i>H. tamariscinum</i> , Hed.	<i>H. purum</i> , Dill.
<i>H. splendens</i> , Dill.	<i>H. triquetrum</i> , Dill.
<i>H. Schreberi</i> , Dill.	<i>H. loreum</i> , Dill.

These, he stated, had all been collected at Innellan during the Christmas holidays. Mr King also exhibited a drawing of a very fine specimen of a cephalopod, *Loliyo vulgaris*, Lam., which had been found on the beach at Innellan. This "squid," as it is commonly called, measured twenty inches in length. Although tolerably common, there is no record of the occurrence of the species in the Clyde.

Dr. Freeland Fergus exhibited two specimens of the parasitic nematode *Trichina spiralis*, Owen, found in the muscles of a patient

who had died in the Glasgow Royal Infirmary; and in the course of some descriptive remarks he stated that the symptoms arising from the presence of these animals were apt to be confounded with the indications of rheumatic or typhoid fever.

The Secretary (Mr. J. M. Campbell) exhibited eggs of *Sterna hirundinacea*, Less., collected by him at the Port of Santa Cruz, Patagonia, in 1871. He made some remarks on the habits and range of the species, which he stated he had found breeding very abundantly on a little island at the mouth of the Santa Cruz River. Mr. Campbell also exhibited a skull of a variety of the black rat, showing a peculiar malformation of one of the upper incisors which had grown in a spiral direction until it had again entered the skull.

The President (Mr. J. A. Harvie-Brown) sent for exhibition an extensive series of one of the so-called "coal unios," *Anthracosia robusta*, Sow., obtained in the upper coal measures of the Dal-mellington district, Ayrshire, where this shell is abundant.

Mr. John Young, F.G.S., made some remarks descriptive of the genus and its affinities.

Mr. David Robertson, F.L.S., F.G.S., exhibited specimens, dredged in Loch Fyne, of *Nonionina orbicularis*, Brady, a foraminifer new to the British fauna, and first described by Mr. H. B. Brady, F.R.S., from soundings obtained in the Austro-Hungarian North Polar expedition in 1872. He also exhibited a beautiful specimen, dredged off Cumbrae, of *Lagena curvilineata*, Blackwill and Wright, a species new to the Scottish fauna.

PAPERS READ.

I.—*The Flora of Ben Laoigh.* By Mr. Peter Ewing.

Ben Laoigh, (sometimes spelled Lui), forms part of the Grampian range, and is situated about twenty-five miles south-west of Ben Lawers, its altitude being 3708 feet,—only 276 feet lower than that mountain of world-wide fame.

Although I have headed this "The Flora of Ben Laoigh," my investigations have as yet been wholly confined to the north-east and north-west water-sheds; but I have no doubt that with very few exceptions the flowering plants on these parts of the mountain will be found recorded in the following list. The list of Mosses and *Hepaticae*, however, I do not believe to be in any way complete.

As to the list of flowering plants, 253 in number, 7 of our rarer

alpine species, recorded for Ben Lawers, will be missed; but 5 will be found which I never gathered, or know to have been gathered, on that mountain. To this list I have appended some remarks to show the distribution of certain species on the mountain; and where no remark is made the plant may be understood to be generally distributed. I have only given the altitude where I regarded it as interesting.

As to the list of Mosses, 179 in number, 19 will be found which are not recorded for the county in the *London Catalogue of British Mosses*, including 7 not there recorded for Scotland.

As to the list of *Hepaticae*, 83 in number, 13 will be found which are not recorded for the county in the *London Catalogue*, including 7 not there recorded for Scotland.

No doubt this list in itself is of little scientific value; but if some of our members would take up the investigation of the botany of a mountain, and collect and preserve the plants found upon it, keeping also in view their distribution, such lists would be of very great value indeed. No one can have any idea of the number of species occurring on a mountain till his observations have taken this form.

PHANEROGAMS.

Thalictrum alpinum, Linn.

Anemone nemorosa, Linn.

Ranunculus hederaceus, Linn. One patch observed.

Lingua, Linn.

acris, Linn.

repens, Linn. A few plants occur here and there round the foot of the mountain.

Ficaria, Linn. Common at the base.

Caltha palustris, Linn. Common at the base. I have never observed the alpine form.

Trollius europaeus, Linn.

Cardamine pratensis, Linn. Frequent, flowering in the end of July.

hirsuta, Linn. Frequent.

sylvatica, Link. Rare.

Arabis thaliana, Linn. Rare.

petraea, Lam.

Cochlearia officinalis, Linn., var. *alpina*.

Draba incana, Linn.

Capsella Bursa-pastoris, Mœnch. Common at the base.

- Epilobium montanum*, Linn.
 tetragonum, Linn. Rare.
 palustre, Linn.
 alsinifolium, Vill. Rare.
 anagallidifolium, Lam.
 alpinum, Linn.
- Sedum Rhodiola*, DC.
- Saxifraga oppositifolia*, Linn.
 nivalis, Linn.
 stellaris, Linn.
 aizoides, Linn.
 hypnoides, Linn.
- Chrysosplenium oppositifolium*, Linn.
- Parnassia palustris*, Linn.
- Bunium flexuosum*, With.
- Angelica sylvestris*, Linn. Frequent to 3000 feet.
- Heracleum Sphondylium*, Linn. Frequent to 2500 feet.
- Cornus suecica*, Linn. Rare.
- Galium boreale*, Linn.
 saxatile, Linn.
 palustre, Linn., var. *Witheringii*.
- Asperula odorata*, Linn. Frequent.
- Valeriana officinalis*, Linn. Rare.
- Scabiosa succisa*, Linn. Rare, and not observed in flower.
- Carduus palustris*, Linn. One large patch at 2500 feet.
- Saussurea alpina*, DC.
- Gnaphalium supinum*, Linn.
 dioicum, Linn.
- Solidago Virga-aurea*, Linn., var. *cambrica*. Frequent.
- Tussilago Farfara*, Linn.
- Hypochæris radicata*, Linn.
- Leontodon hispidus*, Linn.
 autumnalis, Linn., var. *pratensis*.
- Taraxacum officinale*, Wigg., var. *palustre*.
- Crepis virens*, Linn.
 paludosa, Mœnch.
- Hieracium Pilosella*, Linn.
 holosericeum, Bækh. Very common on this and the adjoining mountains.
 nigrescens, Willd.

- Hieracium pallidum*, Fries.
 murorum, Linn.
 vulgatum, Fries.
 rigidum, Fries.
Campanula rotundifolia, Linn.
*Vaccinium Oxycocco*s, Linn.
 Vitis-idaea, Linn.
 uliginosum, Linn.
 Myrtillus, Linn.
Arctostaphylos Uva-ursi, Wimm.
Erica Tetralix, Linn.
 cinerea, Linn.
Calluna vulgaris, Salisb.
Pyrola rotundifolia, Linn. Although this plant is common from 2000 to 3500 feet, it seldom flowers. Five flowers were seen in 1882, and six in 1883.
Gentiana campestris, Linn.
Menyanthes trifoliata, Linn.
Veronica humifusa, Dicks. Frequent.
Euphrasia officinalis, Linn.
Bartsia alpina, Linn.
Rhinanthus Crista-galli, Linn. Found at 3250 feet.
Melampyrum pratense, Linn., var. *montanum*.
Thymus Serpyllum, Fries.
Prunella vulgaris, Linn.
Pinguicula vulgaris, Linn.
Lysimachia nemorum, Linn.
Primula vulgaris, Huds.
Trientalis europæa, Linn.
Armeria maritima, Willd.
Plantago maritima, Linn.
Rumex Acetosa, Linn.
 Acetosella, Linn.
Oxyria reniformis, Hook.
Mercurialis perennis, Linn.
Urtica dioica, Linn. A patch 975 feet above the farm.
Alnus glutinosa, Linn.
Betula alba, Linn.
Myrica Gale, Linn.
Salix aurita, Linn.

- Salix phylicifolia*, Linn., var. *Davalliana*.
nigricans, "Sm."
repens, Linn., var. *prostrata*.
ascendens.
Arbuseula, Linn., var. *prunifolia*.
venulosa.
vaccinifolia.
herbacea, Linn.
reticulata, Linn. Rare.
- Potamogeton natans*, Linn.
polygonifolius, Pour., var. *Kirkii*.
- Triglochin palustre*, Linn.
- Orchis mascula*, Linn.
maculata, Linn.
- Gymnadenia conopsea*, Brown.
- Habenaria viridis*, Brown.
- Narthecium ossifragum*, Huds.
- Tofieldia palustris*, Huds.
- Luzula pilosa*, Willd.
sylvatica, Beck.
campestris, DC.
multiflora, Koch., var. *congesta*.
spicata, DC.
- Juncus trifidus*, Linn.
castaneus, Sm. About fifty plants.
triglumis, Linn.
biglumis, Linn. Rare.
conglomeratus, Linn.
effusus, Linn.
acutiflorus, Ehrh.
lamprocarpus, Ehrh., var. *nigritellus*. On the road past
the farm.
supinus, Mœnch.
bufonius, Linn.
compressus, Jacq.
squarrosus, Linn.
- Rhynchospora alba*, Vahl.
- Scirpus palustris*, Linn.
pauciflorus, Lightf.
cæspitosus, Linn.



- Scirpus setaceus*, Linn. Frequent beside the streams up to 1500 feet.
- Eriophorum vaginatum*, Linn.
angustifolium, Roth.
- Kobresia caricina*, Willd. Very abundant.
- Carex dioica*, Linn.
pulicaris, Linn.
pauciflora, Lightf.
stellulata, Good.
curta, Good., var. *alpicola*.
ovalis, Good., var. *bracteata*. Growing along with the typical form.
atrata, Linn.
acuta, Linn.
rigida, Good.
vulgaris, Fries.
glauca, Scop., var. *stictocarpa*.
pilulifera, Linn.
pallescens, Linn.
panicea, Linn.
vaginata, Tausch.
capillaris, Linn.
binervis, Sm.
fulva, Good.
flava, Linn., var. *lepidocarpa*.
Ederi, Ehrh.
ampullacea, Good.
pulla, Good.
- Anthoxanthum odoratum*, Linn. Frequent to 3000 feet.
- Alopecurus geniculatus*, Linn.
- Phleum pratense*, Linn., var. *nodosum*. Rare.
- Agrostis canina*, Linn.
vulgaris, With.
- Aira cæspitosa*, Linn., var. *brevifolia*.
pseudo-alpina.
flexuosa, Linn., var. *montana*.
præcox, Linn.
- Avena pratensis*, Linn., var. *alpina*.
- Holeus mollis*, Linn.
lanatus, Linn.

- Triodia decumbens*, Beauv.
Koeleria cristata, Pers.
Molinia cærulea, Mœnch.
Glyceria fluitans, Brown. Frequent.
Poa alpina, Linn.
 Balfourii, Bab. Rare.
Cynosurus cristatus, Linn.
Festuca sciuroides, Roth.
 ovina, Linn., var. *tenuifolia*.
 rubra, Linn., var. *duriuscula*.
Lolium perenne, Linn.
Nardus stricta, Linn.

FERNS.

- Hymenophyllum unilaterale*, Willd.
Pteris aquilina, Linn.
Cryptogramme crispa, Brown.
Lomaria spicant, Desv.
Asplenium Trichomanes, Linn.
 viride, Huds.
Cystopteris fragilis, Bernh., var. *dentata*.
 montana, Link. This plant is being fast rooted out.
Aspidium Lonchitis, Sw.
 aculeatum, Sw.
Nephrodium Filix-mas, Rich.
 dilatatum, Desv., alpine form.
 Oreopteris, Linn.
Polypodium vulgare, Linn.
 Phegopteris, Linn.
 Dryopteris, Linn.
 alpestre, Hoppe.
Botrychium Lunaria, Sw.

LYCOPODS.

- Lycopodium clavatum*, Linn.
 alpinum, Linn.
 Selago, Linn.
Selaginella Selaginoides, Gray.

EQUISETA.

- Equisetum arvense*, Linn. On the debris at the mines.

- Equisetum pratense*, Ehrh.
 var. *alpestre*.
palustre, Linn.
 var. *subnudum*. Frequent.
limosum, Linn., var. *fluviatile*. About twelve plants.
variegatum, Schleich.

MOSSES.

- Sphagnum acutifolium*, Ehrh.
 var. *deflexum*, Schpr.
 rubellum, Wils.
 quinquefarium, Lindb. New.
 elegans, Braithw. New.

squarrosum, Pers.
rigidum, Schpr. New to Scotland.
subsecundum, Nees.
tenellum, Ehrh.
papillosum, Lindb.
cymbifolium, Ehrh.

Andreaea petrophila, Ehrh.
alpina, Turn.
falcata, Schpr.
crassinervis, Bruch.

Gymnostomum rupestre, Schwg.
 curvirostrum, Ehrh.
 commutatum, Mitt.

Weissia viridula, Brid.
Weissia mucronata, Bruch.
 crispula, Hedw.
 cirrhata, Hedw.

Rhabdoweissia fugax, Hedw.
 denticulata, Brid.

Cynodontium virens, Hedw.
Dicranella squarrosa, Schrad.
 subulata, Hedw.
 heteromalla, Hedw.

Dicranum fulvellum, Sm.
 Starkii, W. & M.
 falcatum, Hedw.
 Blyttii B. & S.

- Dicranum arcticum*, Schpr.
 fuscescens, Turn.
 scoparium, Linn.
 majus, Turn.
 palustre, Bry. Brit.
- Campylopus atrovirens*, De Not.
 flexuosus, Brid.
 paradoxus, Wils. New.
 fragilis, B. & S.
- Ditrichum homomallum*, Hedw.
 flexicaule, Schwg.
- Barbula muralis*, L.
 unguiculata, Dill.
 fallax, Hedw. New.
 rigidula, Dicks.
 convoluta, Hedw.
 tortuosa, Linn.
 fragilis, Hook.
 subulata, Linn.
- Ceratodon purpureus*, Linn.
- Distichium capillaceum*, Linn.
 inclinatum, Hedw.
- Encalypta rhabdocarpa*, Schwg.
 ciliata, Hedw.
- Grimmia apocarpa*, Linn.
 pulvinata, Dill.
 Schultzii, Brid. New.
 torquata, Grev.
 Doniana, Sm.
- Racomitrium patens*, Dicks.
 aciculare, Linn.
 protensum, A. Braun.
 sudeticum, Funck.
 heterostichum, Hedw.
 var. *gracilescens*, Bry. Eur.
 fasciculare, Schrad.
 lanuginosum, Hedw.
 canescens, Hedw.
- Ptychomitrium polyphyllum*, Dicks.
- Amphoridium lapponicum*, Hedw.

- Amphoridium Mougeotii, B. & S.
 Ulotia Bruchii, Hornsch.
 intermedia, Schpr. New.
 phyllantha, Brid.
 Orthotrichum affine, Schrad.
 Lyllii, H. & T.
 leiocarpum, B. & S.
 Edipodium Griffithianum, Dicks.
 Dissodon splachnoides, Schwg.
 Tetraplodon muioides, Hedw.
 Splachnum sphaericum, Linn.
 Funaria hygrometrica, Linn.
 Amblyodon dealbatus, Dicks.
 Meesia uliginosa, Hedw.
 Catoscopium nigrum, Hedw.
 Bartramia ithyphylla, Brid.
 pomiformis, Linn.
 Halleriana, Hedw.
 Ederi, Gunn.
 Conostomum boreale, Swartz.
 Philonotis fontana, Linn.
 var. falcata, De Not. New to Scotland.
 calcarea, B. & S.
 Breutelia arcuata, Dicks.
 Webera acuminata, Hoppe.
 polymorpha, Hoppe.
 elongata, Dicks.
 nutans, Schreb.
 cruda, Schreb.
 carnea, Linn.
 Zieria julacea, Schpr.
 Bryum pendulum, Hornsch.
 inclinatum, Swartz.
 pallescens, Schleich.
 erythrocarpum, Schwg.
 alpinum, Linn.
 caespiticium, Linn.
 argenteum, Linn.
 capillare, Linn.
 pallens, Swartz.

- Bryum pseudo-triquetrum*, Hedw.
 Schleicheri, Schwg.
 filiforme, Dicks.
- Mnium undulatum*, Hedw.
 hornum, Linn.
 serratum, Schrad.
 punctatum, Hedw.
- Aulacomnium palustre*, Linn.
- Tetraphis pellucida*, Linn.
- Tetrodontium Brownianum*, Dicks.
- Oligotrichum hereynicum*, Ehrh.
- Atrichum undulatum*, Linn.
- Pogonatum nanum*, Neck.
 aloides, Hedw.
 urnigerum, Linn.
 alpinum, Linn.
 var. *campanulatum*, Hornsch.
- Polytrichum sexangulare*, Flörk.
 strictum, Banks.
 commune, Linn.
 var. *humile*, Schpr.
 fastigiatum, Lyle.
- Diphyscium foliosum*, Linn.
- Fissidens osmundoides*, Hedw.
 adiantoides, Hedw.
- Hedwigia ciliata*, Dicks.
- Antitrichia curtispindula*, Linn.
- Neckera pumila*, Hedw.
 crispa, Linn.
 complanata, Linn.
- Homalia trichomanoides*, Schreb.
- Cylindrothecium concinnum*, De Not.
- Thamnum alopecurum*, Linn.
- Isothecium myurum*, Dill.
- Orthothecium rufescens*, Dicks. Fruits freely in July and
 August.
- Homalothecium sericeum*, Linn.
- Brachythecium Starkii*, Brid.
 rutabulum, Linn.
 rivulare, B. & S.

- Brachythecium plumosum*, Swartz.
Eurhynchium myosuroides, Linn.
 Swartzii, Turn.
Plagiothecium pulchellum, Hedw.
 denticulatum, Linn.
 undulatum, Linn.
Amblystegium serpens, Linn.
Hypnum revolvens, Swartz.
 uncinatum, Hedw.
 filicinum, Linn.
 commutatum, Hedw.
 falcatum, Brid.
 hamulosum, B. & S.
 cupressiforme, Linn.
 molluscum, Hedw.
 ochraceum, Turn.
 stellatum, Schreb.
 cordifolium, Hedw.
 giganteum, Schpr.
 sarmentosum, Wahl.
 cuspidatum, Linn.
 Schreberi, Ehrh.
 purum, Linn.
 trifarium, W. & M.
 scorpioides, Linn.
Hylocomium splendens, Dill.
 squarrosum, Linn.
 loreum, Linn.
 triquetrum, Linn.

HEPATICÆ.

- Marchantia polymorpha*, Linn.
Preissia commutata, Nees.
Conocephalus conicus, Linn.
Frullania dilatata, Dum.
 fragilifolia, Tayl.
 Tamarisci, Dum.
 var. *atrovirens*.
 germana, Tayl. New to Scotland.
Lejeunea serpyllifolia, Mich.
 patens, Lindbg. New.

- Radula complanata*, Linn.
 commutata, Gottsche.
Porella lævigata, Schrader.
 platyphylla, Linn.
Pleurozia cochleariformis, Weiss.
Lepidozia reptans, Linn.
 setacea, Mitten. New.
Bazzania trilobata, Linn.
 trierenata, Lindbg.
 triangularis, Schl. New.
Odontoschisma Sphagni, Dicks.
Cephalozia divaricata, Sm.
 bicuspidata, Dum.
 multiflora, Spruce. New to Scotland.
 Lammersiana, Hüb. New to Scotland.
Lophocolea bidentata, Linn.
 heterophylla, Schrad. New.
Chiloscyphus polyanthos, Linn.
Saccogyna viticulosa, Mich.
Kantia Trichomanis, Linn.
Trichocolea tomentella, Ehrh.
Blepharozia ciliaris, Nees.
Herberta adunca, Dicks.
Anthelia julacea, Lightf.
 Furatzkana. Only once before found in Britain, viz.
 by Mr. West, an English botanist, on Ben Lawers.
Blepharostoma trichophyllum, Linn.
Scapania subalpina, Dum.
 undulata, Dill.
 nemorosa, Linn.
 resupinata, Dumort.
 purpurea, Carr.
 planifolia, Hook.
 curta, Mart., var. *rosacea*, Nees.
Diplophyllum albicans, Linn.
Plagiochila asplenioides, Linn.
 spinulosa, Dicks.
Jamesoniella Carringtoni, Balf.
Mylia Taylori, Hook.
Eucalyx obovata, Nees.

- Eucalyx hyalina*, Lyell.
Jungermannia crenulata, Sm.
 var. *gracillima*, Sm.
 lurida, Dum.
 sphaerocarpa, Hook.
 cordifolia, Hook.
 riparia, Tayl.
 Mülleri, Nees.
 barbata, Schreb.
 Flærkii, Web. & Mohr.
 quinquedentata, Web.
 lycopodioides, Wallr.
 ventricosa, Dicks.
 bicrenata, Lindenb.
 incisa, Schrad.
 alpestris, Schleich.
 inflata, Huds.
 turbinata, Rad. New.
 minuta, Crantz.
Nardia emarginata, Ehrh.
 Funcikii, Nees.
 compressa, Gray.
 scalaris, Schrad.
Gymnomitrium concinatum, Corda.
 crassifolium, Carr.
 crenulatum, Gottsche.
Blasia pusilla, Linn.
Pellia epiphylla, Linn.
 calycina, Tayl.
Aneura pinguis, Linn. New.
 sinuata, Dicks. New to Scotland.
 multifida, Gray.
Metzgeria furcata, Dum.
 pubescens, Schrank. New.
 conjugata, Lindbg. New to Scotland.

II.—*Notes on the occurrence near Glasgow of the Kingfisher, Alcedo ispida, Lin.* By Mr. James Steel.

The author stated that on 23rd September last he had observed an example of the Kingfisher on the Clyde at Cambuslang, and a pair near the railway bridge above the Clyde Ironworks. He was informed by Mr. J. M. Campbell that a specimen had been obtained on the Rouken burn, near Thornliebank, and Mr. James J. F. X. King had also observed this beautiful bird on the Kelvin at the Botanic Gardens. Mr. James S. Dixon, in a paper read before the Society on "The Birds frequenting Possil Marsh,"* remarks:—"During the winter of 1864 I several times saw the Kingfisher (*Alcedo ispida*) fishing for sticklebacks, and darting along the surface of the ditches which intersect and flow from the Possil Marsh and the neighbouring Lochburnie."

30TH JANUARY, 1883.

Mr. John A. Harvie-Brown, F.R.S.E., F.Z.S., President, in the Chair.

Messrs. John Forsyth, 40 Dalmarnock Road, Parkhead, and James Dalrymple Duncan, F.S.A. Scot., 211 Hope Street, were elected Ordinary Members.

Mr. D. Gregorson exhibited bifurcated fronds of Hart's-tongue, *Scolopendrium vulgare*, Sm., obtained from ferns in cultivation, and he explained the manner in which the plants had been treated. In the course of some discussion as to the probable causes of this abnormal growth, Mr. James Ramsay stated that he had frequently observed ferns, after producing for a time bifurcated fronds, return at length to their original condition. Professor John Cleland, M.D., F.R.S., made some remarks on the tendency in animals and plants to diverge from their ordinary forms.

Mr. Peter Cameron exhibited some larvae and pupae preserved by a new process, the medium used being a solution of chromic acid. After describing the process, which consisted in steeping the larvae, &c., in a weak solution of the acid for some days, he said that the

* *Proceedings*, ii. 161.

advantages of this method were that the objects retained their form without any distortion, and every detail of structure could be made out, while the colour was not any more changed than would have been the case had the objects been kept in spirit. If not immersed too long in the acid, the larvae, &c., were quite flexible, and their limbs could be moved without breaking. The method, in fact, appeared to him to possess all the advantages of the old plan of keeping the larvae in spirit, without any of its disadvantages, while it also seemed to be quite as good as the methods of preserving the larvae by inflation or roasting over gas.

Mr. Thomas Scott, Corresponding Member, exhibited some species of Land Shells from the Greenock district, on which he made the following remarks:—

The species of Land Shells now exhibited were collected during various botanical rambles in the neighbourhood of Greenock and at Skelmorlie. Besides these species a number of more common forms are also found; but, as I intend ere long to prepare a full list of the Land Shells known to occur in the district around Greenock, I have made no reference to them at present.

Limæ flavus, L. I have as yet found only one or two specimens in the neighbourhood of Greenock.

L. marginatus, Müll. Common in gardens in the district.

L. maximus, L. Frequent. In handling half-grown specimens I have observed that when irritated they lifted repeatedly the edges of the mantle. This operation imparts a very peculiar appearance to the slug.*

Zonites radiatulus, Alder. This pretty species occurs at the Cloch and in one or two other places in the district.

Z. excavatus, Bean. Cloch, Shielhill Glen, and other places.

Helix lamellata, Jeff. One specimen of this species was obtained at the Cloch by my son, Mr. Andrew Scott.

H. aculeata, Müll. Cloch. This *Helix*, though small, appears somewhat formidable on account of its spiny epidermis.

H. rufescens, Penn. Plentiful near Greenock.

H. sericea, Müll. Tower Hill, Gourock; not uncommon at Skelmorlie.

H. fusca, Mont. Cloch, Shielhill Glen, and other places.

H. caperata, Mont., with var. *major*. At Skelmorlie, which appears to be the nearest locality to Greenock.

* I find that Dr. Jeffreys incidentally refers to this habit. *Brit. Conch.*, i. 138.

Pupa ringens, Jeff., and var. *pallida*. This interesting species occurs at the Cloch, Shielhill Glen, and Rottenburn Glen (west end of Loch Thom), where I also find the variety.

Vertigo pygmaea, Drap. Very common in Rottenburn Glen.

„ „ var. *pallida*. Rottenburn Glen, occasional.

V. substriata, Jeff. Rottenburn Glen, rare.

V. edentula, Drap. Shielhill Glen, Cloch.

Balia perversa, L. Skelmorlie.

Acme lineata, Drap. One specimen of this shell was obtained at the Cloch in May, 1882, by my son, Mr. Andrew Scott.

Mr. J. M. Campbell exhibited a young living Alligator, *Alligator mississippiensis*, from the Mississippi; and in the course of some remarks he described the characters which distinguish the Alligators from the Crocodiles and Gavials.

Mr. James Lumsden, F.Z.S., in exhibiting a Pectoral Sandpiper, *Tringa maculata*, shot at Loch Lomond by Sir George H. Leith Buchanan, Bart., Corresponding Member, said that during the year 1881 several new species had been added to the list of Loch Lomond birds, but for 1882 there was only one to add, and that the Pectoral Sandpiper. On 24th November, 1882, Sir George H. Leith Buchanan obtained a specimen of this rare species when out snipe-shooting on the banks of Loch Lomond, near the mouth of the Endrick; and he (Mr. Lumsden) trusted the following extract from Sir George's letter would satisfy those naturalists who object to any rare birds being shot, that the present specimen was obtained by accident. "On the 24th November I shot a specimen of the Pectoral Sandpiper of America. It rose from some rushes, and I took it for a Jack-snipe until I picked it up. As it was blowing very hard at the time with snow and rain, I could not see distinctly." The specimen was a female, and its stomach contained small insects.

This species has only once been recorded from any part of Scotland, a specimen having been shot at the mouth of the Don, in Aberdeenshire, in October, 1867, as mentioned by Mr. Gray in the *Birds of the West of Scotland*, who includes it on the authority of Mr. Angus. In England it is more common, about twenty instances of its occurrence being on record. The home of the Pectoral Sandpiper is America, and it is met with in Europe only as a rare straggler. It is widely distributed over North America, is recorded from South America as far south as Brazil and Peru, and is very

well known in the West Indies. According to Dr. Cones it is seldom seen in flocks, but scattered singly or in pairs. In some parts of America it receives the name of "meadow-snipe," "short neck," and "fat bird." In other districts it is also called "jack-snipe."

I.—*The Seal and Whale Fishery of 1882.* By Mr. Thomas Southwell, F.Z.S.

In this paper it was stated that the Newfoundland sealing in the season of 1882 opened under the most unfavourable circumstances, owing to the vast accumulation of ice in the Atlantic. All through the spring, and quite into the month of June, reports represented the Newfoundland seas as bristling with huge icebergs, whilst from Cape Breton to 200 miles S.E. of Cape Race stretched a tremendous pack of heavy ice, which the sealers on their arrival in vain tried to penetrate, effectually closing the port of St. John's. On the 2nd March five of the Dundee vessels were reported still fast in the ice, and they only reached St. John's on the 9th March, barely in time to make their arrangements for sailing on the 10th, the day fixed by law for their departure.

On the 21st May H.M.S. "Teredos" reported the ice to be nearly solid from Cape Breton to Newfoundland; twenty-one ships were locked in the ice N.W. of Cape Race, one large ship of 1000 tons resting forty feet above the water; and at the end of the month there were still many ships imprisoned in the vast ice-field off Cape Breton. It was not surprising, therefore, that the Dundee vessels should have been much less successful than in the season of 1881, the take of Seals having been only 63,204, against 139,985 in the previous year. The "Arctic" and the "Thetis" were the most successful, the former taking 24,663 and the latter 10,598 Seals, the remaining four vessels securing 27,943 Seals between them. The "Wolf" was also reported "full," and the "Proteus" and "Walrus" (all three belonging to British owners), the former with 8000 and the latter with 7800 Seals. The Newfoundland voyage, notwithstanding the difficulties which the vessels encountered, might, so far as the British vessels were concerned, be said, upon the whole, to have been a successful one, although far short of the exceptional season of 1881. The "Thetis" proceeded from St. John's direct to the Greenland Seal fishery, and succeeded in shooting 3317 old

Seals and eight Bottle-nose Whales, thus making a very successful voyage. It is believed that fourteen vessels belonging to British owners, in addition to the Dundee sealers, left St. John's Harbour on the 10th March.

Only eight of the thirteen Scotch vessels which sailed for the northern sealing voyage were successful, the total take being 22,142 Seals, against 23,894 in the season of 1881; but as the Norwegian vesse's took even more Seals than our own, it is probable that the whole brood was destroyed, and that, had more ships been present, it would only have resulted in a lower average.

The old Seal-fishing in April is reported to have been a perfect failure, partly owing to the weather, and partly to the heavy ice being surrounded by thin bay-ice, which prevented the boats from getting near the Seals.

The Dundee vessels, nine in number, which went on to Davis Straits in search of Right Whales, were rewarded with 78 of these valuable monsters, which produced 770 tons of oil and 582 cwts. of bone, which, with oil at £33 per ton and bone at £1150 per ton, would yield a return of £58,876.

The notable feature in the fishery of 1882 was the capture of a large number of Bottle nose Whales, *Hyperoodon rostratum*, 463 of these animals having been secured by the Scotch vessels alone. 203 of these fell to the lot of the "Eclipse;" and the cargo was estimated to yield something like 230 tons of Bottle-nose oil, which has been proved to be little if at all inferior to true sperm oil, being worth about £60 per ton. It is to be feared that their value having become fully known, it will in future go hard with the Bottle-noses. A considerable number of these Whales were also taken by the Norwegian fleets.

II.—*The Heterœcism of the Uredines.* By Mr. Robert Turner.

As some considerable time has elapsed between the reading of the paper and its publication, a few notes have been added.—R.T., August, 1884.

We have long been aware that many of the parasitic entozoa of man and brute, after living for a time in one creature, transfer themselves and their havoc to another. To understand the object of migration in the case of these parasites is not very difficult. The living morsels lie patiently await in some animal likely to be

devoured by another, till, as a happy consummation for them, they are gulped into a ravenous maw where they find a congenial climate and awake to new activities. The dog pleurably gorges himself with rabbit, but often worries up at the same time a sufficiency of these included morsels to mar his future. In the same way the best mousers among cats are in danger of most misery. Cow, sheep, and pig harbour parasites that produce various species of tapeworm in man, when human wisdom—in the shape of boiling, roasting, and the like—is at fault in thoroughness. The parasite ordinarily assumes a different form in each of the animals which it inhabits; but sometimes all its metamorphoses are completed in the same animal—as is the case with *trichinæ*—and then carried out *de novo* in the next suitable flesh-eater in which it gains a settlement.

I remind you of these facts, as my subject is one of a kindred nature to which much attention has only been turned in recent years, the heterœcism and dimorphism of certain vegetable parasites, the Uredines, that infest the leaves, stems, flowers, and fruits of plants. The conclusions of many competent observers have been to the effect that some parasitic fungi can, for the furtherance of their own interests, migrate from plant to plant and take different forms if needful. Though a few able botanists are still disinclined to admit that such heterœcism is clearly established, it seems to me that its existence in many instances can hardly be doubted, though many details still await confirmation or correction. The different forms which these parasitic fungi assume at various stages have led to their being referred to several distinct species, as *Æcidium*, *Uredo*, *Puccinia*—a classification similar to what that of the larva, pupa, and imago of an insect as distinct species would be. In any fresh classification there arises the difficulty of settling which of the names the species should bear; and, as sexuality in these plants has not yet been established, all nomenclature is in the meantime provisional. In recent classifications the name given to the resting-spore stage, as the most advanced yet known, is generally adopted. Should it be established, however, that the cluster-cup stage is a sexual generation, as has long been surmised and is highly probable, this nomenclature would undergo extensive changes, as that condition would then be recognised as the most complex, so that what is now, for instance, generally called *Puccinia* would be termed *Æcidium*.

A typical *Æcidium*, I may remind you, has mycelium that ramifies in the interior leaf-tissue and produces on the under surface

of the leaf peridia fringed with recurved teeth. These peridia are either scattered over the surface or collected in tufts and clusters. Sometimes they are elongated (as in *Roestelia* and *Peridermium*), and open by lateral fissures or a lacerated mouth or burst irregularly. Inside the cups moniliform chains of spores are produced. Growing from the same mycelium, usually appearing before the peridia and on the upper side of the leaf—though sometimes on the same surface as the peridia—are flask-like bodies known as *spermogonia*, which are clothed with very fine threads that protrude like a brush from the mouth, and which contain besides a very minute dust, *spermatia*. These spermogonia have long been surmised to be connected with the sexual reproduction of the fungus, but as yet all their bearings on the life-history of the plant have eluded observation. The largest spermatia that have been examined are only $\frac{1}{2500}$ inch long by $\frac{1}{100,000}$ inch across; but the length of many is not more than this width.

On cereals and other grasses, and generally on many plants in early summer, examples of Uredo or rust are frequent. From the mycelium tufts of branches are given out towards the surface, and each of these bears a roughish spore at its tip—not a chain of spores as with *Æcidium*—and, from the mass of such spores, rusts are usually very conspicuous. These spores are most frequently brown, but sometimes yellow.

Later in the season teleutospores appear. If these are single-celled, the parasite is known as *Uromyces*; if two-celled, as *Puccinia* or *Gymnosporangium*; if there are three cells side by side, as *Triphragmium*; if three or more cells in a row, as *Phragmidium*. These spores usually germinate after a period of rest. The mildew on wheat (*Puccinia graminis*) is one of the best known examples of this stage. Its spores grow from the same mycelium as the rust ones (*Uredo linearis*), but, while these rust spores are orange, roundish, and somewhat rough, the others are elongated, club-shaped, and—though brownish under the microscope—black in mass to the naked eye.

So long ago as the end of last century the barberry bush had been almost extirpated in some parts of England, as farmers had become convinced that it was a fruitful source of mildew in wheat. Botanists were, however, inclined to regard this as a vulgar error. About seventeen years ago Prof. de Bary of Strasbourg, by experiment and observation, satisfied most continental botanists

that *Uredo linearis* and *Puccinia graminis* of wheat were but stages in the development of *Æcidium Berberidis* of the barberry. Till recently his results were usually ignored, denied, or doubted in Britain. In 1881 Dr. Charles B. Plowright, of King's Lynn, instituted a series of experiments which he has continued during last year, and these have verified the accuracy of de Bary's observations. He adopted every precaution to guard against error, and his results, I need hardly add, may be implicitly relied on. Not only did he sow spores of *Æcidium Berberidis* on wheat, but of *Puccinia graminis* on barberry, and in the one case came up *Uredo linearis*, in the other, *Æcidium Berberidis*. In the light of this knowledge it is interesting to trace the life-history of the parasite. First, growing in hedge or copse is a barberry bush. On the under-side of its leaves appear cluster-cups, on the upper-side the flask-like spermogonia. The cluster-cups ripen and the spore at the tip of each chain goes off and is superseded by the one next it, which has in turn to make way for its successor, and so on. The æcidiospore thus thrown upon the world either finds some kind of grass on which it can grow or perishes without fulfilling its mission. Should it fall in with a young blade of wheat, it begins work, sends out a filament that searches about till it hits on a stoma, into which it insinuates itself. The part of the germinating filament inside the leaf thereupon swells out and branches, the contents of the spore flow through into this enlarged space, and thus the parasite gets inside to work havoc. Its mycelium spreads through the tissue, and in about a week it sends up every here and there multitudinous tufts of thread-like branches towards the surface of the leaf, which burst through the epidermis, producing spores that fill the ruptured parts in reddish mass. The minute roughening on these spores probably helps to fix them to any blade of wheat on which they may fall, and their lightness permits every breath of air to disperse them. During nearly the whole season they are produced and dispersed, and, falling on wheat plants, give out tubes that bore their way inside, and plunder, and, from their mycelia, reproduce spores of a similar kind. But towards the end of the season, when a chill comes into the air and a rigidity to the grasses, we could almost imagine that the parasite had become stricken with a presentiment of futurity. It gives up producing rust spores, and, to save itself from annihilation, slips into another alternation of generation. It produces dark, hard, heavy teleutospores, attached

by a stem to the tissues of the host-plant, as they are not meant to be thrown off and to germinate immediately like the rust ones. They lie quiet for months awaiting springtime. Then they germinate, sending out a filament from each of their two divisions. The upper part of this filament gives off three simple tapering branches, each bearing a clear yellowish spore-like body at the tip. Off on the wind float these sporidia, and some at last reach a haven of rest on a barberry bush. Falling on a leaf they do not take the trouble to hunt out a stoma, but bore right through into the interior, where they send out mycelial threads, and in about a week cluster-cups are produced. The cluster-cup spores will not—so far as known—germinate on the barberry, nor will these clear yellow spores on grasses. In the barberry seems to lie for this parasite as a species the secret of renewed possibilities of vigorous mischief. There it would appear to touch afresh the torch of life, and through mysterious sexuality—as I have already remarked, a sexuality as yet only surmised—to develop latent force. The youthful spore is thrown off full of vital zeal, and its fresh vigour infuses itself into the threadlets of destruction which it sends into the grasses. Rust and mildew may perhaps be able to propagate themselves for years in some milder makeshift way without fresh cluster-cups; but, when the spores from such cluster-cups come, ruin comes with them. They set to with a will, and the wheat stalk often dies green, and rarely produces more in the shape of grains than shrivelled starvelings. We can then say with Shakespeare—

. “The green corn
Hath rotted ere his youth attained a beard.” *

Many other instances illustrative of heterœcism may be adduced. The cylindrical peridia (*Peridermium Pini*) that sometimes occur on the young leaves of Scotch Fir send out spores that are said to produce the golden rust (*Coleosporium Senecionis*) on the under side of groundsel leaves. The tufts of minute tassels (*Ræstelia lacerata*) on the leaves and fruit of the hawthorn are a phase in the life of the parasite on the common juniper (*Podisoma Juniperi*); those on pear leaves (*Ræstelia cancellata*), of the parasite of Savin

* Further details on this interesting subject will be found in the various papers by de Bary, and in his book, “Neue Untersuchungen über Uredineen,” Berlin, 1865; in the English translation of Sachs’ “Textbook of Botany,” 2nd Edition, page 330; and in “Grevillea,” “The Gardener’s Chronicle,” “Science Gossip,” and other English serials for 1881, and since.

Juniper (*Podisoma Sabinae*). The curious little horns (*Ræstelia cornuta*) on the leaves of the rowan-tree produce spores from which on the common juniper proceed the gelatinous orange fungus known as *Gymnosporangium Juniperi*. In the same way a cluster-cup on the nettle is associated with a puccinia that appears on various carices, while cluster-cups on *Echium vulgare*, *Rhamnus Frangula*, *Orchis maculata*, *Tussilago Farfara*, and many other plants, in a further stage become puccinia on various grasses.

These discoveries of the identity of species formerly considered distinct have led some continental botanists, Winter and Schröter especially, to attempt a classification of the Uredines more in harmony with the facts ascertained.

Note.—This classification in a modified form is given by Dr. Plowright in "Grevillea" for March, 1883, to which I beg to refer you. The following is (in an abridged form) the arrangement of

URAMYCES and PUCCINIA.

- | | | |
|------------------|-------------------|---|
| 1. Lepturomyces. | 1. Leptopuccinia— | } Teleutospores only, germinating
at once. |
| 2. Micruromyces. | 2. Micropuccinia— | |
| 3. Hemiuromyces. | 3. Hemipuccinia— | Uredo and teleutospores. |
| 4. Uromycopsis. | 4. Pucciniopsis— | Æcidio and teleutospores. |
| 5. Eu-uromyces. | 5. Eupuccinia— | Æcidio, uredo and teleutospores. |

(a) All three spore forms on same host plant.

(b) Spermogonia and æcidiospores on one host plant, uredo and teleutospores on another.

The plants included in the 5th division, section *b*, are those with which we are now interested. Of these the following is a list so far as known, and of the plants on which they are found:—

Uromyces Dactylidis, Otth. Æcidiospores on *Ranunculus bulbosus*. Teleutospores on *Dactylis glomerata* and some other grasses.

Uromyces Poæ, Rabh. Æcid. on *Ranunculus Ficaria* and *R. repens*. Tel. on *Poa nemoralis* and *Poa pratensis*.

Uromyces Junci, Desm. Æcid. on *Inula dysenterica*. Tel. on *Juncus obtusifolius*.

U. pisi, Pers. Æcid. on *Euphorbia Cyparissias*. Tel. on *Vicia Cracca* and various species of *Pisum* and *Lathyrus*.

Puccinia graminis, Pers. Æcid. on *Berberis vulgaris*. Tel. on cereals and other grasses.

P. rubigo-vera, DC. Æcid. on *Lycopsis arvensis*, *Echium vulgare*, *Symphytum officinale*. Tel. on various grasses.

P. coronata, Corda. Æcid. on *Rhamnus Frangula* and *R. catharticus*. Tel. on various grasses.

P. Moliniæ, Tul. Æcid. on *Orchis* and *Listera*. Tel. on *Molinia cærulea*.

P. Poarum, Niel. Æcid. on *Tussilagō Farfara*. Tel. on *Poa annua* and *P. pratensis*.

P. Magnusiana, Körn. Æcid. on *Rumex Hydrolapathum*. Tel. on *Phragmites communis*.

P. scssilis, Schneid. Æcid. on *Allium ursinum*. Tel. on *Phalaris arundinacea*.

P. caricis, Schum. Æcid. on *Urtica dioica*. Tel. on various carices.

P. sylvatica, Schröt. Æcid. on *Taraxacum officinale*. Tel. on *Carex muricata*.

Assuming that the main facts of this plant heterœcism are correct, it is probable that only a few of the connections and relations have been traced, and that, as our knowledge grows, intercommunications at present undreamt of may be discovered. For instance, *Æcidium Grossulariæ*, which is ranked under section Pucciniopsis, is probably heterœcismal. Though common in this country, yet here no teleutospores have been observed in connection with it on the gooseberry; but such is stated to have occurred on the Continent, and hence it is classed under Pucciniopsis. It is difficult to conceive that an *Æcidium* spore can survive from season to season, and the inference from this would appear to be that the relations of this parasite are as yet problematic. Again, the wheat-mildew is by no means limited to districts where the barberry is found, so that it is highly probable that that plant is not the only one on which the æcidiospores are produced. Another instance might be adduced in *Coleosporium Senecionis*, which is frequently found in situations miles distant from fir-trees. Such cases would appear to indicate that much still remains to be discovered in this branch of investigation. Some errors of observation have, besides, possibly taken place, owing to imperfection in the modes of investigation, and to the obscurity of the relationships of these low organisms. Notwithstanding all this, I think there can be no doubt of the reality of the heterœcism itself in many of the Uredines, and thus a new field lies before us for study and observation. As to the very restricted nature of the heterœcism, as between two, or at most a very limited number of host plants, there seem to be many facts—some of which have already been referred to—that point to relations existing over a wider area.

At the heart of the mystery of this heterœcism lies, no doubt, a good and sufficient reason. The problem is hard; but you may, perhaps, pardon me if I hazard a guess. Cluster-cups are never very injurious to the plants on which they grow, while rusts and

mildews are. A destructive parasitic fungus could not so readily survive on living plants, if it confined all its operations to one, for destroying the species it would itself perish. It seems, besides, to be of advantage to such a parasite to have a secure retreat at one stage of its existence, where, without proving very injurious to the host plant, it may develop its cluster-cups; and, if we assume these to be the sexual generation, the importance of such a nesting-place is apparent. Having obtained a certain stability of this kind it can freely exert its destructive powers on plants other than this host, without danger to its own existence as a species. Parasites, like *Ustilago segetum*, that usually only attack a limited number among many plants of the same kind, or that are not very destructive, may pass their whole life on one individual without bringing their existence as a species into peril. This moderation is for them a path of safety. The more destructive parasites, however, have an advantage in being heterœcismal, and by curbing themselves at one time of their life may safely break through all restraints at another. Parasites must have powers of destruction co-ordinated with the security of their own existence as species, or they must perish. Cluster-cups commonly attack temporary organs—leaves generally—as if they meant no permanent harm to their host-plants; while rusts and mildews are usually destructive of the plants themselves on which they prey. For instance, *Ræstelia cornuta* does little harm to the rowan-tree, only attacking the leaves; but the *Gymnosporangium* affects the juniper differently, as it preys on the permanent parts of the shrub, and year by year silently but surely brings it to destruction.

It suggests itself as a coincidence worthy of note, that while among the Lepidoptera, which depend for food on living vegetation, the caterpillar subsists on a plant usually different from that in which the winged insect finds its food of nectar, among the Coleoptera that depend on decaying matter, beetle and larva alike generally feed on the same substance. The reason for this arrangement seems clearly to be that it would prove awkward were a voracious caterpillar forced to restrain its appetite for the plant on which it preys, lest it should damage its chances of food when it becomes a creature with wings. Thus, it is arranged that the caterpillar shall fill its place in the world as a glutton, and that when it reaches the perfection of winged existence it shall sip nectar from plants that, as a caterpillar, it never attacked.

I think there can be little doubt that this subject of plant heterœcism is one in which there is yet room for much discovery by patient observation and investigation, and one worthy to interest any intelligent mind.

27TH FEBRUARY, 1883.

Mr. John Kirsop, F.S.A. Scot., Vice-President, in the Chair.

Messrs. James White, Free Church Training College, and Andrew P. Dron, 18 Windsor Street, were elected Ordinary Members.

The Secretary read the following Bye-Laws of the Society, passed at a meeting of Council held on 30th January, 1883:—

B Y E - L A W S

OF THE

NATURAL HISTORY SOCIETY OF GLASGOW.

Supplementary to Rule VII.—All names of Members intended to be proposed as Office-bearers shall be sent in writing to the Secretary, at least 8 days before the General Meeting in September, shall be submitted to a Meeting of Council, and shall be printed, with the names of their proposers and seconders, in the Circular calling the General Meeting.

Supplementary to Rule XII.—There shall be a Summer Session extending from May to September, for excursions to places of interest and for Meetings at which specimens may be exhibited and short papers read, but at which no general business of the Society shall be competent.

The Council shall appoint a Committee to take charge of the Summer Session, and shall issue, in April, a Syllabus with dates of the Meetings and Excursions, &c., which shall be deemed sufficient notice thereof.

A Member of the Society shall be appointed each year by the Council as Secretary of the Summer Session. He shall record the proceedings in a Minute-book provided for the purpose, and shall prepare a Report of the work to be read at the following General Meeting in September.

Supplementary to Rule XVII.—The second sentence of this Rule shall refer only to the election of Members (Rules iv., v. and

vi.), to the removal of Members (Rule xvi.), and to motions affecting the Constitution (Rule xx.).

Supplementary to Rule XVIII.—All subscriptions and entry monies shall be due upon election, and thereafter on 1st September of each year. Should a Member be a second year in arrears of his subscription, the Treasurer shall twice send him notice to that effect, and if payment be not then made, his name shall be removed from the roll.

At the January Meeting of each year, and thereafter during the Session, the Treasurer shall place in the Rooms a list of Members, having all arrears of subscriptions marked upon it.

Supplementary to Rule XXI.—No volume shall be retained for a longer period than four weeks, when it must be returned to the Librarian; the loan may, however, be renewed for a similar term, provided no other application has been made for the work.

No Member shall be allowed to borrow more than two volumes at one time, without special permission from the Council.

Mr. James J. F. X. King exhibited 35 species of *Trichoptera* and a group of *Neuroptera-planipennia*, intended to form the nucleus of a collection, which he stated had been prepared by the Museum Committee for the Kelvingrove Museum.

Mr. Thomas King exhibited specimens of *Mnium undulatum*, Hed., found by him in fruit at Innellan on 24th ulto.; and he stated that the moss, although common in most districts, is rarely found bearing capsules.

Mr. Peter Ewing exhibited flowers of coltsfoot, *Tussilago Farfara*, L., and made some remarks on the changes of position which the heads assume before and after the period of flowering. He also exhibited specimens of a hepatic, *Lophocollea bidentata*, N., in fruit.

Mr. James Steel exhibited a Peregrine Falcon, *Falco peregrinus*, shot near Bowling. After referring to the infrequency of the species in the district, he drew attention to the specimen, which possessed only one leg, and remarked that the absence of a limb did not seem to have interfered with the predatory habits of the bird, as it was found to have struck down a grouse just before being shot.

PAPERS READ.

I.—*On Sea-weeds.* By Mr. D. Gregorson.

An interesting description was given of the groups of marine

Algae, and the characteristics of many of the species found on our coasts. The author also referred to the best method of preserving these plants, and in illustration of his remarks he exhibited a large collection containing many beautiful specimens.

II.—*Meteorological Notes and Remarks on the State of Vegetation in the Public Parks of Glasgow during the Year 1882.* By Mr. D. M'Lellan, Superintendent of Parks.

In my closing remarks upon the weather of the previous year, which was a very unpropitious one, I expressed a hope that this year would turn out brighter and better for all concerned in the cultivation of the soil. This wish has, fortunately, to a certain extent been realized, as the following short summary of the statistics of each month will show:—

January was an exceptionally mild month for the season of the year—there being only 3° of frost registered, and the thermometer being below the freezing-point only on three mornings. Many plants were in flower out of doors at the various public Parks in the city, among them being daisies, polyanthus, marsh marigold, hepaticas, jasminum, *Daphne Mezereum*, rhododendron, snowdrop, and christmas rose. The total rainfall was 3·065 inches, and there were 18 days on which no rain fell. The average temperature was 40·5°, compared with 27° as the average temperature during the corresponding month of 1881. On the 6th of the month there was a very violent storm of wind, which did very considerable damage to trees and shrubs. The prevailing winds were from the south-west.

During the month of February there was a continuation of the same weather—mild and open—as was experienced during the preceding month; but towards the end of the month the wind was from the east, and very cold. In addition to the plants in flower during January, the blooms of the crocus, *Erica herbacea*, *Pulmonaria officinalis*, and mahonia were to be seen. The thermometer was only at and below the freezing-point on two mornings, and there was 1° of frost registered during the whole month. The temperature averaged 43·5°, while, in the month of February 1881, it was as low as 27°. The total rainfall was 3·089 inches, and the dry days numbered 13. The prevalent winds were south-west.

March was also a mild, moist month, and many more plants appeared in flower. Among them were the hyacinths, daffodil, hybrid rhododendrons, coltsfoot, *Scilla sibirica*, *Ribes sanguinea*, and *Bulbocodium vernum*, while a number of trees and shrubs were nearly in leaf. Only 6° of frost were registered during four mornings; and the average temperature was 43°, as compared with 35° in the corresponding month of the previous year. The total rainfall during the month was 3·05 inches, and there was no rain on 12 days. Winds were prevalent from the south-west.

April commenced with cold east winds, which continued during almost all the month; and as vegetation was very far advanced, owing to the mildness of the weather during the first three months of the year, it received a rather severe check. The horse-chestnuts suffered especially, and lost all the young tender leaves which had burst out in the beginning of the month. The white rhododendrons were in magnificent bloom during the first week of this month, but were entirely blighted on the evening of the 10th, when the thermometer fell below the freezing-point. The average temperature was 43°—the same as in the preceding month—and 9° of frost were, in all, registered. The rainfall was comparatively small, being only 1·99 inches, and there was no rain on 21 days.

May came in, as the saying is, “like a lion, and went out like a lamb.” The first fortnight of the month was very cold, and there were many heavy showers of sleet and hail which materially injured and retarded vegetation. But towards the end of the month the weather was much warmer and finer, which, to a certain extent, counterbalanced the bad effects of the first half of the month. This is the month during which many of the flowering trees and shrubs come into bloom, and the double cherry, thorns, lilacs, and laburnums gave a poor display of blossom. The oak came into leaf on the 8th and the ash on the 18th—these being the latest of our trees to put forth their leaves. The temperature averaged 50°, the total rainfall was 2·041 inches, and the dry days numbered 17. The prevalent winds during the first half of the month were from the north-east, and during the last half from the south-west.

June may be characterised as a genial, growing month, during which all vegetation made very rapid progress, and flowers were promising a good display of bloom for the month of August. Rain fell more or less on 18 days during the month, giving a total rain-

fall of 3·022 inches, and the average temperature was 55°. The prevalent winds were from the south-west.

During the month of July there were only 8 days on which no rain fell, and the rainfall reached the large total of 4·03 inches. The average temperature was 59°—a very low figure for a month which is usually one of the warmest in the year. With this extra amount of moisture, the great want of sunshine, and the consequent low temperature, flowering plants did not make the progress which is expected during this month, and which is necessary to mature their growth, and to produce a good display of flower. The prevalent winds were from the south-west.

August was an improvement on the preceding months, there being 19 days on which there was no rain, and the total rainfall being only 1·82 inches. The average temperature was not high—59°—being the same as last month; but during the first fortnight the weather was warm, and there was a fair amount of sunshine. Flowers, accordingly, made up a little of the way which had been lost during the preceding month, and during the last fortnight there was a fair display of blossom in the various Parks and Squares. Vegetation in general, however, had made good progress, and the foliage on trees and shrubs was very good.

September was, upon the whole, a good harvest month, with 14 dry days, and a total rainfall of 3·46 inches. The temperature averaged 53°, and the prevalent winds were from the south by west. Flowers began to show signs of decay towards the end of the month, as the plants had never got properly matured for the want of sunshine and heat.

The weather during the month of October continued much the same as during the preceding month, but there was more continual dripping. There was one continuous week of good weather, however, from the 23rd inst. to the 29th, which gave farmers an opportunity of getting in any crops which were still in the fields. The total rainfall during the month was 3·36 inches, and there were 15 dry days. The average temperature was 48°, and the thermometer was at or below the freezing-point on three mornings towards the end of the month, registering in all 10° of frost.

November proved to be the wettest month of the year, as the rainfall amounted to no less than 5·05 inches, with only 11 days on which there was no rain. There was also a very considerable fall in the average temperature, which was 38°, and the thermometer

was at or below the freezing-point on 11 mornings, registering in all 14° of frost. The prevalent winds were south by west.

The month of December was the most variable of the whole year, extremes of heat and cold recurring often within twenty-four hours. The temperature was at or below the freezing-point on 21 days, and 146° of frost were registered. On 6 days it never rose above 32°, the freezing-point. Rain, sleet, or snow, fell upon 18 days, giving a total of 4·042 inches of moisture for the month. The average temperature was 33°, as compared with 39° for the corresponding month of the year 1881. The prevailing winds were south by west on 16 days, and north by east and west on 15 days.

The following summary and comparison with the previous year may be of interest:

The highest day temperature during the year 1882 was upon the 18th May, when the thermometer registered 77° in the shade. In 1881 the highest day temperature was 82° in the shade, upon the 29th May.

The lowest night temperature was on the 15th December, when the thermometer fell to 9°, or 23° of frost. In January 1881 the lowest point reached was zero, or 32° of frost.

On 38 days during the year the thermometer fell below the freezing-point, registering a total of 193° of frost, as compared with 560° on 86 days in 1881. The average temperature was 46° in 1882, as against 45° in 1881.

Rain fell more or less on 192 days, giving a total rainfall of 41·035 inches, as compared with 160 days, and a rainfall of 33·03 inches during 1881. The rainfall during 1882 was thus in excess of the previous year by about 8 inches, and the number of wet days was increased by 32.

Although these statistics prove that the year 1882 was throughout an exceptionally wet season, still the temperature was fairly high throughout the year. Accordingly vegetation made rapid progress during the latter part of May and June; and as the months of August and September were fairly good, there was a display of flowers in the Parks which was greatly superior to that in the previous year.

Trees and shrubs flowered very sparingly during the spring months, owing to the immature state of the buds and wood—a result of the wet, unfavourable weather during the previous autumn. The unprecedented mild weather during the early spring months

brought on vegetation prematurely, and it received a severe check in the beginning of May. The early trees, such as the lime and chestnut, suffered most severely; and although they pushed out new leaves and wood, and recovered to a certain extent, the constitution of the trees is materially impaired.

Altogether the year 1882 has not been such a gloomy one as some of its predecessors, although the florist at least cannot look back upon it as a bright spot. Still the weather was suitable generally for the farmer, and this certainly is a matter of great congratulation. Sunshine was somewhat sparingly given us during the summer months; but we had a fine dry autumn, and the crops, which were generally heavier than usual, were got in safely and in good condition. It is a long road which has no turning, however, and as the two previous years of 1881 and 1882 have not been so bright and pleasant as some of their predecessors, we have every reason to hope that 1883 may be numbered among the good, prosperous, and prolific years.

Subjoined is the Meteorological Record for the last three years, as kept at the Queen's Park, Glasgow:—

*Copy of Meteorological Record kept at Queen's Park, Glasgow.
Rain Gauge above the Sea Level, 143 95.*

MONTH.	1880.				1881.				1882.			
	Rain-fall.	THERMO-METER.		Dry Days.	Rain-fall.	THERMO-METER.		Dry Days.	Rain-fall.	THERMO-METER.		Dry Days
		Average.				Average.				Average.		
		Max.	Min.			Max.	Min.			Max.	Min.	
January,	2·58	38	32	20	·40	32	22	27	3·65	43	38	18
February, ...	2·96	45	36	11	3·66	40	32	19	3·89	48	39	13
March,	2·24	46	33	23	2·44	44	32	13	3·50	48	38	12
April,	3·11	51	37	13	1·33	50	34	22	1·99	49	37	21
May,	1·06	57	40	21	3·46	62	42	17	2·41	60	40	17
June,	2·10	65	46	17	2·26	64	46	14	3·32	65	46	12
July,	4·18	66	49	18	3·80	65	51	11	4·03	67	51	8
August,	·76	69	51	28	3·33	63	48	17	1·82	68	50	19
September, ...	3·14	64	48	19	1·91	61	47	17	3·46	61	44	14
October,	·84	50	34	24	2·22	52	39	23	3·36	54	41	15
November, ...	5·52	42	31	12	5·03	50	37	9	5·50	44	33	11
December,	3·60	40	33	18	3·46	44	35	16	4·42	38	28	13
	32·09	53	39	224	33·30	52	39	205	41·35	53	40	173

27TH MARCH, 1883.

Mr. John A. Harvie-Brown, F.R.S.E., F.Z.S., President, in the Chair.

Mr. James J. F. X. King exhibited 12 species of *Olonata*, part of the Collection in course of preparation by the Museum Committee for the Kelvingrove Museum.

Mr. Thomas Scott, Corresponding Member, exhibited an unusual variety of *Helix nemoralis*, L., found one day last month in "Scott's Glen," in the neighbourhood of Greenock, by Mr. T. Fisher. Mr Scott stated that this variety is smaller than the typical *H. nemoralis*, is of a uniform greenish-yellow colour, and has a prominent white ridge, the shell being so thin that the ridge is distinctly seen through it. The tubercles on the body of the animal are rather coarser than usual, and there is a distinct white line extending down the back from near the bases of the upper tentacles. At each side of this white line there is a brownish band, then a band of lighter colour, the margin of the foot being darkish grey. This variety differs from the typical form in being smaller and having a white rib, and from the variety *hortensis* in having the shell of a uniform colour instead of banded. It may be identical with the variety mentioned in *Science Gossip* for January, 1883, and named *albo-labris*, Crowther.

Mr. W. Craibe Angus exhibited a Land Rail or Corn Crake, *Crex pratensis*, Bechst., shot, during a very severe storm, in Tiree, on the 23rd November, 1880. This bird was part of the "bag" of a party of three guns, the bag containing some 250 brace of birds—redshanks, water-rails, godwits, and snipe—the great majority being snipe. It had a wound in one of the wing bones, and this, although healed, made the wing stiff and somewhat contracted. The maimed wing doubtless explains why the bird had not accomplished its autumnal flight; and the gun had probably saved it from death by starvation. Although there are several records of the Corn Crake being shot in Scotland in winter, some of these are open to doubt; few of the birds having fallen into the hands of those capable of identifying the species. The bird, which belonged to Mr. Angus, has been presented to the Kelvingrove Museum.

Mr. John Kirsop, F.S.A. Scot., V.P., laid on the table three volumes of *Hepaticæ Britannicæ*, collected by Dr. Benjamin Carrington, Eccles, and Mr. William H. Pearson, Pendleton.

Mr. Henry E. Clark, M.R.C.S., exhibited three human skulls

from Peru which had been sent to him for examination by Mr. John Kirsop, F.S.A. Scot., V.P. One of these was quite entire, but the other two had been divided vertically so that only the face and anterior portions of the cranium remained. The teeth were sound and well-preserved, but showed marked evidences of attrition, possibly the result of the grain on which their owners fed being ground in mills formed of soft stone, the flour being thus mixed with traces of sand. All three skulls were greatly compressed antero-posteriorly, the forehead shelving backwards and upwards from the superciliary ridge. The complete skull resembled very closely the most compressed Peruvian skull figured in Morton's *Crania Americana*, but was even more distorted than that is represented to have been; and it had a capacity of 85 cubic inches, as compared with 90 cubic inches, the measurement of the average British skull. The occipital region showed very marked flattening, as did also the frontal region, but in the latter there was a central rounded prominence, probably due to the presence of a hole in the anterior compressing-board. Mr. Clark described the means by which this compression was exercised, and mentioned that only the children of the chiefs were subjected to the process; as far as could be ascertained it did not affect the mental qualities of the persons; and the skulls exhibited were of fair average capacity, giving no evidence of any arrested development. He also referred to the wide distribution of this singular custom, and remarked that it had prevailed in tribes the most diverse, between whom it was impossible to conceive that there had ever been any communication. The mutilated skulls exhibited were partly covered by the dried scalps; and the hair was long, dark, and straight, and not brown, as would have been the case had the skulls been buried amongst lime. The vertex of each of these imperfect skulls had been pierced, and through the hole passed a rope terminating in a rude tassel, showing that they had at one time been suspended, either as the trophies of a successful war, or more probably in the process of burial, for when whole skeletons had been found in Peruvian burial-places they were always in the sitting posture. It was noticeable that while the hole in the vertex had been made with some fine instrument, the vertical division had been done very roughly, appearing as if effected by means of a club or axe. Mr. Clark gave a brief summary of the evidence in support of the view that these skulls belonged, not to the race of Incas, but to an

older race which inhabited Peru at a remote period, but did not become totally extinct till some centuries after their conquest by the Incas. Their burial-places are of enormous extent, and show evidences of no small civilization.

Mr. John Kirsop, F.S.A. Scot., V.P., described the articles found along with these skulls, which consisted of pieces of coarse cloth, netting, fish-hooks, and rude needles. In some instances gold and other ornaments had also been found in the burial-places.

PAPERS READ.

From Bahia Blanca to the Rio Negro. By Mr. Ernest Gibson, Corresponding Member.

In this paper the author described his experience of a short trip to the Sierra de la Ventana range in the early part of 1881, with notes on the Fauna and Flora of the route.

A paper was also read by Mr. John A. Harvie-Brown, F.R.S.E., F.Z.S., entitled *The N.W. Coasts of Sutherlandshire and their Bird Life, including the Islands of Garbh and Bulgie.*

24TH APRIL, 1883.

Mr. Robert Mason, Vice-President, in the Chair.

The following gentlemen were elected Ordinary Members of the Society, viz.:—Messrs. Ernest E. Barker, 10 Grafton Square; David Rattray, 136 Mains Street; George Leslie, M.B., C.M., Old Manse, Falkirk; and Alexander Whyte, 140 Mains Street.

Mr. Thomas Scott, Corresponding Member, exhibited some Shells from the Glasgow and Paisley Canal, upon which he made the following remarks:—

Some time ago I happened to visit that part of the Glasgow and Paisley Canal a little east of Elderslie railway station; perhaps I should rather say the *bed* of the canal, for ere this the canal had been drained as far west as Elderslie for the purpose of allowing the formation of the new railway from Glasgow to be proceeded with.

Walking eastward along the bed of the canal, I was sorry to observe the great "slaughter of the innocents" that had taken place. *Anodonta cygnea*, L., was lying about in great abundance, and could be gathered in nearly all stages of growth from the ova

(in shells recently dead) up to the mature mollusc; and one could have filled a wheel-barrow with them in a very short time. The larger shells were nearly all half-buried in the mud, in the position in which the animal had lived. *Spharium corneum*, L., and *Bythinia tentaculata*, L., were in countless numbers; other species of aquatic shells were lying here and there, and among these the rare *Limnæa auricularia*, L. I am not aware that this species of *Limnæa* has before been recorded from the Paisley Canal, but I understand that Mr. J. M. Campbell of the Kelvingrove Museum used to find it here many years ago.

Among *Anodonta cygnæa* were one or two varieties which may be worth recording, viz.:—

- var. *radiata*, Müll. This variety when full grown is the finest of all the forms of the swan-mussel, measuring fully $5\frac{1}{2}$ inches. I found it to be rather rare.
- var. *incrassata*, Shepp. This variety, which is easily distinguishable from its great thickness across the umbones, I found to be the prevailing form among those I saw in the canal bed.
- var. *minor* (?) This form, of which I got a few specimens, is very stunted, and although evidently adult it measures not more than 3 to $3\frac{1}{2}$ inches in length. It will be observed from the specimen exhibited that in form it resembles var. *incrassata*; but being so decidedly smaller than usual, I have, for the sake of reference, named it "var. *minor*."

Professor John Young, M.D., F.G.S., made some remarks on the characteristics of the large and variable group of fresh-water *Unionidae*, referring more particularly to the genus *Anodonta*.

Mr. Donald Farquhar exhibited a number of lizards, snakes, molluscs, and other objects from Port Elizabeth, South Africa, collected by his brother, Mr. John Farquhar, formerly a member of the Society. He also made some remarks on the distribution and habits of the various species.

Mr. John Young, F.G.S., exhibited a specimen of *Productus scabriculus*, from Highfield, Blantyre, showing a broad marginal fringe; and he stated that this abnormal feature was very rare in species of the genus *Productus*. So far as he was aware this was the first time it had been met with in *P. scabriculus*.

Mr. George J. Combe laid on the table some large specimens of *Petasites alba*, collected by him at Kippen, Stirlingshire.

ABSTRACT STATEMENT OF ACCOUNTS,—SESSION 1881-82.

To Cash in Bank per last Account,	£14 14 2	By Rent and Attendance,	£2 2 6
„ Do. in Treasurer's hands per last Account,	1 3 7	„ Postages, Carriages, &c.,	12 17 9½
„ 161 Members' Annual Subscriptions at 5s.,	40 5 0	„ <i>Proceedings</i> "Illustrations,"	5 0 0
„ 25 New Members' Entry-money at 10s.,	12 10 0	„ Magazines and Books,	6 9 10
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„ <i>Proceedings</i> , &c., sold,	2 14 7½		
„ Interest from Bank,	1 5 10		
	<hr/>		<hr/>
	£81 0 2½		£81 0 2½

August 29th, 1882.—Compared with Vouchers and found correct.

(Signed) ARCHD. ROBERTSON.
JOHN STEWART.

LIST OF SOCIETIES, &c., WITH WHICH PUBLICATIONS ARE EXCHANGED.

- Alnwick.—Berwickshire Naturalists' Field Club.
 Amsterdam.—Koninklijke Akademie van Wetenschappen.
 Barrow.—Naturalists' Field Club.
 Basel.—Naturforschende Gesellschaft.
 Bath.—Natural History and Antiquarian Field Club.
 Belfast.—Naturalists' Field Club.
 Natural History and Philosophical Society.
 Birmingham.—Philosophical Society.
 Bonn.—Naturhistorischer Verein der Preussischen Rheinlande
 und Westfalens.
 Bordeaux.—Société Linnéenne.
 Boston.—Society of Natural History.
 Bremen.—Naturwissenschaftlicher Verein.
 Brighton.—Brighton and Sussex Natural History Society.
 Bristol.—Naturalists' Society.
 Brünn.—Naturforschender Verein.
 Brussels.—Société Entomologique de Belgique.
 Société Malacologique de Belgique.
 Société Royale de Botanique de Belgique.
 Budapest.—Királyi Magyar Természettudományi Társulat.
 Cambridge, Mass. Entomological Club.
 Nuttall Ornithological Club.
 Editors of "Science."
 Cassel.—Verein für Naturkunde.
 Cherbourg.—Société Nationale des Sciences Naturelles et Mathématiques.
 Chester.—Society of Natural Science.
 Christiania.—Royal University of Norway.
 Cincinnati.—Society of Natural History.
 Cordoba.—Academia Nacional de Ciencias.
 Danzig.—Naturforschende Gesellschaft.
 Davenport.—Academy of Natural Sciences.
 Dorset.—Natural History and Antiquarian Field Club.

- Dresden.—Naturwissenschaftliche Gesellschaft "Isis."
- Dublin.—Royal Dublin Society.
- Dumfries.—Dumfriesshire and Galloway Natural History and Antiquarian Society.
- Durham.—Tyneside Naturalists' Field Club.
- Eastbourne.—Naturalists' History Society.
- Edinburgh.—Botanical Society.
Geological Society.
Naturalists' Field Club.
Royal Physical Society.
- Elberfeld.—Naturwissenschaftlicher Verein.
- Essex.—Epping Forest and Essex Naturalists' Field Club.
- Florence.—Società Entomologica Italiana.
- Frankfurt.—Senckenbergische Naturforschende Gesellschaft.
- Gent.—Natuurwetenschappen.
- Glasgow.—Archæological Society.
Faculty of Physicians.
Geological Society.
Industrial Museum.
Mitchell Library.
Philosophical Society.
Stirling's Library.
- Giessen.—Oberhessische Gesellschaft für Natur und Heilkunde.
- Gorlitz.—Naturforschende Gesellschaft.
- Graz.—Naturwissenschaftlicher Verein für Steiermark.
- Griefswald.—Naturwissenschaftliche Vereine von Neu-Vorpommern und Rügen.
- Halifax.—Nova Scotian Institute of Natural Science.
- Halle.—Naturforschende Gesellschaft.
- Hamburg.—Naturwissenschaftlicher Verein für Hamburg-Altona.
- Heidelberg.—Naturhistorisch-medicinischer Verein.
- Helsingfors.—Societas pro Fauna et Flora Fennica.
- Königsberg.—Physikalische-ökonomische Gesellschaft.
- Leeds.—Naturalists' Club and Scientific Association.
Yorkshire Naturalists' Union.
- Leipzig.—Naturforschende Gesellschaft.
- Liège.—Société Royale des Sciences.
- Liverpool.—Naturalists' Field Club.
- London.—British Museum Library.
Editors Entomologists' Monthly Magazine.

- London.—Entomological Society.
 Royal Geographical Society.
 Geologists' Association.
 Hampstead Naturalists' Club.
 Linnean Society.
 Quekett Microscopical Club.
 Royal Microscopical Society.
- London, Ontario.—Entomological Society of the Province of Ontario.
- Lyons.—Société Linnéenne.
- Madrid.—Sociedad Española de Historia Natural.
- Metz.—Société d'Histoire Naturelle.
- Manchester.—Field Naturalists' and Archæologists' Society.
 Geological Society.
 Literary and Philosophical Society.
 Scientific Students' Association.
- Moscow.—Société Impériale des Naturalistes.
- Münster.—Westfälischer Provinzial-Verein für Wissenschaft und Kunst.
- Neuchâtel.—Société des Sciences Naturelles.
- Newhaven, Conn.—Academy of Arts and Sciences.
- New York.—Linnæan Society.
- Northampton.—Natural History Society.
- Norwich.—Norfolk and Norwich Naturalists' Society.
- Nürnberg.—Naturhistorische Gesellschaft.
- Padua.—Società Veneto-Trentina di Scienze Naturali.
- Paisley.—Free Library.
- Paris.—Société Entomologique de France.
 Société Zoologique de France.
- Passau.—Naturhistorischer Verein.
- Perth.—Perthshire Society of Natural Science.
 Scottish Naturalist.
- Philadelphia.—Academy of Natural Sciences.
- Plymouth.—Plymouth Institution, and Devon and Cornwall Natural History Society.
- Poughkeepsie.—Vassar Brothers Institute.
- Prague.—Königl.-Böhm. Gesellschaft der Wissenschaften.
- St. Louis, Miss.—Academy of Science.
- Salem, Mass.—Essex Institute.
- Schaffhausen.—Société Entomologique Suisse.
- 'Sgravenhage.—Nederlandsche Entomologische Vereeniging.

- Staffordshire.—North Staffordshire Naturalists' Field Club.
Stettin.—Entomologische Zeitung.
Stuttgart.—Verein für Vaterländische Naturkunde in Württemberg.
Trieste.—Società Adriatica di Scienze Naturali.
Truro.—Royal Institution of Cornwall.
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33787

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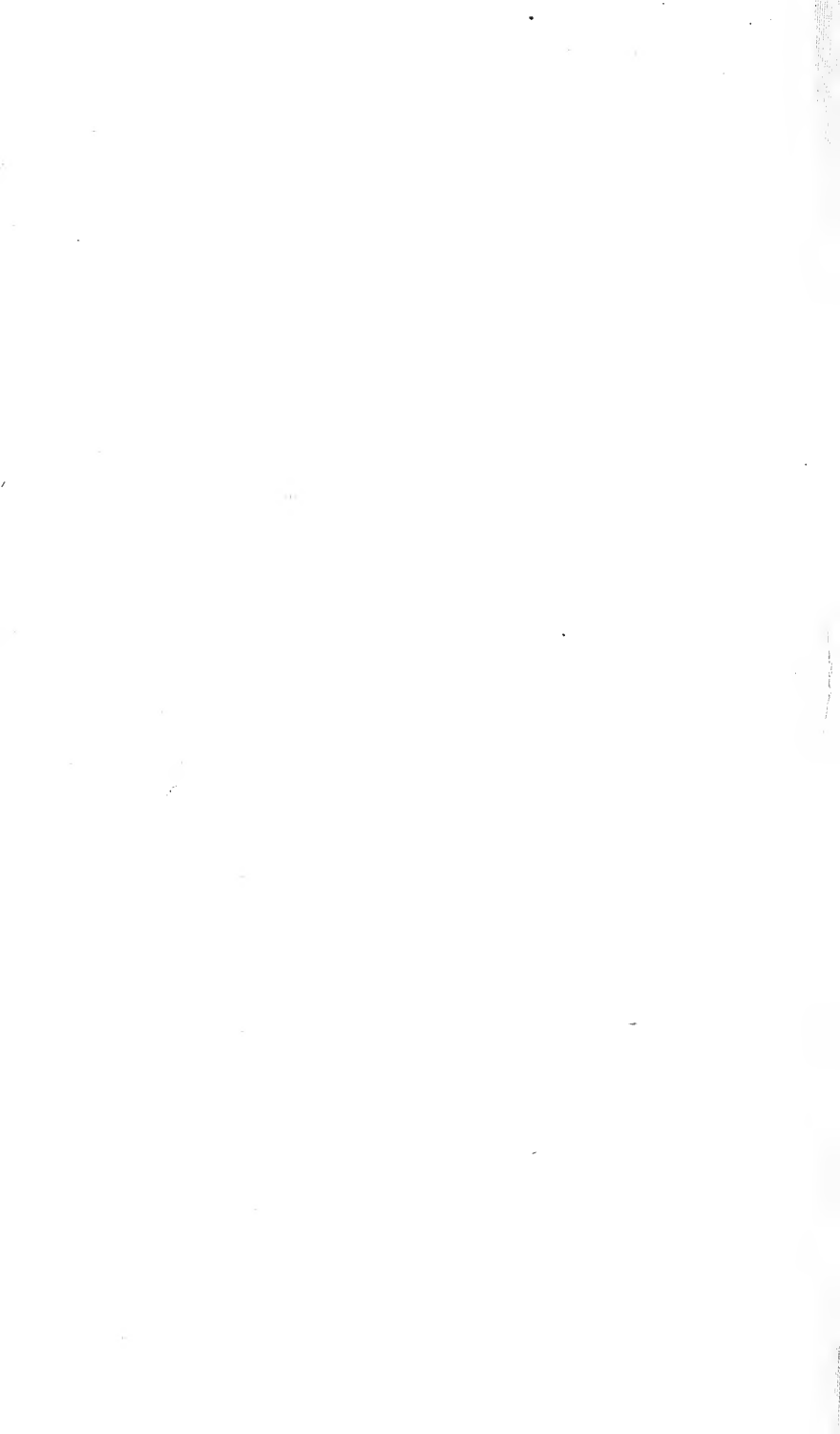
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In Preparation.

GENERAL INDEX TO THE PROCEEDINGS OF THE NATURAL HISTORY SOCIETY OF GLASGOW.

This Index will afford a convenient means of reference to the contents of vols. i.-v. of the Proceedings, and is suitable for binding at the end of vol. v.



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