



878



TRANSACTIONS  
OF THE  
NATURAL HISTORY SOCIETY  
OF GLASGOW

(INCLUDING THE PROCEEDINGS OF THE SOCIETY).

VOL. VII. (NEW SERIES.) PART I.

1902-1903.

WITH TWO PLATES.



GLASGOW: PUBLISHED BY THE SOCIETY  
AT ITS ROOMS, 207 BATH STREET.

DECEMBER, 1904.

*See T.P. 1905*

S. 101. A. 12.

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PRESENTED

30 APR. 1907



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Page	54,	line	3,	for	<i>fragillifolia</i>	read	<i>fragilifolia</i> .
..	..	..	7,	..	<i>ovat</i>	read	<i>ovata</i> .
..	..	..	8,	..	<i>serpyfolia</i>	read	<i>serpyllifolia</i> .
..	55,	..	15,	..	<i>stellujera</i>	read	<i>stellulifera</i> .
..	58,	..	6,	..	<i>Pressia</i>	read	<i>Preissia</i> .
..	79,	..	13,	..	<i>Eriophila</i>	read	<i>Erophila</i> .
..	87,	..	30,	..	<i>Jamesonilla</i>	read	<i>Jamesoniella</i> .
..	115,	..	33,	..	Hydrocharidacea	read	Hydrocharidacea.
..	117,	..	2,	..	<i>Roestalia</i>	read	<i>Raestelia</i> .
..	..	..	9,	..	<i>azoides</i>	read	<i>aizoides</i> .
..	119,	..	26,	..	<i>sphagnii</i>	read	<i>sphagni</i> .
..	..	..	28,	..	<i>ornithopodiodes</i>	read	<i>ornithopodioides</i> .
..	190,	..	10,	..	<i>pratense</i>	read	<i>pratensis</i> .
..	..	..	30,	..	<i>denundatum</i>	read	<i>denuclatum</i> .
..	192,	..	5,	..	"Schuns"	read	"Schum."
..	193,	..	4,	..	<i>Ægopodium</i>	read	<i>Ægopodium</i> .
..	210,	..	25,	..	<i>Cetomia</i>	read	<i>Cetonia</i> .

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Natural History Society of Glasgow.

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List of Birds observed on eight several visits to Loch Roag, Outer Hebrides, in the months of June and July, from 1886 to 1902.

By DAVID BRUCE.

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[Read 30th September, 1902.]

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*Turdus musicus*, Linnaeus.—Song Thrush. Common. The pre-eminent song-bird of the Lewis, where birds of the Passerine order are few, owing to the entire absence of hedges and shrubbery.

*T. merula*, L.—Blackbird. Common in the woods around Stornoway Castle, otherwheres scarce.

*Saxicola oenanthe*, L.—Wheatear. Very plentiful.

*Pratincola rubicola*, L.—Stonechat. Observed a pair in the whins near Stornoway.

*Erithacus rubecula*, L.—Redbreast. Common around Stornoway Castle, otherwheres scarce.

*Phylloscopus trochilus*, L.—Willow-Wren. Only observed at Stornoway Castle.

*Accentor modularis*, L.—Hedge-Sparrow. Common.

*Troglodytes parvulus*, Koch.—Wren. Common.

*Motacilla lugubris*, Temminck.—Pied Wagtail. Only observed a few times.

*Anthus pratensis*, L.—Meadow-Pipit. Common.

*A. obscurus*, Lathan.—Rock-Pipit. Very common around the rocky shores.

*Hirundo rustica*, L.—Swallow. Observed a pair at Bernera, Loch Roag.

*Passer domesticus*, L.—House-Sparrow. Only observed at Stornoway.

*Linota cannabina*, L.—Linnet. Observed, but not often.

*L. flavirostris*, L.—Twite. Common.

*Emberiza miliaria*, L.—Corn-Bunting. Very common.

*E. schoeniclus*, L.—Reed-Bunting. Only observed once.

*Sturnus vulgaris*, L.—Starling. The most abundant bird around Stornoway and on Loch Roag.

*Corvus monedula*, L.—Jackdaw. Observed at Stornoway.

*C. corax*, L.—Raven. Occasionally seen on Loch Roag.

*C. cornix*, L.—Hooded-Crow. By far too plentiful.

*C. frugilegus*, L.—Rook. A rookery of over thirty nests now (June, 1902) in full swing in the woods around Stornoway Castle. Until a few years ago the bird was unknown except as a straggler driven by stormy easterly winds to the Lewis.

*Alda arvensis*, L.—Sky-Lark. Fairly plentiful.

*Cuculus canorus*, L.—Cuckoo. Occasionally heard.

*Accipiter nisus*, L.—Sparrow-Hawk. Only seen once.

*Falco peregrinus*, Tunstall.—Peregrine Falcon.—The most plentiful of the Raptores, took a nest with young from Uig in 1892. A nest or two may be got every year from the Old Hill, and probably a nest or two from each of the eight or nine Flannan Islands, where, in the millions of Puffins, Razor-bills, and Guillemots, the supply of food is abundant.

*F. aesalon*, Tunstall.—Merlin. Occasionally observed.

*F. tinnunculus*, L.—Kestrel. Only observed once.

*Phalacrocorax carbo*, L.—Cormorant. Not plentiful. Shot at an albino of this species in 1896 at the Flannan Islands, but failed to get it. In September, 1900, a bird shot on Loch Roag was sent to me under the impression that it was the same bird, but it proved to be a young female whose ovary contained three eggs size of No. 8 shot, and over thirty not larger than herring roe.

*P. graculus*, L.—Shag. Abundant, perhaps twenty times more numerous than *P. carbo*.

*Sula bassana*, L.—Gannet. Frequently seen fishing on Loch Roag in the nesting season, although their nearest nesting-

places are the Stack of Suleskerry, 80 miles to the N.E., and Boreray, in the St. Kilda group, 80 miles to the S.W.

*Ardea cinerea*, L.—Common Heron. Only occasionally seen, although said to be plentiful.

*Anser cinereus*, Meyer.—Grey Lag-Goose. Nests every year on Pabba, one of the Loch Roag islands.

*Bernicla leucopsis*, Bechstein.—Barnacle-Goose. Found the remains of this bird on Maskerry, another of the Loch Roag islands.

*Tadorna cornuta*, S. G. Gmelin.—Common Sheld-Duck. Observed by Dr. Herbert Langton, M.B.O.U., who was with me this year.

*Anas boscas*, L.—Wild Duck. Fairly common.

*Nettion crecca*, L.—Teal. A pair observed in 1898.

*Clangula glaucion*, L.—Golden-eye. Observed by Dr. Langton, M.B.O.U.

*Somateria mollissima*, L.—Common Eider Duck. Has greatly increased in numbers these sixteen years. Now nesting on most of the islands in Loch Roag and, although the birds are much harried by the natives, who have discovered that the egg when fresh is a very fine food, seem to go on increasing.

*Mergus serrator*, L.—Red-breasted Merganser. Common.

*M. albellus*, L.—Smew. Observed by Dr. Langton, M.B.O.U.

*Columba livia*, Gmelin.—Rock Dove. Plentiful.

*Lagopus scoticus*, Latham.—Red Grouse. Not very plentiful in a country where heather abounds.

*Crex pratensis*, Bechstein.—Corn-Crake. Fairly common.

*Gallinula chloropus*, L.—Moor-Hen. Observed once.

*Aegialitis hiaticola*, L.—Ringed Plover. Common.

*Charadrius pluvialis*, L.—Golden Plover. Not observed often.

*Vanellus vulgaris*, Bechstein.—Lapwing. Sometimes seen, but the bird is rather rare than common in the Lewis.

*Streptilas interpres*, L.—Turnstone. A few birds seen on occasional visits.

*Haematopus ostralegus*, L.—Oyster-Catcher. Very common. I found the droppings of this bird largely composed of crushed mussel shells which leads me to think that the bivalve must be swallowed whole.

*Gallinago coelestis*, Frenzel.—Common Snipe. Fairly common.

*G. gallinula*, L.—Jack Snipe. Heard at Scalliscrow, Uig, midnight, June 29, 1896.

*Tringa alpina*, L.—Dunlin. Only observed twice.

*Totanus hypoleucus*, L.—Common Sandpiper. Fairly common.

*T. canescens*, Gmelin.—Greenshank. A few pairs nest from year to year on the shores of Little Loch Roag.

*Numenius arquata*, L.—Common Curlew. Not often seen.

*N. phaeopus*, L.—Whimbrel. Occasionally seen.

*Sterna macrura*, Naumann. Arctic Tern. Abundant. A colony of perhaps 1,000 pairs nest year after year on the island of Maskerry, while a few nests may be found on every island and islet on Loch Roag.

*S. fluviatilis*, Naumann.—Common Tern. Present, but in comparatively small numbers.

*S. minuta*, L.—Little Tern. Observed at the Narrows, Loch Roag in 1896.

*Larus ridibundus*, L.—Black-headed Gull.—A few observed nesting on small islets in fresh-water lochs.

*L. canus*, L.—Common Gull. Common.

*L. argentatus*, Gmelin.—Herring Gull. Fairly common, but not nearly so plentiful as *L. fuscus*.

*L. fuscus*, L.—Lesser Black-backed Gull. Abundant.

*L. marinus*, L.—Great Black-backed Gull. Fairly common.

*Rissa tridactyla*, L.—Kittiwake Gull. Rarely seen on Loch Roag. Many large colonies nesting on the Flannan Islands.

*Stercorarius crepidatus*, Gmelin.—Arctic or Richardson's Skua. Observed at sea, off Gallon Head.

*Alca torda*, L.—Razor-bill. Abundant. Thousands nesting on the Flannan Islands.

*Uria troie*, L.—Guillemot. More abundant than the Razor-bill. Nesting on the Flannan Islands.

*U. grylle*, L.—Black Guillemot. Plentiful on Loch Roag.

*Fratercula arctica*, L.—Puffin. Very many breeding on the Flannan Islands, but not often seen on Loch Roag in breeding season.

*Mergulus alle*, L.—Little Auk. Have found remains washed ashore.

*Columbus glacialis*, L.—Great Northern Diver. Frequently seen.





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*C. arcticus*, L.—Black-throated Diver. Frequently observed.

*C. septentrionalis*, L.—Red-throated Diver. Frequently observed.

*Podiceps fluviatilis*, Tunstall.—Little Grebe. Observed by Dr. Langton, M.B.O.U.

*Fulmarus glacialis*, L.—Fulmar. Often observed at sea, near the Flannan Islands, and sometimes on Loch Roag. Eggs taken this year (1902) from Flannan Islands by Dr. H. Langton, M.B.O.U.

*Procellaria pelagica*, L.—Storm Petrel. Observed at sea off the Flannan Islands, where, on the authority of the lighthouse-keeper, I understand it nests.

*Oceanodroma leucorhoa*, Vieillot.—Leach's Fork-tailed Petrel. Had a bird and an egg sent to me this year from the Flannan Islands.

*Puffinus anglorum*, Temminck.—Manx Shearwater. As far as I know only breeding on the Stack of Berissay, Loch Roag. Have observed the bird at sea near the Flannan Islands, where it probably also nests.

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## Reminiscences of the Early Days of the Natural History Society of Glasgow.

By WILLIAM FERGUSON, of Kinmundy, LL.D., F.L.S., F.G.S.,  
F.S.A. Scot.

PLATE I.

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[Read 27th November, 1902.]

I ESTEEM it a very high honour to have been asked to give an address to the Natural History Society of Glasgow in this its fifty-second session, and it is a great pleasure to me to be here to-night and speak to an association of which I was one of the original founders nearly fifty-two years ago.

During the decade of the forties there was a group of very energetic and enthusiastic young men in Glasgow pursuing

with devotion and perseverance various branches of natural history. Among these were Thomas Gray, in the department of conchology, who had gathered a magnificent collection of shells; his brother, John Gray, devoted to entomology; Robert Gray, no relation of the already-mentioned Grays, great in birds, and the author of a standard work, *The Birds of the West of Scotland*; Wm. Gourlie, distinguished in botany, and also a good conchologist; Dr. W. S. Lorrain, interested in general natural history; James R. Fraser, with geological proclivities; my brother, Thomas, entomology and birds; my own subjects, botany and geology. There were others, whom I have forgotten, but these were all very closely allied, and met often at each other's houses, and on holiday excursions, to help and encourage one another in our various fields of investigation.

It was out of this association of congenial pursuits that the Natural History Society originated, and my brother has preserved among his notes an account of its birth. It was on the 2nd July, 1851, and here is the note—"J. P. Fraser having called a meeting of naturalists for to-night in the Thistle Coffee Room, it was very well attended, all who were asked having come forward, viz.:—Mr. Gourlie, four Grays, Dr. Lorrain, Bell, and I, and we immediately set about forming an association for the purpose of having excursions, &c., and several rules were unanimously agreed to."

Then again on the 9th—"There was a meeting of the Natural History Society to-night, at which Dr. Scouler, of Dublin, was elected honorary president, and delivered an essay 'On the Symmetrical Arrangement of Plants and Animals,' which was listened to with great attention and interest."

The original members of the Society were thus:—

Dr. Scouler.	J. P. Fraser.
Wm. Gourlie.	Wm. Ferguson, } Bros.
Dr. W. B. Lorrain.	Thos. Ferguson, }
Thomas Gray, } Bros.	Wm. Keddie.
John Gray, }	H. Colquhoun.
Robert Gray, } Bros.	
Archd. Gray, }	

Twelve in all.

Of these twelve only three are now alive—Mr. Thomas Gray, my brother, and myself.\*

About a year before the formation of the Natural History Society, another association of naturalists resident in the West of Scotland, and chiefly connected with the Philosophical Society of Glasgow, was formed for the elucidation of the natural history and geology of Clydesdale. The district they selected as the scene of their labours was briefly defined as "The Clyde and its Tributaries." The geological section were to terminate their labours at Toward Point on the one side and Inverkip on the other. The entomologists were to include Arran in their field, whilst the marine department was to extend as far as Ailsa Craig. The botanists were even then pretty well on with their work, the information already acquired only needing to be in some instances verified and the whole arranged. In the observing and collecting of insects considerable progress had been made. Interesting discoveries rewarded the labours of the geological section. They found it indispensable to employ an agent to collect fossils, and they had to acquire and even prepare maps and sections. They were able to avail themselves so far of the collections of fossils which had been previously made, such as that belonging to the committee of the local museum which was collected when the British Association met in Glasgow in 1840. It was hoped that these collections, with those to be made by the new association, would one day form the nucleus of a local geological museum worthy of Glasgow. Whether this has now been accomplished I cannot say.

The sections and their secretaries, so far as formed, were—

A.	I.—Geology,	-	-	-	W. Ferguson.
B.	II.—Botany,	-	-	-	W. Gourlie.
C.	III.—Zoology,	-	-	-	R. Gray.
D.	IV.—Articulata,	-	-	-	R. Gray.
E.	V.—Insecta and Arachnida,				R. Hislop.
F.	VI.—Mollusca,	-	-	-	T. Gray.
G.	VII.—Ichthyology,	-	-	-	R. Gray.
H.	VIII.—Ornithology,	-	-	-	John Mactier.

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\* While this paper is in the press for publication, news has come of the lamented death of Dr. Ferguson.

I don't know how far any of these sections carried their work, as I left Glasgow in February, 1852, but, as far as the geological section was concerned, I have still notes of a meeting of that section on May 14th, 1850. At it several papers on local geology were mentioned as having been obtained, which had originally appeared in the Highland Society's *Transactions*. One of these was by Dr. Rankin on the geology of Carluke, and this was interleaved and annotated by the author so as to bring up the subject to that date, these notes having been made expressly for the section. The existence of eight other papers on local geology, and their titles, was intimated.

I cannot find any further notes of the section's work, but an agent was obtained and set to work on the fossils of the Upper Ward. Through him (Mr. Dorem) a large number of fossils was obtained, and on the 4th December, 1850, I exhibited a number of them, with notes, to the Philosophical Society. The specimens shown were from a mass of upwards of 1,500, which at the time were laid out on tables in one of the rooms of the Andersonian, but which, I have been told, have long since been swept away as rubbish. The selection exhibited were from five different localities—Brockley, Craigbank, Trows, Coalburn, and Auchinbeg, all in the Lesmahagow district. I need not trouble you with any details of these notes, but I may mention that one of the specimens enabled Dr. Scouler to decide a point of which he was not before certain, namely, that the spines which characterise one of the species of the fossil *Productus* are hollow.

I have not been able to find any records of work done by the other sections, but that work was done and some of its fruits recorded is, I think, shown by the early records of the Natural History Society. Thus, I find that at its third meeting, on 5th August, 1851, Mr. John Gray read a paper "On the *Hydrocanthari* of the West of Scotland," with illustrative specimens. On the 4th October of same year, Dr. Lorrain gave "Some Observations on *Helices*." On 6th January, 1852, Mr. Roger Henedy submitted "Contributions to the Natural History of Clydesdale, from the Flora and Fauna of Gourrock." On 6th April, 1852, Dr. Landsborough sent "Some Observations on *Hippothou divaricata*," and Mr. H. D. Graham, Iona,

“On the Habits of the Ice Duck, *Harelda glacialis*.” On 5th October, same year, Mr. John Gray read “On the Local Distribution of the British Sphagidae.” These are merely specimens of local work culled from the notices of meetings I have preserved as long as I remained a regular member, but I left Glasgow for Liverpool in February, 1852, and on 4th July, 1854, your *Proceedings* say—“The annual general meeting was held this evening. Dr. Colquhoun occupied the chair. After the usual routine business, Mr. William Ferguson, of London [where I had then gone to reside], was unanimously elected an Honorary Member.”

It may interest you if I give an account of some of our excursions in pursuit of our various branches of research, and I will first speak of our visit to the coal and ironstone mines belonging to Mr. Kincaid, of Lennox, in the neighbourhood of Campsie. This took place on the 27th July, 1850. The party were—Mr. Robert Gray and his brother, Mr. Wm. Garden, Mr. Andrew Williamson, my brother, and myself. Mr. Mackintosh and Mr. James Stevenson joined us at Lennoxton. We were accompanied to the mines by Mr. Dempsey, who worked in them before they were discontinued. Three small urchins also accompanied us.

The valley in which Campsie lies is formed by the elevation of two series of trap hills, those on the north side being high, and known as the Campsie Fells. The carboniferous strata do not exist in the centre of the valley, but occur tilted up against the volcanic hills on both sides. The mines we were visiting are in the range of hills to the south of the village, and the entrance to them is distant some quarter of a mile from the railway station.

On arrival we went to Mr. Galloway's office, where Mackintosh met us, and where we divested ourselves of our upper respectable garments and assumed garbs more suited to the work we had in hand. We could only muster three lamps and four candles, which was rather a small supply for eleven people. Dempsey had previously had the mine examined, and, as there was water in it, he intended taking us through the first stage in a waggon with a pony. We accordingly got all packed into a coal truck, and proceeded into the mine. Unfortunately, however, several

patches of the roof had given way, so that the rails were blocked, and it was impossible to take in the waggon. We accordingly had to get out and leave it, proceeding on foot. In some places the water was half-way up to our knees, and this, perhaps, for two hundred yards. At some distance from the mouth we came to a formidable obstacle. A large portion of the roof had given way, and we had to scramble over the debris, betwixt which and the roof there was just sufficient room to crawl on our bellies, and no more. Williamson, Gray, and my brother had come for the special purpose of capturing a very rare moth, *Tinea stella*, found only in this mine. I had gone to see the geology of it, and for general purposes. Garden and Stevenson were prompted by curiosity. When we had gone in a good way we moved off into a side working to the left or west, where the *Tineas* had been found plentifully on a former occasion. Going up about a hundred yards, we came to a second considerable slip. It was easily got over, but when we went down the opposite side we found the air was not good. The lamps burned dimly, and the candles went out altogether. This being the case, we deemed it advisable to retrace our steps. Before doing so, Dempsey retrimmed the lamps, but forgot to bring away the oil flask with him. We did not notice this omission at the time, nor, indeed, until it was too late to rectify the mistake. Up to this time one or two *Tineas* had been seen, but none captured. The foul air had a palpable taste, but I did not feel my breathing affected in the slightest degree. I felt slightly nervous, however, when my light went out three times in succession, and thought it best to be off. We went back till we came to the main way. Mackintosh was first, and set off up the principal adit, taking one of the boys with him, who was to come back and tell us if *Tineas* were to be had. Williamson also went with him. The rest of us waited a while, and then sent the other two boys up to see if they were going to return. When we had waited half-an-hour, which we spent in examining the limestones and shales for fossils, we tired, and set off up the main line after the others. We had gone some way when Mackintosh and one of the boys met us. They had found *Tineas*, and had come down to see if we were coming up. I immediately set off to join Williamson, who was

a quarter of a mile further on. In some places the roof was very low, so much so that even bending my knees and stooping as much as possible I rubbed my back upon it, and it was very severe upon the neck and back stooping so and having to look out for the road and the roof at the same time. I found Williamson sitting composedly in ambush for Tineas at a point fully three-quarters of a mile from the entrance. Up here the dust was nearly as annoying as the water was at the lower part of the mine. It was eight to ten inches deep, and we sank in it as in mud. We could not help stirring it up with our feet; it was almost suffocating.

We waited here for a considerable time expecting the others, but no one came. We had two lamps and one candle, but the candle was nearly done, as also was the oil. This, as well as the lateness of the hour—it was now four o'clock—induced us to return. Williamson had caught several Tineas, and I had caught four for him, so we had little inducement to stay. By the time we got back to the place where I had left the rest my candle was done, and, to save oil, we had previously put out the lamps, having only one left to the five of us. A sudden gust extinguished our only light, and we were all left in total darkness, nearly half-a-mile from the outer air. Luckily some of the boys had matches, and we got a light again. But we could see no sign of the others, so presumed they had tired waiting and gone out. We therefore hastened on with one lamp, which I carried, going first, and got back to the slip, which we passed safely, and so wading through the waters reached the place where we left the pony and waggon. We found the pony standing just as we had left it, and this showed us our friends were still in the mine. We got the waggon mounted on to the rails, harnessed the pony, tumbled into the truck, and got back into the open air again. How beautiful was the light of day after being immured for nearly three hours in that horrible place. It was nearly six when we emerged, and the others soon followed. We were pretty figures with oil and grease and coal dust and iron-ore water, but we sorted ourselves as best we could at a small spring, and had a good drink of water medicated with orange shrub.

Mr. Dempsey had told me that at his other works on the

opposite or north side of the valley, very strangely shaped stones were got. One that day had been taken out shaped quite like a man's foot. This roused my curiosity, and I wished to see them. So he took me over. We had about two miles to go to the foot of the Campsie Fells and beyond the fields. We found the lime workings open. A very thick coating of diluvium, till, or boulder clay covers the limestone. The limestone comes out in huge masses, and the whole is very much waterworn. When they began to work it at first it was even looser than it is now. It would appear to be a mass of large limestone boulders, or rather the limestone has been split up into large masses, the surfaces and sides of which have been subjected to the violent action of water. The lump he had spoken of had been broken up, but enough remained to show that it had derived its shape from being water-worn. One mass still *in situ* presented a strong resemblance to a horse's head, ears and all. The limestone contains fossils—*Productus*, *Spinifer*, *Ammonite*, &c. This limestone is above the coal, which is wrought beside it in pits about ten feet deep. It is the same as is found on the south side. In the latter mine there is coal, then blaze or alum schist, and above that the limestone. The coal is very full of pyrites. Considerably further down the hill, and nearer to the village, a shale crops out on the roadside, perfectly full of *Productus* and other fossils. The limestone is very compact, and the fossils in it are few.

It was on this occasion that I first met with one who afterwards became a well-known geologist and author, and Curator of the Hunterian Museum—Mr. John Young. My note at the time was—"While standing in the crowd at the station, hammer in hand, I was accosted by an intelligent-looking man, who asked if I had been geologising. I said I had, and told him where and with what success. We entered into conversation, and I found he knew a good deal about geology, and had examined the district. He told me of a fine section of encambal limestone on the Glassert, and showed me specimens he had from it." This was the beginning of a valued friendship, which led to interesting correspondence and to more than one delightful excursion under the valuable guidance of his local knowledge.

[Dr. Ferguson then described at some length two other very

interesting excursions which he had made in these early days of the Society's history. One of these was on 17th August, 1850, to Glenwhapple or Craigen Glen; the other was on the Queen's Birthday, 22nd May, 1857, to explore the limestone workings of Corrieburn, on the south-east face of the Campsie Hills, and afterwards to cross them towards Lennoxton. After a graphic narrative of these excursions, the lecturer concluded by saying:—]

I have notes of many other excursions in the neighbourhood of Glasgow, but I must not tax your patience longer. I have mentioned these as specimens of the field full of interest which lies round about you here in Glasgow. I have dwelt chiefly on the geological aspects, as these were more immediately in my line; but other branches of natural history were equally illustrated. For instance, here is one of my brother's notes—“On breaking up a portion (in Corrie Glen), Mr. Frazer laid open a chrysalis, which he gave me, which I kept, and hope it may emerge perfect.” Then, under date 10th July, forty-nine days later—“On the 5th I omitted to note the appearance of a moth from a chrysalis which J. P. Frazer had exhumed while looking for fossils at Corrie, and which he gave me at the time. It turns out to be *Graphireptora remigora*, a rare insect.”

The writing of these notes has recalled to me the memory of many interesting scenes and many friendships, now, alas! closed by the cold hand of death. If I have interested you for these minutes in the fragmentary story of an olden time, or evoked a desire to further investigate the secrets of nature which lie so richly around you, and whose revelations always amply repay the students of their mysteries, I am well rewarded. To come here and visit this scene of your labours has been a rare treat to me. But I fear I have come far short of your expectations. I can only say I have done my best, and beg you to accept the will for the deed, and forgive me for any disappointment I have caused you.

My best wishes are for the continued success and growing usefulness of your Society, and it is my pride to-day that I had to do with the originating of an association which has such a splendid record of useful work as is yours.

## Experiments on the Thickening of Some Tree Stems.

By R. S. WISHART, M.A.

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[Read 23rd December, 1902.]

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IT has long been known that the assimilated sap passes from the leaves to where it is to be used or stored, through the parenchyma and thin-walled bast tissue. That it descends through the bast of the stem of a dicotyledonous tree has often been demonstrated by removing a ring of this tissue from right round the stem, and showing that by this the downward current is checked. Where time and opportunity are available, an experiment of this kind is most instructive, and may well be recommended to all students or instructors in what is now called "Nature Knowledge." The ways of accomplishing it may be various; but the best and surest way is to cut out a ring right into the wood, and see that the wood is scraped clean, so that none of the bast is left, and that the cambium is also scraped out along with it. This is usually what is recommended and done. But in some cases at least the experiment may be performed in a simpler manner. In November, 1897, I tied a branch of Sycamore tight with a hard cord wound three times round about it, and waited for future developments. As soon as the summer growth of the following year began, the well-known bulging at the cord was apparent. To begin with, there was a bulging below as well as above, and this was my repeated experience, although we usually hear only of the bulging above the cause of the interruption. My experiments, however, have most frequently been worked upon branches and not upon main stems, and this might account for supplies of assimilated food being to some extent conveyed from below towards the point of interruption. In any case temporary supply might have come from stored food. The result was that, by the end of the first summer's growth, the bulging above was not much greater than the bulging below. This growth of the under portion was, however, only temporary,

and next year things turned out very differently. During the second summer the portion of the branch below the cord increased none in thickness, or at least to no perceptible extent, while all above the cord grew and thickened as if there had been no interruption, and the bulging close to the cord went on in the most typical fashion.

The third season showed a continuance of what was accomplished in the second, and by the end of June there was a marked difference between the thickness of the stem below the binding cord and that of the portion above it. Unluckily, at this stage a severe night of wind and rain became too much for the heavily foliated branch, and snapped it through at the contracted part. This put a sudden end to the experiment as far as that particular specimen was concerned.

It was in March, 1901, that I cut out the ring in the Sycamore stem herewith shown, so that it has had the growth of two summers to produce the appearance it now has. An inch and a-half below the ring it measures  $5\frac{1}{8}$  inches in circumference, while at the same distance above it the circumference is  $6\frac{1}{16}$  inches. This makes nearly an inch of difference between the two, as the result of growth under restrained circumstances for two summers. It is interesting also to see that the upper portion shows two rings of wood more than the lower, the former having seven, while the latter has only five. In both it can be observed that the fourth is the greatest, so that this tree must have had a particularly favourable growth in the year 1899. The result of the last cold summer (1902) is that the final ring on the upper portion is decidedly smaller than any of the others.

Experiments of this kind have long been used for a double purpose—firstly, to show that the ascending sap is conveyed through the wood; and, secondly, that the assimilated sap passes through the bast. The first point is established by the fact that the leaves go on as if no interruption were made, and even if you cut out a ring of bast, as I have done from a Sycamore, when the tree is in full leaf in summer, the leaves show no sign of drooping. Then the check to the thickening of the stem below the ring shows that the supply from above has been cut off.

I have also tried the Sycamore with a spiral curve cut out of the bark, and it gave as the result a spiral thickening following the upper side of the cutting. The same thing is seen in this ash walking stick, which I have shown in the Society before, and in which the twining of a Honeysuckle caused the interruption of the downward flow of sap sufficiently to induce a spiral thickening of the stem above the spiral coil of the binding Honeysuckle. The grains of the wood can be seen to run in a natural perpendicular direction along the central portion of the stick, but they take the spiral course in the wood formed since the binding was effected. In this case, instead of arresting the downward flow of assimilated sap, the interruption only changed its direction. Following this change, the cambium and hence the new conducting tissue and the new wood also change in such a way that the lengths of their cells and vessels take the direction of the spiral instead of a course parallel to the axis. The result is the formation of what looks, in the distance, like one branch twined round another, but which on closer inspection reveals its true origin. When this stick was cut the Honeysuckle was still adhering tightly, and the mark of it is yet clearly seen. Both below and above the portion round which the plant twined the thickening is normal, and it is interesting to see how it passes from the normal to the spiral below, and again from the spiral back to the normal above.

A few summers ago I chanced to come upon another interesting case of changed direction of descending sap, in a wood near Dinan. A Spanish Chestnut tree had some years previously got its trunk cut right across one side, through the bark and into the wood, and the result was a bulging growth to the right and left. In this way the arrested sap got a passage made past the cut part. The back of the tree showed nothing abnormal, and both above and below all was going on in the ordinary course. I have referred to the Ash stick and the Spanish Chestnut in similar terms elsewhere.\*

The other subject of my recent experiments is the Lime tree, and with it I find an important difference in behaviour. I

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\* *The Self-Educator Series, Botany*, pp. 109-111. Hodder & Stoughton, London, 1900.

have tried it by binding and by cutting out a ring, and in both cases the inconvenience suffered by the tree has only been temporary. A considerable bulging appears the first year, just as in the case of the Sycamore, but special attention seems to be devoted to the repair of the injury, and by the end of the second year the Lime has, in all my experiments, succeeded in pretty well repairing the damage to such an extent as to let normal growth again proceed. In this bit of a Lime stem, which measures  $12\frac{1}{2}$  inches in circumference at the middle, I cut out a spiral curve from the bark, going twice round the stem, and scraped the wood well with a knife. The result as now shown is that, after two years' growth, the gap is quite covered over with new bast, connecting the part above with that below. In the Lime tree, therefore, there appears to be a recuperative power which the Sycamore has not got, and for this reason it can the more easily make good any injury that has been done to its bark.

An interesting point is that, in all the stems of Sycamore and Lime that I have cut, the checking of the flow of assimilated sap has been at once followed by a great development of buds from the stem at and below the region of obstruction. The specimens herewith shown give evidence of this. The aim of the plant and the consequent direction of its energy seem to be to restore, as far as possible and with the least possible loss of time, the original conditions of growth. Since the flow of assimilated sap necessary to promote growth in thickness below a certain level has been cut off, the next best move is to develop new twigs and leaves to provide an independent supply. Below the spiral or the ring, all of the trees tried have shown a large number of such buds. We know that a similar result follows pruning—that when a gooseberry twig gets a part cut from it, a number of branches spring out from it; or that when a tree—a Chestnut, for instance—gets its leading top branch broken, the consequence is the growth of many lateral branches, which form a bushy top. Advantage of this principle is taken in pruning a hedge of Hawthorn or Privet or Holly; for one twig that is cut off two or more are developed to take its place, and by this means the hedge is thickened.

Now, from the foregoing experiments it seems to be the case

that a circumcision of the bark has the same effect in inducing lateral buds as the actual amputation of the branch has. In either case the aim is to repair an injury, and hence the vigorous development of buds in the region where the injury is felt.

These experiments give merely a glance into what might be made as wide a subject as you please, and they claim no more than what they show in the individuals dealt with.

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### *Juncus tenuis* (Willd.).

By Mrs. PETER EWING.

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[Read 27th January, 1903.]

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*Juncus chloroticus*, R. S. sys., VII., I., p. 240 (1729).

*J. compressus* x *effusus*, C. Kze. Tasch-fl., V., Leipz., p. 55 (1867).

*J. germanorum*, Steud., syn. gl., II., p. 305 (1855).

*J. Gesneri*, Smith's English Flora, II., p. 164 (1824).

*J. gracilis*, Sm. Comp. Flora Brit., p. 55 (1800).

*J. macer*, Gray arr. of Br. Pl., II., p. 164 (1821).

*J. Smithii*, En. Pl. III., p. 349 (1841).

Gallia, Belgium, Batavia, Germania, Bohemia, (*Amer.*).

The specimen of *Juncus tenuis* I have to show was found on the roadside near Lochgilphead on the 29th September, 1902. The road runs parallel with the Crinan Canal for some distance on the Argyllshire side of the canal, and is probably the most frequented in the district, being the coach road to Ford, which links Lochgilphead and Ardrishaig with the railway, as well as being the road to Crinan, which links Loch Fyne with the Atlantic.

The plant was growing in considerable quantity, associated with such forms as *Juncus bufonius*, *J. lamprocarpus*, &c., and, whatever its previous history may have been and its future fate may prove, it was, to all appearance at least, flourishing there with the freedom and confidence of an established denizen of the district.

The history of the occurrence of this plant is peculiarly interesting to us, as its first record for Britain was made by George Don in 1795 or 1796. Its subsequent, rather erratic, appearances have already been the subject of two papers in this Society, but since the date of the last, by Mr. Alexander Somerville, B.Sc., F.L.S., in 1895, additional information has been gathered, and in view of this a brief recapitulation of its occurrences may be permitted.

It was discovered, as I have already said, by Don, whose record has been treated with something very like contempt by subsequent makers of Floras—who, however, as far as I can gather, did not make any serious effort to clear up the matter for themselves, but, because the plant was one not likely to be found in such a station as Don described as its habitat in Forfarshire, and possibly also because Don had found so many things which other collectors were unable to trace, they simply put it aside.

It was not until 1883—nearly ninety years afterwards—that Mr. Toundrow found it in Herefordshire; for, although Mr. John Thomson, of Dennistoun, Renfrewshire, had gathered it in 1863, twenty years earlier, and sent a specimen to Greenock Museum, it was included in the collection of that institution under the name of *Juncus acutiflorus*. In 1886 Mr. James M'Andrew, of New Galloway, sent a specimen from Kirkcudbrightshire to Mr. Arthur Bennett. Then, in 1889, it was found by Mr. Reginald W. Sully, F.L.S., in several places in County Kerry, and in the same year it was picked up by the late Professor King on the roadside between Kilmalcolm and Bridge of Weir. It is a curious fact that Mr. Thomson who, with Mr. William Stewart, of this Society, accompanied Professor King at the time, did not recognise it as the same plant as he had previously collected as *J. acutiflorus*. Shortly afterwards Mr. Ewing visited the place in company with Professor King, and collected specimens of the plant, which were submitted to Mr. Bennett, and certified by him as *Juncus tenuis*. In 1889 Mr. M'Andrew again found it near Shiel. Since then it has been recorded for Carnarvonshire by Mr. W. H. Painter in 1891; by Mr. Laurence Watt for Dunbartonshire in the same year; by Mr. E. J. M. Graham for Cornwall in 1894; by Mr.

N. A. Philips for Cork in 1894; by Mr. Robert Kidston, F.R.S., for Stirling in 1894; by Mr. N. Hiern for Devon in 1895; by Mr. M'Andrew again for another station near Creetown, in Wigtonshire, in 1895; and by Mr. Grant for Westernness in 1896.

In Mr. Ewing's note on the Renfrewshire specimen he remarks that, in comparing the various records previous to that date, "one is immediately impressed with the similarity of the stations in which the plant has been discovered." Subsequent records, while differing in some points, in every case tend to deepen this general impression. For instance, Mr. Graham's Cornish specimen was found "on a strip of waste ground by the high road." Mr. Robert Kidston refers to the plant as being found by the roadsides. Mr. R. A. Philips also says, "growing principally on damp roadsides and bare spots by the sides of streams." He also adds, "not in turf." Mr. W. P. Hiern found it on "a narrow flat strip of turf along a roadside." Mr. M'Andrew's specimen was likewise found on the roadside, associated with *Juncus squarrosus*, *J. lamprocarpus*, grasses, &c." Mr. Laurence Watt says—"It is found growing along the River Leven, both in and out of the water." It seems to flourish "in soils and under conditions which vary very much, from a saline marsh to a mountain bog." Mr. Toundrow's remark on his discovery of it is interesting:—"In February, 1884," he says, "I met with one large tuft, bearing about thirty old flowering stems. From that time onward it produced a lessening number, until in the dry season of 1887 it only bore three or four very short and weakly stems, and then, apparently, died out, as I have failed to find any trace of it since." Mr. J. Lloyd Williams describes three stations in North Wales where it was discovered. The first was near the Port-Madoc embankment, which is built on land reclaimed from the sea. "The soil," he says, "is sandy, but not marshy. *J. tenuis* is confined to cattle tracks which intersect a portion of it, and it extends along several of them for twenty or thirty yards. I failed to find it in the wetter parts near the water, or in the better land near the railway. On subsequent visits with botanical friends we had some difficulty in finding it again. The part where it used to flourish best had been railed off from the cattle; the tracks had been overgrown with herbage, and the *Juncus* had all dis-

appeared. We found it, however, growing plentifully in the new tracks which had been made by the cattle." Mr. Williams also describes another station in which the only part of the footpath occupied by the plant was that along which cattle were in the habit of passing to and from a farmyard. Here, again, the land was reclaimed, and the soil was sandy and not wet. Mr. Williams further remarks that the partiality of the plant for cattle tracks suggests that cattle may be the means of distributing the seed—a suggestion which Mr. Bennett does not seem to favour, though he admits that there is "some agency at work in the distribution of this plant not yet accounted for." "The problem British botanists have to work out," he says, "is whether *Juncus tenuis* is an introduced species, and, if so, how did it come?"

The conditions under which this plant from Argyllshire was found, while not throwing any new light on our existing knowledge, are interesting as being in many respects similar to those under which plants from widely separated localities have been discovered, and, at any rate, its occurrence in this district is an addition to the rapidly accumulating data by which we hope to get nearer a solution of the problem.

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### List of Birds observed at or near Davos in the Winter of 1901-02.

By JOHNSTONE MACFIE, M.D.

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[Read 27th January, 1903.]

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DAVOS AM PLATZ is situated in the Canton of the Grisons, Switzerland, 1,560 metres above the level of the sea. Roughly speaking, at Davos we are living about the level of the cairn on Ben Nevis, and, although so many degrees south of that point, the winter climate is severe—the country deeply covered with snow, and the thermometer often showing from 30° to 40° of frost, Fahrenheit.

During my stay in the neighbourhood of Davos, I observed the following birds:—

1. *The Raven*.—Seen and heard several times.

2. *Carrion Crow*.—Seen daily: it seems to be the commonest species at all seasons, and the only one of the crows observed during the winter.

3. *Common Dipper*.—Seen frequently; indeed, whenever one came upon a stream that was not fast bound in ice, there one was sure to see a specimen or two of these lively and busy birds.  
Of the *Tits*—

4. *Cole Tit*.

5. *Blue Tit*.

} Repeatedly observed in the fir woods. I have no doubt there were other kinds in the flocks, but those two were the only ones about which I could be positive as to the species.

6. *Gold Crest*.—Seen twice certainly, along with the Tits.

7. *Tree Creeper*.—Observed once certainly, probably oftener, with the flocks of Tits.

8. *Bullfinch*.—A pair seen in the gardens above Davos several times.

9. *Chaffinch*.—Occasionally in similar situations as the Bullfinches.

10. *Common House Sparrow*.—Comparatively a recent importation, but now perfectly at home, as he always is, and numerous about the houses and gardens.

Those birds already mentioned were all noticed between the 21st of December and the 15th of February—the severest and deadest time of the winter.

On the 15th of February, or a few days before that date, I saw a flock—ten or twelve—of what at the distance I took to be Redwings feeding on the berries of the Rowan or Mountain Ash, but as I could not be certain of the species I have not included them in my list.

On the same date, in the fir woods above Klösters, I had quite a near view of a pair of—

11. *Blue Jays*.—I never had the good fortune of seeing the much more rare Pine Jay. On the same day at Klösters I saw several—

12. *Siskins* and a pair of Ravens.

On the 3rd of March, at the foot of the Fluella Pass, beside the stream that comes down there—

13. One *Wagtail*, but I could not make out the species.

14. *Crested Tit*.—The Crested Tit is seldom seen in Scotland, so it was with special interest that I watched this one at Davos.

On the 6th of April, two days before leaving Davos, and when the snow was clearing off the lower meadows, and the white and yellow *Crocus* was shooting up wherever the grass appeared, in the fir woods above the old church at Frauenkirche, I had my first and only opportunity of watching—

15. *The Greater Spotted Woodpecker*.—A single bird; it remained in sight for ten minutes or so, hunting among the brushwood and along the stem of a fallen tree.

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## Meteorological Notes and Remarks upon the Weather during the Year, 1902, with its General Effects upon Vegetation.

By JAMES WHITTON, Superintendent of Parks, Glasgow.

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[Read 28th April, 1903.]

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IN order to preserve the continuity of the series, these notes have been compiled, as in former years, from the records kept at Queen's Park, Glasgow.

*January*.—For a series of years the weather conditions in the earlier part of this month have been somewhat mild and moist and unseasonable in character. The opening days of January, 1902, proved no exception, as for the first ten days the weather was fairly mild, and rather wet, with S.-W. winds. The wind changing to N.W. on 11th, there was a sharp change in the conditions, and a spell of severe wintry weather was experienced from the 11th to the 15th. The frost for a few days being intensely keen, and as frosts in the City are now usually accompanied by fogs, the atmospheric conditions were extremely unpleasant while they lasted. Another change to mild showery weather lasted until the 25th, which was followed by another

wintry spell, with a snow fall of 2 inches on 28th, and 4 inches on 29th. Keen frosts with dense fogs were experienced on the latter days of the month.

The barometric chart shows a most irregular line of atmospheric pressure during the month. The lowest point was 28·70 on the 2nd, then rising with sharp steps it reached 30·50 on the 14th. After that date dropping with a few variations to 28·80 on the 25th. During the prevalence of the frosty weather it rose rapidly until it reached the high figure of 30·80 inches on the 31st.

The amount of frost registered is somewhat abnormal considering the changeable weather experienced. The total amount for the twelve days on which it occurred being 134°—the lowest reading being on the 30th when 21° were recorded. On three different occasions during the month the temperature did not rise above freezing point (32° Fahr.).

The rainfall amounted to 3·54 inches. The wettest day being the 3rd, as 0·87 inches, being the fall for the preceding 24 hours, were registered on the morning of the 4th. There were 17 dry days.

Prior to the sharp frosts, the grass in the parks was very bright in colour for the season, and buds on many shrubs showed a tendency to premature development.

*February.*—The weather during this month was generally of a wintry character. Cold winds and intense frosts being a marked feature. There was a fall of snow on the 8th. A pleasing exception to the general rule when frosts are experienced in the City was the absence of heavy fogs. During the frosty weather of the second week the air was comparatively clear and crisp. The fog fiend, however, was strongly in evidence on the 13th. No frost was registered after the 18th, and the last week was dull, cold, and wet.

After the abnormally high reading of the barometer on the 31st January the atmospheric pressure fell sharply from 30·70 inches on the 1st to 29·25 inches on the 6th. Thereafter it steadily rose to 30·00 inches on the 15th, afterwards falling without any extreme fluctuation, until on the 28th it stood at 29·10 inches.

Frost occurred on fourteen days, and its intensity is shown by the fact that a total of 149° were recorded. The greatest amount being registered on the 13th and 14th, when the thermometer fell to 11° and 10°, giving 21° and 22° frost respectively. The latter proved to be the lowest reading of the year.

The severity of the weather may further be illustrated by stating that only on nine days during the month was the maximum temperature above 40°, and on three days it did not rise above freezing point (32°). The average maximum temperature was 39°, and the average minimum 29°, against 42° and 30° respectively in February, 1901. There were twenty dry days, consequently the rainfall was under the average, only 1·40 inches being recorded.

Consequent on the severe frost and low temperature, with little snow covering to protect them, many plants suffered considerably. The softer shoots of laurels and aucubas were blackened, and that useful town shrub, *Olearia Haasti*, severely injured in many places. Wallflowers were killed outright. None of the early spring flowering plants were visible until the end of the month, when a few snowdrops and winter aconites made their appearance.

*March.*—The weather throughout this month was very erratic, and the changes not always of the pleasantest nature. Strong, cold, gusty winds, with frequent showers, characterised the general condition, more especially at the latter end of month. The barometric readings were low, and all under 30·00 inches. For nearly three weeks the pressure was fairly regular, between 29·30, on the 1st, to 29·90, on the 16th and 17th. The pressure rapidly fell for three days, and on 20th and 21st the barometer indicated 28·90 inches. A storm of wind and rain occurred. Thereafter for five days the pressure rose steadily, but was very erratic between the 26th and 31st.

Notwithstanding the cold feeling of the atmosphere caused by the winds and rain, no great extremes of temperature were noted. There was a remarkable absence of frosts for March, as only on four occasions was the thermometer below freezing point, and the total amount registered was 18°, of which 7° were recorded on the morning of the 24th. The maximum temperature averaged 49°, and the minimum 37°.

There were only eight dry days, but, despite the showery

nature of the weather, the amount of rain which fell was under the average, only 2·52 inches being registered. Of this quantity 0·50, or half an inch, fell on the afternoon and evening of the 19th.

The cold winds had a retarding effect on vegetation, and the month was well advanced before the swelling of buds on trees was very noticeable. Snowdrops and winter aconites began to open freely during the first week, followed a little later by the crocus and early forms of narcissi, all of which made a fair display. *Jasminum nudiflorum* and *Rhododendron praecox* were in flower by the 18th—both much later than usual.

*April.*—The unsettled weather which prevailed in March continued for a few days, when, with a change of the wind northwards, it became drier, with slight frosts. Throughout there was a lack of warmth, and with a prevalence of biting winds the weather was unseasonably cold, and somewhat changeable.

The atmospheric pressure was fairly regular, showing no extreme fluctuations. On the 1st it was at 29·30 inches, rising to 30·10 inches on the 7th, then falling moderately to 29·60 inches on the 21st. A sharp drop to 29·20 inches on the 22nd was accompanied by a short storm of wind and rain. With a change of the wind eastwards, the pressure rose quickly and regularly till the 28th when it stood at 30·20 inches.

Though the thermometer was at or below freezing point on eight occasions, frost was registered only on five days to the total of 7°. The average maximum temperature was 53°, and the average minimum 41°, as compared with 54° and 37° in April, 1901.

The rainfall for the month was only 0·82 inch, a remarkably small quantity for April, and very much below the average. There were 18 dry days.

On account of the cold drying winds, vegetation was slow in developing, the leafing of the larger deciduous trees being especially backward. The hawthorn, willow, and balsam poplar were not much in leaf before the middle of the month, and it was near the end ere such subjects as the beech, sycamore, birch, lime, laburnum, and chestnut appeared. It was likewise during the last week ere the pears and plums were in bloom, also the ribes, *Rhododendron Eugenie*, hyacinths, and tulips, which usually are about a fortnight earlier. The great bulk of narcissi bloomed

during the first three weeks, but from some unexplainable cause less freely than usual. This peculiarity was noticeable in the same varieties growing on the lawns as well as in the garden borders.

*May.*—With a preponderance of cold northerly winds, the weather conditions during the month were extremely unseasonable. There was a want of the genial softness which usually characterises the weather of May. During the earlier part of the month there were frequent touches of frost, with very little rain. The latter half was more changeable, with frequent showers and high winds; a destructive easterly gale being experienced on the 30th and 31st.

The barometric chart shows a wide variation of the atmospheric pressure during the month. On the 3rd it was 29·30 inches, rising rapidly to 30·20 inches on the 8th. For a few days the fall was steady, then more sharply from the 15th till, on the 17th, it was at 29·00 inches, predicting the heavy rain which fell on the 18th. A sharp rise followed, till on the 24th it was up to 30·20 inches, then dropping again quickly to 29·20 inches on the 28th, another rise brought it to 29·70 inches on the 31st. These rapid changes correctly indicate the changeable nature of the weather.

The minimum thermometer in shade was at or below freezing point on four occasions, and 4° of frost were registered. It may be noted, as showing the want of warmth on the earth's surface, that the radiating thermometer on the grass was below freezing-point no less than 21 times, and that a total of 150° of frost was there recorded. This frost, whilst not seriously injuring ordinary plants, effectively checks favourable development. The average maximum temperature was 53°, and the average minimum 39°, compared with 62° and 40° respectively for May, 1901—a marked difference!

The rainfall amounted to 2·15 inches, the greatest fall for one day being 0·30 on the 27th. There were thirteen dry days.

The prolonged cold weather was extremely prejudicial to the proper development of plant growth. The majority of deciduous trees and shrubs bore abundance of blossom, which, unfortunately, between wind and frost, got so damaged that the display was

neither so fine nor so prolonged as was anticipated. The frost of the 10th ruined the flowers of the pear, plum, cherry, and bush fruits generally, whilst the gale of the 31st not only ruined the apple blossom but seriously damaged the foliage of sycamores, maples, chestnuts, and other soft-leaved trees. Many trees were stripped nearly bare, the Norway maple especially. Curiously, however, despite the backward weather, the oak leafed on the 9th, about its usual time, whilst the ash was fully a fortnight later, the former getting its foliage injured and the latter escaping. The house swallow appeared on the 9th, and the corncrake on the 14th.

*June.*—Like that of the preceding month the weather throughout was generally cold, with a preponderance of easterly winds. During the first three days a strong easterly gale prevailed. The wind having veered to S.-W., brought a delightful change, and the weather for a few days was mild and balmy; the 4th being the first genial "growing" day of the year. Thereafter, until the end of the third week, it was somewhat variable—cold and sunless. Then the warmest week of the year was experienced, when the temperature in the shade was over 70°. The 25th proved to be the warmest day of the year.

With a prevalence of easterly winds the barometer readings were moderate in range, and though slightly erratic in course, none were below 29·40 inches. The highest reading was on the 27th, when the pressure was 30·15 inches.

Owing to the want of sunshine the temperature was low. Only on nine occasions was the maximum temperature in shade above 60°. The highest reading was 80° for the 25th. On no occasion did the minimum thermometer exceed 54°, whilst on several occasions it was as low as 40°. The average maximum temperature was 58°, and the average minimum 47°, the former being 5° less and the latter the same as in June, 1901.

The month's rainfall was again low, only 2·06 inches being recorded. Of that amount, 0·77 inches was registered on the morning of the 7th. There were seventeen dry days.

The dry, cold, windy weather had its natural effect on the growth of plants, consequently vegetation continued in a very backward condition. There was little evidence of the leafiness of

June, as the arboreal vegetation was in a pitiable state owing to the damaging effects of the gale, when the soft, young foliage of the trees was torn and lacerated by the wind. Many species of trees, notably chestnuts, sycamores, elms, and beeches did not re-foliate, and presented a blighted appearance all season. Norway maples, where exposed, cast their first leaves, and had quite a wintry appearance before they rehabilitated themselves by making a secondary growth. Pyruses, hawthorns, laburnums, weigelas, and other deciduous trees and shrubs, though later than usual, bloomed abundantly, but the flowers getting injured, did not last long, consequently the display was disappointing after the brilliant promise of flower buds.

*July.*—Without any notable variation, the weather conditions of this month were very similar to what obtained in June. The want of sunshine and low rainfall again being the chief characteristics.

The range of atmospheric pressure was remarkably even and fairly high, being chiefly between 29.70 and 29.90 inches. Only twice was it above 30.00 inches, and the only sharp falls were on the 10th and 26th, when the barometer indicated 29.40 and 29.35 inches respectively during the prevalence of heavy rains.

The continued lack of sunshine is again evidenced by the low temperatures recorded. The thermometer in shade was only above 60° on 14 days—reaching 70° only once—while on several occasions it did not even reach 60°. The average maximum consequently is low, being only 61°, and the average minimum 47°, compared with 69° and 55° respectively for July, 1901.

There were 17 dry days, and the rainfall totalled 2.63 inches. Of that amount 0.31 inch was registered on the morning of the 12th, 0.55 on the 13th, 0.38 on the 26th, and 0.42 on the 27th.

Vegetation continued to make little headway under the ungenial conditions. At the end of the month the ordinary summer bedding plants were no better than what they usually are at the end of June. Sweet peas and other annuals were almost at a standstill. The only satisfactory subjects were the violas and the hardy herbaceous plants. The growth made by trees and shrubs generally was poor and unsatisfactory. Many of the larger trees, especially elms, limes, and sycamores, defoliated considerably during the month.

*August.*—With the exception of the 2nd, which was wet, the first half of the month was dry. The first week was somewhat dull and cold. Bright weather prevailed until the 17th, after which it became more unsettled and showery. Severe thunderstorms, accompanied by heavy rain, which did a considerable amount of damage, were experienced on the 18th and 27th.

The barometer readings showed a moderate range in the atmospheric pressure, which, excepting a fall to 29·40 inches on the 18th, when the break occurred in the dry spell of weather, was between 30·00 inches on the 1st, and 29·70 inches on the 31st.

With 19 dry days the amount of rain which fell was again below the average. The total amount being 2·67 inches. Of that quantity 0·50 inch was registered on the 19th, and 1·08 inches on the 28th, after the thunderstorm on the previous days.

Again the temperatures showed a low range. Only on 14 days was the maximum above 60°. The average maximum was 60°, and the average minimum 51°. In the corresponding month of 1901 the respective figures were 65° and 51°.

The lack of sun heat had a marked effect on the usual ruck of annual plants, consequently the flower beds in our parks were less bright than usual, and the results generally very disappointing. The growth made by most hardy plants was also below the average. The defoliation of the larger trees, such as the lime, elm, and sycamore, began early in the month; in fact the sycamores dropped their leaves so much during the season that the majority of those trees in our City parks were quite divested of foliage by the end of the month.

*September.*—The weather throughout this month was rather varied in character, with a number of stormy days. A severe storm of wind and rain occurred on the 3rd and 4th. The first frost of the autumn was registered on the 13th. The closing days of the month were fine and bracing.

The barometric chart showed a most erratic line of atmospheric pressure with a wide range. From 29·70 inches on the 1st there was a sharp fall to 29·00 inches on the 3rd, then a rapid rise to 30·15 inches on the 8th. With some erratic steps, it dropped to 29·30 inches on the 16th, rapidly rising to 30·20

inches on the 19th. A steady fall to 29.70 inches on the 23rd was followed by as steady a rise, till, on the 28th, it was at 30.40 inches, and 30.10 inches on the last day of the month.

The rainfall amounted to 3.56 inches. Of that amount 0.85 inch was registered on the 3rd, 0.72 inch on the 4th, 0.40 inch on the 5th, 0.39 inch on the 16th, 0.22 inch on the 21st, and 0.28 inch on the 24th, much of the rain falling during the late evening and early morning hours. There were 14 dry days.

Excepting the one frosty morning, no particular variation in the temperature was recorded. The averages were again low, the maximum being 59°, and the minimum 48°. The former being 3° and the latter 1° lower than the respective figures for September, 1901.

There was a marked absence of the autumnal coloration on the foliage of trees and shrubs, and the defoliation of deciduous trees, which was so apparent during August, was further hastened by the storms of wind and rain. Consequently the bulk were bare and quite wintry like in appearance by the end of this month. The touch of frost slightly injured dahlias and similar tender plants, but the former recovered wonderfully, and with the finer weather towards the close began to bloom. The early flowering section of chrysanthemums outdoors, though late, bloomed profusely. Sweet peas and several annuals were almost an entire failure.

*October.*—With a succession of light easterly winds, the weather for the first fortnight was dry and fine, though somewhat cold in the mornings. The wind changing to the S.-W. brought heavy rains on the 14th and 15th. Showers were somewhat frequent, and the weather changeable during the latter half of the month. For the first ten days the barometer readings were fairly high and steady, thereafter they were extremely irregular. The most noticeable change being from 29.90 inches on the 15th to 29.03 inches on the 16th. The pressure rose steadily, with one exception, daily until the 25th, when it indicated 30.25 inches. Another sudden drop to 29.50 inches occurred on the 26th. With another sharp rise on the 31st, the pressure was at 29.80 inches.

The rainfall amounted to 2.34 inches. The greatest amount

registered for 24 hours being 0·85 inch on the 15th, 0·54 inch on the 16th, 0·29 inch on the 22nd, and 0·48 inch on the 26th. There were 17 dry days.

On two mornings 2° of frost were registered, and freezing point touched on three other occasions. The average maximum temperature was 51°, and the average minimum 40°. These figures are the same as those noted for 1900, but 2° and 1° lower respectively to those of the same month in 1901.

Owing to the comparative immunity from frosts, combined with mild showery weather, the autumn flowering plants developed better than was anticipated, and redeemed to a considerable extent the disappointment of the preceding months.

*November.* — The weather experienced during the month, though changeable, was mild for the season of the year. The first week was fairly pleasant, with occasional light showers. Less agreeable conditions characterised the second week, when the weather was stormy, with heavy rains, the 12th, especially, being wet and stormy. Better weather obtained between the 14th and 23rd, though, with the touches of frost, the mornings were somewhat foggy. The latter part of the month was extremely unpleasant, with cold, heavy rain. The absence of sunshine was a feature of the conditions which prevailed.

The changeable character of the weather is clearly indicated by the wide and erratic nature of the barometrical readings. On the 2nd the pressure was 30·10 inches. It quickly fell to 28·90 inches on the 9th, then rising with several sharp steps up to and keeping steadily above 30·00 inches from the 14th to 21st. A steady fall followed till the 26th, with a quick drop to 28·90 inches on the 28th. With another quick rise it stood at 29·60 inches on the 30th.

Although there were but 10 dry days, the amount of rain which fell only totalled 2·21 inches. Of that amount 0·32 inch was registered on the morning of the 9th, 0·24 inch on the 10th, 0·22 inch on the 12th, 0·28 inch on the 25th, and 0·31 inch on the 29th.

Frost was registered on five mornings to the total of 15°, of which 5° were on the 22nd. The absence of hard frost is shown by the average temperatures being higher than those noted for the

preceding November, the figures being for the maximum  $47^{\circ}$ , and for the minimum  $39^{\circ}$ , against  $46^{\circ}$  and  $36^{\circ}$  respectively for 1901.

The open character of the weather prolonged the season of the autumn flowering plants to a marked degree, and though some things were a little bedraggled and weather worn, others kept wonderfully fresh. More dahlia blooms were got in the early part of November than in August and September. The oaks retained their foliage well through the month, whilst grass kept growing, and was in a wonderfully fresh condition.

*December.*—Though the morning of the 1st was fine, heavy rain fell after midday. The rain continued over the 2nd, accompanied by a cold easterly wind, the atmospheric conditions therefore were extremely unpleasant. Frost set in on the 4th with some severity, and lasted fully a week. During its prevalence there were two days of disagreeable fogs, when the maximum thermometer did not rise above freezing point ( $32^{\circ}$  Fahr.). The wind veering to S.-W., a change set in on the 13th, and for a week thereafter the weather was very unsettled, and heavy rains fell. A few fine days followed, then a recurrence of the changeable stormy weather which lasted till the close of the year—Christmas day being very stormy.

The barometric readings were exceedingly erratic, and, with the exception of those of January, had the widest range of any month of the year. Beginning with a downward tendency the atmospheric pressure was at 29.20 inches on the 2nd, sharply rising to 30.40 inches on the 4th, then fairly steady until the 12th, when it rapidly declined to 29.25 inches on the 16th. With a quick rise for six days it was over 30.00 inches. Another sharp fall occurred on the 25th, and a very notable one from 29.70 inches on the 27th to 28.50 inches on the 30th. On the 31st the tendency was upwards.

The rainfall amounted to 4.84 inches—the greatest for any month of the year. The amount registered for the 24 hours being on several occasions above the normal. Thus, on the morning of the 2nd, the amount was 0.75 inch; on the 3rd, 0.50 inch; on the 14th, 0.32 inch; on the 15th, 0.68 inch; on the 16th, 0.99 inch; on the 28th, 0.35 inch; and on the 29th, 0.26 inch. There were 15 dry days.

Frost to the extent of  $59^{\circ}$  was registered on eight mornings. The lowest reading of the thermometer was  $16^{\circ}$ . This occurred on both the 7th and 8th. The average maximum temperature was  $42^{\circ}$ , and the average minimum  $35^{\circ}$ , both  $2^{\circ}$  respectively higher than those of the previous December.

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Regarding the rainfall of 1902 we find, on comparing the records of previous years, that the amount registered was 30.82 inches. This quantity is much below the average of the past 12 years, which is 36.52 inches. Only once in the period named has there been a lower rainfall, when in 1895 the amount, 27.57 inches, was abnormally low. The number of dry days during the year being 185. For the third year in succession December proved to be the wettest month of the year, with a total of 4.84 inches. In 1901 the amount was 4.50, and 1900 7.71 inches. April belied its reputation for showers, proving to be the driest month of the year, with the abnormally low rainfall of 0.83 inch. The driest month of 1901 was February, with a rainfall of 1.40 inches. The wettest day of the year was the 27th August, when, for the 24 hours, the amount of rain registered was 1.08 inches. This amount for one day was exceeded both in 1900 and 1901.

The following table of rainfalls recorded in the various Public Parks of the City is interesting, as showing the variations in the different parts of the City. Due allowance must always, of course, be made for local conditions, as the exposure, altitude, and surroundings are different in each case:—

RAINFALL DURING 1902 IN THE PUBLIC PARKS.

	QUEEN'S.	MAX. WELL.	KELVIN-GROVE.	SPRING-BURN.	ALEX-ANDEA.	GLASGOW GREEN.	BELLA-HOUSTON.	TOLL-CROSS.	GEORGE SQUARE.
Height of Gauge above Sea-level.	145 ft.	69.1 ft.	48.3 ft.	361 ft.	141.4 ft.	34.7 ft.	160 ft.	85 ft.	40 ft.
	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
January, -	3.54	3.17	3.10	2.86	2.90	3.03	2.99	3.60	2.92
February, -	1.49	0.90	1.29	1.14	1.29	1.62	1.47	1.21	1.40
March, -	2.52	2.23	2.59	2.12	2.38	2.26	2.21	2.68	2.08
April, -	0.82	0.66	0.84	0.65	0.69	0.57	0.84	0.81	0.64
May, -	2.15	2.02	2.15	1.79	2.02	1.85	2.33	2.21	1.96
June, -	2.06	1.74	1.98	2.06	1.88	1.76	2.04	1.99	1.63
July, -	2.62	2.29	2.59	2.88	2.92	2.67	2.23	3.17	2.87
August, -	2.67	3.31	2.35	2.37	2.61	3.11	2.35	2.80	2.82
September, -	3.56	3.09	2.86	2.68	3.03	3.02	3.11	3.20	2.80
October, -	2.34	2.28	1.85	1.53	1.84	2.04	1.53	2.11	1.36
November, -	2.21	2.18	2.43	1.83	2.31	1.98	1.92	2.22	1.67
December, -	4.84	4.48	4.46	3.22	3.84	4.18	3.82	4.77	3.69
Totals, -	30.82	28.35	28.49	25.13	27.71	28.09	26.84	30.77	25.84

Regarding the temperatures in comparison with those of the preceding year, the most notable feature is the low averages, especially during the summer months. As one or two degrees more or less on the average monthly temperatures means much on the climatic conditions, it becomes a serious matter when the difference reaches from five to eight degrees less as happened last July. The averages therefore give a clear indication of the cold and sunless character of the past summer.

The thermometer was at or below freezing point (32° Fahr.) on 65 days, and frost was registered on 50 days to the extent of 392°. In 1901 frost was registered on 57 days, and the total was

327°, while the freezing point was reached 78 times. Both years being pretty nearly alike on these points. The lowest readings of the thermometer occurred in February, when 21° of frost were registered on the 13th, and 22° on the 14th. The lowest reading in 1901 was 17° (15° of frost), on the 16th November. On eight days the temperature did not rise above freezing point during the 24 hours, this happening only twice in 1901 and five times in 1900.

As in the previous year, February was the coldest month, frost to the extent of 149° occurring on 14 days. In February, 1901, there were 97° on 20 days.

July, with an average maximum temperature of 61°, was the warmest month. August, with 60°, being the next. Both these months had the same average minimum temperature, viz., 47°. In 1901 the averages for July were 69° and 55°, and for August, 65° and 51°—a striking difference in comparison with what obtained in the past year.

The highest readings of the thermometer in shade were 80° on the 25th and 82° on the 26th June, these occurring during the only really warm week of the year. Only on six occasions during the year was the thermometer at or above 70°, whereas in 1901 such occurred 24 times.

The table of temperature on pages 42-43 may be of service for comparison.

Regarding the direction of the winds, there was, as in 1901, a preponderance of easterly winds beyond the usual ratio. From the south, 1; south-west, 216; west, 21; north-west, 18; north, 1; north-east, 6; east, 35; and south-east, 28 days, respectively. Excluding the direct north and south, the western group shows 255, and the eastern group 108 times. In the previous year the western group was 267, and the eastern 97 times. The usual proportion is as 4 to 1 in favour of the western.

In regard to the atmospheric pressure, the barometric records show that the range has been somewhat high and wide. The highest reading of the year was 30·80 inches on 31st January, and the lowest 28·50 inches on the 29th December. The highest reading for 1901 was 30·40 inches on 25th and 26th November, and the lowest 28·25 on the 25th December. The pressure was 90 times at or above 30·00 inches, and 11 times at or below

29.00 inches. In 1901 the figures were 93 and 16 times respectively.

In comparing the records of 1902 with those of the previous year, we find few features of similarity. The most marked was the low rainfall. With a season in which bright sunny weather was specially notable, a rainfall below the average might be looked for; but with a sunless season, such as was experienced, a rainfall so much lower is somewhat surprising. A more sunless season has not been for many decades, and the general lowness of temperature, without any redeeming feature, caused a feeling of discomfort in the climatic conditions very disappointing after the bright hopes raised by the glorious weather which prevailed so fortuitously in 1901.

Regarding the general effect of the weather on vegetation, a more unsatisfactory season could hardly be looked for. The favourable conditions of the preceding year caused trees and shrubs to develop and mature an extremely satisfactory growth, hence the prospects of a brilliant floral display and an abundant fruit harvest were of the best. These were rudely dispelled by the untoward weather which prevailed when the trees were in bloom, as the gales stripped blossom and leaf off the plants, and also shortened the flowering season. Rarely, indeed, were the promises so good and the results so meagre as regards the fruit crops.

With regard to the growth made by annual plants, for a time progress was slow, and the prospects gloomy. Still, on the whole, the results were fairly good, and a fair average obtained in most crops, even with the difficulties in harvesting, which was a somewhat prolonged and vexatious operation.

The cold sunless season has had its effect on perennial plants, and the growth generally is below the usual standard. Rhododendrons and azaleas are sparsely set with flower buds. Deciduous plants, which form the greater bulk of our best flowering subjects, though but moderately furnished with flower buds, may, with genial weather conditions, give better results than when they are overloaded with flowers, as the development of an abnormal amount of bloom causes exhaustion, and too frequently is a contributing cause in the failure or sparsity of the fruit crops in our orchards and woodlands.

In a City whose population is increasing annually by 12,000,

1902.	QUEEN'S PARK.	MAXWELL PARK.	KELVINGROVE PARK.	SPRINGBURN PARK.
THERMOMETER (in shade, 4 feet above ground level).				
Highest reading of year, ... .. }	80°, 26th June	86°, 26th June	85°, 25th June	80°, 26th June
Lowest do. do.,	10°, 14th Feb.	3°, 30th Jan.	12°, 30th Jan.	{ 13°, 30th Jan. and 14th Feb.
Number of days on which thermometer fell to freezing point (32°), ... .. }	65 days	136 days	65 days	115 days
Number of days on which thermometer did not rise above freezing point (32°),	8 days	15 days	9 days	8 days
Degrees of Frost regis- tered—				
January, ... ..	134° on 12 days	213° on 16 days	116° on 12 days	142° on 12 days
February, ... ..	149 " 14 "	221 " 19 "	123 " 13 "	184 " 24 "
March, ... ..	18 " 4 "	56 " 12 "	17 " 6 "	45 " 12 "
April, ... ..	7 " 5 "	84 " 19 "	12 " 5 "	43 " 14 "
May, ... ..	4 " 2 "	62 " 13 "	14 " 4 "	15 " 7 "
June, ... ..	...	3 " 1 "	...	...
July, ... ..	...	...	...	...
August, ... ..	...	1° on 1 day	...	...
September, ... ..	2° on 1 day	9 " 2 days	...	2° on 1 day
October, ... ..	4 " 2 days	56 " 12 "	...	9 " 6 days
November, ... ..	15 " 5 "	64 " 12 "	3° on 1 day	45 " 9 "
December, ... ..	59 " 8 "	105 " 13 "	50 " 8 days	114 " 14 "
Total frost registered,	392° on 53 days	874° on 120 days	335° on 49 days	599° on 99 days

ALEXANDRA PARK.	GLASGOW GREEN.	BELLAHOUSTON PARK.	TOLLCROSS PARK.	GEORGE SQUARE.
85°, 26th June	86°, 6th July	86°, 26th June	91°, 26th June	83°, 26th and 28th June
7°, 30th Jan. and 13th Feb.	7°, 30th and 31st January	8°, 31st Jan.	4°, 30th Jan.	20°, 13th and 14th February
125 days	123 days	82 days	107 days	36 days
15 days	22 days	4 days	7 days	4 days
173° on 12 days	185° on 13 days	158° on 12 days	167° on 13 days	58° on 9 days
213 " 23 "	238 " 24 "	187 " 19 "	210 " 20 "	53 " 11 "
47 " 11 "	55 " 12 "	28 " 8 "	32 " 9 "	1 " 1 day
82 " 17 "	57 " 16 "	29 " 9 "	58 " 15 "	...
41 " 11 "	27 " 8 "	11 " 4 "	38 " 10 "	...
3 " 1 day	...	...	1 " 1 day	...
...	...	...	...	...
2° on 1 day	...	..	...	...
6 " 1 "	4° on 1 day	2° on 1 day	4° on 1 day	...
35 " 8 days	21 " 8 days	6 " 4 days	17 " 7 days	...
50 " 10 "	30 " 7 "	12 " 4 "	22 " 6 "	...
118 " 14 "	120 " 16 "	77 " 10 "	77 " 11 "	22° on 6 days
770° on 109 days	737° on 105 days	510° on 71 days	626° on 93 days	134° on 27 days

and where the open-air space is gradually being lessened by the erection of huge blocks of high tenements which break and stife the sunlight, the necessity for seasons full of sunshine and brightness grows more obvious. The oft-expressed hope can only be reiterated, that weather conditions favourable for the health of the community will be vouchsafed in the coming season.

Subjoined is the abstract of the meteorological record for the past three years as kept at Queen's Park, and the averages for the past twelve years.

COPY OF METEOROLOGICAL RECORD KEPT AT QUEEN'S PARK, GLASGOW.  
RAIN GAUGE 145 FEET ABOVE SEA LEVEL.

MONTHS.	1900.				1901.				1902.				AVERAGES FOR THE LAST 12 YEARS.					
	Rainfall. Inches.	THERMO- METER.		Dry Days.	Rainfall. Inches.	THERMO- METER.		Dry Days.	Rainfall. Inches.	THERMO- METER.		Dry Days.	Years.	Rainfall. Inches.	Mean Tem- perature.	Dry Days.	Number of Days on which Frost was registered.	Degrees of Frost registered.
		Max.	Average.			Min.	Max.			Average.	Min.							
January,	5.08	43	35	4	2.68	42	34	15	3.54	43	33	17	1891	36.09	46	184	85	371
February,	2.68	38	26	20	1.40	42	30	21	1.49	39	29	20	1892	33.84	45	194	101	798
March, ...	0.28	44	31	27	2.06	45	34	21	2.52	49	37	8	1893	33.05	47	186	56	306
April, ...	2.14	55	38	16	3.30	54	37	13	0.82	53	41	18	1894	41.48	46	169	55	256
May, ...	2.19	58	42	17	1.91	62	42	21	2.15	53	39	13	1895	27.57	45	202	99	823
June, ...	4.04	65	49	13	2.81	63	47	19	2.06	58	47	17	1896	33.90	47	209	63	331
July, ...	3.03	67	54	11	2.39	69	55	22	2.62	61	47	17	1897	40.22	46	205	61	347
August, ...	4.36	62	50	16	3.59	65	51	14	2.67	60	47	19	1898	38.44	48	212	42	190
September,	3.70	61	47	18	2.85	61	49	14	3.56	59	48	14	1899	41.67	47	193	64	415
October,	5.05	51	40	10	3.96	53	41	10	2.34	51	40	17	1900	46.46	47	164	57	326
November,	6.20	46	38	9	3.20	46	36	17	2.21	47	39	10	1901	34.65	47	201	70	327
December,	7.71	47	41	3	4.50	40	33	14	4.84	42	35	15	1902	30.82	45	185	53	392
	46.46			164	34.65			201	30.82			185	Aver- ages.	36.52	46°	192	67	407°

## On Some Entomostraca from the Gulf of St. Lawrence.

By THOMAS SCOTT, LL.D., F.L.S.

PLATE II.

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[Read 28th April, 1903.]

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THE Entomostraca which form the subject of the following observations were obtained in some tow-net gatherings submitted to me for examination by my friend, Mr. Alexander Patience, of Glasgow.

The gatherings, which were contained in several small bottles, were all obtained by means of a towing net, and were probably collected at or near the surface of the water. One of them was collected off Griffins Cove in 1872, and another in Shediac Bay in 1873. The other gatherings were simply labelled, "Towing net, Gulf of St. Lawrence, 1873." They are all in fairly good preservation, notwithstanding the length of time they have been immersed in spirit.

This, though a small collection, is of special value from the interesting species contained in it, and though no new forms have been observed, the distribution of several of the species mentioned has been considerably extended.

The number of species observed in the collection is eighteen; fourteen of them belong to the Copepoda and four to the Branchiopoda. Their names are as follow:—

### COPEPODA.

#### Fam. CALANIDÆ.

*Calanus* (?) *helgolandicus*, Claus.

#### Fam. PARACALANIDÆ.

*Paracalanus parvus*, Claus.

#### Fam. PSEUDOCALANIDÆ.

*Pseudocalanus elongatus*, Boeck.

#### Fam. EUCHÆTIDÆ.

*Euchæta* (?) *marina*, Prestandrea.

## Fam. CENTROPAGIDÆ.

*Centropages hamatus* (Lilljeborg).*Isias clavipes*, Boeck.

## Fam. TEMORIDÆ.

*Temora longicornis* (O. F. Müller).*Eurytemora herdmani*, I. C. Thompson and A. Scott.

## Fam. PONTELLIDÆ.

*Anomalocera patersoni*, Templeton.*Labidocera æstiva*, Wheeler.

## Fam. ACARTIIDÆ.

*Acartia clausi*, Giesbrecht.*Acartia Giesbrechti*, Dahl.*Tortanus discaudatus* (I. C. Thompson and A. Scott).

## Fam. CYCLOPIDÆ.

*Oithona similis*, Claus.

## BRANCHIOPODA.

## Fam. ARGULIDÆ.

*Argulus aloæ*, Gould.

## Fam. POLYPHEMIDÆ (Cladocera).

*Evadne nordmanni*, Loven.*Podon polyphemoides*, Leuckart.*Podon leuckarti*, G. O. Sars.

## NOTES ON THE VARIOUS SPECIES.

*Calanus* (?) *helgolandicus*, Claus.—*Calani* were numerous in this collection, and were apparently all of the same species, but unfortunately they were nearly all more or less immature, so that among them all I did not find a single adult male; from a careful examination of the largest and most perfect of the specimens, however, I am inclined to ascribe them to the species mentioned above. *Calanus helgolandicus* has a close resemblance to *C. finmarchicus*, even in details of structure, so that without perfect specimens the two are easily confounded. Professor G. O. Sars, in some remarks on the distribution of the two forms, says that *C. finmarchicus* seems to be characteristic of the Arctic zone, being specially abundant between Greenland and Behring Island, whereas *C. helgolandicus* has

apparently a more southern range. The island of Anticosti, in the Gulf of St. Lawrence, is situated, roughly speaking, between the 49th and 50th degrees of North Latitude, and therefore considerably south of the Arctic Circle; but, on the other hand, the cold current which comes down the Labrador coast might carry the Arctic *C. finmarchicus* as far south as the Straits of Belle Isle, where the species could find an entrance into the Gulf of St. Lawrence. Still, keeping these contingencies in view, I am inclined to consider our *Calanus* as belonging to the more southern species.

*Paracalanus parvus*, Claus.—A male and one or two immature female specimens of this small Calanoid were obtained in the gathering collected off Griffins Cove. Though one of the smallest of the Calanoida, the species has a wide distribution, and it is interesting to find it in this collection. The identification of the species required the dissection of the only male specimen observed.

*Pseudocalanus elongatus*, Boeck.—Several specimens of this common and widely distributed species were obtained; they occurred in three of the samples.

*Euchata* (?) *marina*, Prestandrea.—This species was moderately frequent in the sample labelled "Off Griffins Cove, 1872," and one or two specimens were also observed in another sample collected in 1873. Most of the specimens were immature; no adult males were obtained, but there were one or two that had nearly reached the mature stage. Though I feel satisfied that the specimens obtained belong to *E. marina*, which is the only species they best agree with, the presence of adult males would have made identification of the species more certain.

*Centropages hamatus*, Lilljeborg.—This species occurred somewhat sparingly in at least two of the samples—in the sample collected off Griffins Cove and in that collected in Shediac Bay.

*Isias clavipes*, Boeck. A single specimen of *Isias* was obtained in the gathering collected off Griffins Cove in 1872. This appears to be a distinctly new station for the species.

*Temora longicornis* (O. F. Müller).—This occurred very sparingly in the samples from Griffins Cove and Shediac Bay, and in another labelled "Towing net, Gulf of St. Lawrence,

1873." It is a widely distributed form in the North Atlantic, and occurs sometimes in great abundance.

*Eurytemora herdmani*, I. C. Thomson and A. Scott.\*—A considerable number of specimens of this *Eurytemora* were obtained in a gathering collected by "towing net" in the Gulf of St. Lawrence in 1873; it also occurred in the samples from Griffins Cove and Shediac Bay. The species was described from specimens collected by Professor Herdman, of Liverpool, in the St. Lawrence, chiefly between Quebec and Rimouski, in August and September, 1897. Though Professor Herdman found the *Eurytemora* common between Rimouski and Quebec, it became scarcer to seaward, and none were obtained east of Anticosti Island. It would appear from this, that like the other members of the genus *Eurytemora*, the distribution of *E. herdmani* is limited to water that is more or less of a brackish character. Two forms of this species, a larger and a smaller, were obtained. The smaller differed from the larger and typical form by possessing slightly fewer spinules on the spines of the fifth foot of the female. For the purpose of distinguishing this small form it might be called variety *minor* (see Pl. II., figs. 1 and 2).

*Anomalocera patersoni*, Templeton.—A single example of this fine species was obtained in a gathering collected by towing net in the Gulf of St. Lawrence in 1873, but the exact locality is not given. It is a large and easily recognised species.

*Labidocera aestiva*, Wheeler.—Pl. II., figs. 3 and 4.—Two or three specimens of a *Pontella*-like form, which my son identifies as Wheeler's *Labidocera aestiva*, occurred in the gathering collected in Shediac Bay. The species is described by Professor Wheeler in Vol. XIX. of the Bulletin of the United States Fisheries Commission. Shediac Bay appears to be a new station for this species.

*Acartia clausi*, Giesbrecht.—Pl. II., figs. 9 and 10.—This species occurred very sparingly in the same gathering with the *Labidocera*, and in another collected off Griffins Cove. It was also observed in a third gathering, but the exact locality is not stated. *A. biflosa* resembles somewhat closely the *Acartia*

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\* 1897. *Eurytemora herdmani*, Thompson and Scott, *Liverpool Biol. Soc.*, Vol. XII., p. 78, Pl. V., figs. 1-11.

*clausi* of Giesbrecht, but the spines of the female fifth feet are more slender and straight, or nearly so. In these Gulf of St. Lawrence specimens the spines of the female fifth feet, though moderately stout and curved, as in *Acartia clausi*, are proportionally rather more elongated than in typical specimens (see fig. 9).

*Acartia Giesbrechti*, Dahl. Pl. II., figs. 5-8.—A few specimens of this species—chiefly males—were obtained in the gathering from Shediac Bay. It resembles rather closely the *Acartia tonsa* of Dana, discovered by that naturalist in the South Pacific Ocean; but my son, to whom I am indebted for the identification of the species, points out that in the female *A. tonsa* each foot of the fifth pair ends in a spine, but in the female of *A. Giesbrechti* each foot of the fifth pair ends in a slender seta. The specimens were found in company with those of the *Eurytemora herdmani*, already mentioned, and as Dahl's specimens were obtained at the mouth of the River Tocantius, on the north-eastern coast of Brazil, the normal habitat of the species is probably estuarine rather than in the open sea.

Professor Wheeler has recorded *Acartia tonsa* as common at Wood's Hole. The occurrence of *Acartia Giesbrechti* in the Gulf of St. Lawrence adds considerably to the distribution of the species.

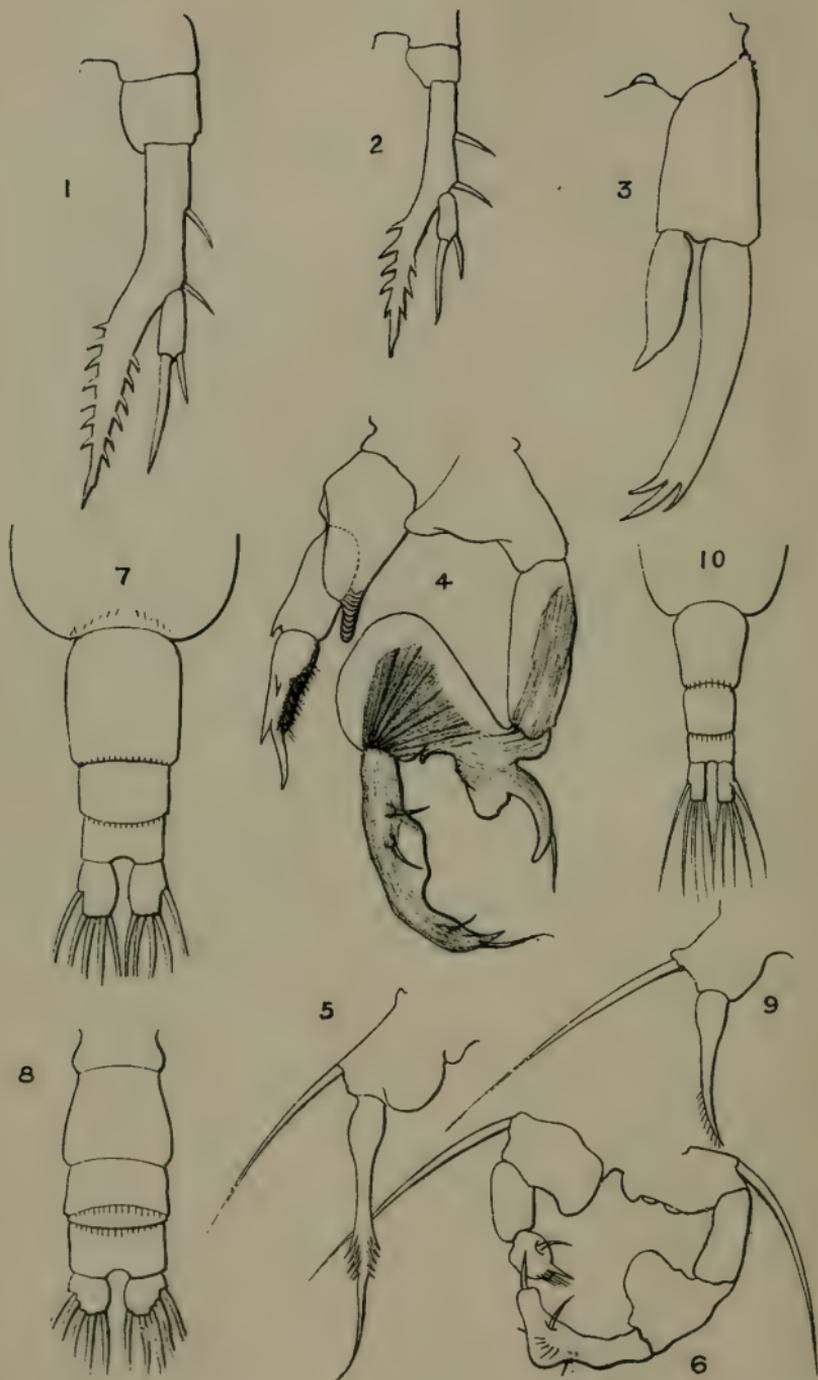
*Tortanus discaudatus*, (I. C. Thompson and A. Scott).\*—A considerable number of specimens of this somewhat curious species were obtained, especially in a gathering labelled "Towing net, Gulf of St. Lawrence, 1873." Though present in gatherings collected off Griffins Cove and in Shediac Bay, the number observed was much fewer.

The species was described from specimens collected by Professor Herdman near the island of Anticosti, in the Gulf of St. Lawrence, and it was also found plentifully in plankton collected somewhat later by the same gentleman in Pugin Sound, on the Pacific Coast. The name *Corynura* was found by Dr. Giesbrecht to be already in use, and substituted *Tortanus* in its place.

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\* 1897. *Corynura discaudata*, Thomson and Scott, *Trans. Liverpool Biol. Soc.*, Vol. XII., p. 80, Pl. VI., figs. 1-11.; Pl. VII., figs. 1, 2.





EXPLANATION OF PLATE II.

Figure 1.—	<i>Eurytemora herdmani</i> ,	one of the 5th feet,	-	-	-	♀ × 154.
„ 2.—	„	„	small form,	-	-	♀ × 154.
„ 3.—	<i>Labidocera æstiva</i> ,	-	-	-	-	♀ × 135.
„ 4.—	„	„	-	-	-	♂ × 106.
„ 5.—	<i>Acartia giesbrechti</i> ,	-	-	-	-	♀ × 270.
„ 6.—	„	„	-	-	-	♂ × 216.
„ 7.—	„	„	abdomen,	-	-	♀ × 106.
„ 8.—	„	„	-	-	-	♂ × 106.
„ 9.—	„	<i>clausi</i> ,	one of the 5th feet,	-	-	♀ × 270.
„ 10.—	„	„	abdomen,	-	-	♀ × 79.

Natural size of the species mentioned above—

<i>Eurytemora herdmani</i> ,	large form,	-	-	♂ 1·61 m.,	♀ 1·52 mm.
„	„	small,	„	♂ 1·14 „,	♀ 1·12 „
<i>Labidocera æstiva</i> ,	-	-	-	♂ 2·49 „,	♀ 2·49 „
<i>Acartia giesbrechti</i> ,	-	-	-	♂ 1·29 „,	♀ 1·52 „
„	<i>clausi</i> ,	-	-	♂ 1·00 „,	♀ 1·00 „



*Oithona similis*, Claus.—This species occurred very sparingly in one of the gatherings mentioned above, along with *Tortanus discaudatus*. It is a widely distributed species, and is sometimes frequent in the British seas, where it is usually referred to under the name of *Oithona spinifrons*, and sometimes *O. helgolandica*, Claus. *Oithona similis* is recorded by Dr. Giesbrecht in his Report on the Copepoda obtained in the collections brought from the Antarctic by the German Expedition in the steam yacht "Belgica." The same author has also recorded the species from the Mediterranean and from Kiel.

*Argulus alosæ*, Gould.\*—A single somewhat immature specimen of this *Argulus* was obtained in a small sample of Copepoda collected off Griffins Cove in 1872. This specimen, though not full grown, possesses the more important characteristics by which *A. alosæ* is distinguished, and I have no hesitation in ascribing it to that species. The specimen measures fully four millimetres in length, but the length of one full grown is, according to Wilson's description, seven and a-half millimetres.

The species appears to be confined to the coasts of North America, and is found on several kinds of fishes, but that on which it was first discovered by Dr. T. W. Harris is called the Ale Wife, *Clupea vernalis*, Mitchell (*Pomolochus pseudoharengus*, Wilson). Gould, who first described the *Argulus alosæ*, considered the *Clupea vernalis* to be identical with the European *Clupea vulgaris*, Cuv. (*C. alosa*, Lin.), better known to us by the name of Allis Shad; but Mr. C. B. Wilson, whose work is referred to above, and from which the information given here is chiefly obtained, says that this fish does not occur on the American coast, while the Ale Wife is quite common, and from it have been obtained most of the recent specimens of the *Argulus alosæ*. It may, however, be of interest to mention that, according to Day's British Fishes, Vol. I., page 235, "Ale Wife" is one of the names used by the Welsh fishermen to designate both the Allis (or Alice) and the Twaite Shads.

Mr. J. F. Whiteaves reports the occurrence of an *Argulus*

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\* 1841. *Argulus alosæ*, Gould, *Invertebrata of Massachusetts*, p. 340.

1902. *Argulus alosæ*, C. B. Wilson, "North American Parasitic Copepoda of the family Argulidae," *Proc. U.S.A. National Mus.*, Vol. XXV., p. 797, Pl. XII.; Pl. XXVI., fig. 80.

from the Gulf of St. Lawrence which is supposed to belong to this species, and which was found on a kind of Stickleback, *Gasterosteus biaculeatus*, Shaw.

#### CLADOCERA.

The three species of Cladocera observed in these gatherings from the Gulf of St. Lawrence are all common and widely distributed forms. Several examples of both *Evadne nordmanni* and *Podon leuckarti* were obtained, but the small *Podon polyphemoides* was very rare, and it was only by dissecting the one or two specimens noticed that I was sure of the species.

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### The Hepaticae of the Clyde Area.

By PETER EWING, F.L.S.

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[Read 26th May, 1903.]

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It may seem premature to again submit a list of the Hepaticae of the Clyde Area, seeing that I am supposed to have submitted a list for the British Association Handbook only last year. For that list, however, I disclaim all responsibility, and have no hesitation in saying that it is not correct, though my name appears in conjunction with it.

The Clyde Area is well defined as "the land draining into the Clyde or Firth of Clyde north of the most southern points of Ayrshire and Cantyre."

In the following list localities will be found corresponding with the Watsonian vice-counties partly coming within the area, thereby serving two purposes, as these, with all their faults, are likely to be the only divisions in common use by topographical workers for some time yet, besides which they are the divisions used by Mr. Macvicar in the topographical work on the species on which he is presently engaged.

The tract of country embraced is a varied one, including, as it does, hills of considerable elevation, well-wooded and well-watered valleys, and a large extent of sea margin, with here and there deep glens, supplying the majority of these plants with the amount of moisture and protection they must have.

They form a very interesting class of plants, and are in many cases very beautiful. They have been much neglected, however, not from want of willing workers, in my opinion, but simply because there are no text-books of any consequence in the language on the subject. A somewhat pretentious work on the Hepaticae has been quite recently published, it is true, but it is very far from being perfect, its price making it prohibitive to the average beginner, and its weak descriptions of critical forms rendering it useless to the advanced student. It is only in the case of a few critical species or badly developed plants that any serious difficulty will be experienced, and for these help can easily be obtained.

In the following list there are fifty-eight plants (prefixed by an \*), not formerly recorded for the West Lowlands, in the eighth edition of the *London Catalogue*, twenty-one (prefixed by a †) not formerly recorded for Scotland, and six (prefixed by a ††) new to the British Flora. This shows how much there is still to do before we can assert that the country is anything like exhausted.

It is an open secret that Mr. Macvicar intends publishing a tentative list showing the distribution of these plants in Scotland, and ultimately a more comprehensive topographical work on much the same lines as the "Glasgow Catalogue of Native and Established Plants." I would, therefore, press on those who may wish out-door amusement during the winter and spring months to take up this order of plants, as, after Mr. Macvicar's work has been completed, he may not be quite so accessible. Meanwhile he is anxious to devote the whole of his time to Scotch plants.

So far as I am aware, this is the first really satisfactory list that has ever been given for the district. Mr. Macvicar has seen all the plants, and has had Continental opinion on some of them to confirm his own, and a specimen from each locality given is in my own herbarium.

- Frullania Tamarisci*, L.—Barrhill, Kelly Glen, Falls of Clyde, Campsie, Tighnabruaich, Helensburgh, Arran, Carradale.
- F. fragillifolia*, Tayl.—Campbeltown, Ben Voirlich.\*
- F. germana*, Tayl.—Carradale.†
- F. dilatata*, L.—Mochra Hill, Ayr, Inverkip, Falls of Clyde, Aberfoyle, Dunoon, Balloch, Bute, Campbeltown.
- Lejeunea ovat*, Tayl.—Ben Lomond.†
- L. serpyfolia*, Dicks.—Darvel, Loch Thom, Falls of Clyde, Campsie, Tighnabruaich, Ben Lomond, Arran, Campbeltown.\*
- L. patens*, Lindb.—West Kilbride, Loch Thom, Ben Lomond, Corrie (Arran), Tarbert (Loch Fyne).
- L. ulicina*, Tayl.—Bute.\*
- Radula complanata*, L.—Largs, Castle Semple, Falls of Clyde, Campsie, Dunoon, Balloch, Bute, Campbeltown.
- Porella laevigata*, Schrad.—Largs, Loch Thom, Campsie Glen, Tighnabruaich, Balloch.\*
- P. platyphylla*, L.—Largs, Ballagan, Campbeltown.
- P. rivularis*, Nees.—Largs, Falls of Clyde, Tarbert (Loch Fyne).\*
- Pleurozia cochleariformis*, Weiss.—Lochgilphead, Ben Lomond.
- Anthelia julacea*, Lightft.—Campsie, Lochgilphead, Ben Lomond, Corrie (Arran), Tarbert (Loch Fyne).
- Herberta adunca*, Dicks.—Campsie, Ben Voirlich, Ardrishaig.
- Blepharozia ciliaris*, L.—Barrhill, Wilsontown, Campsie, Tighnabruaich, Ben Lomond.
- B. pulcherrima*, Hoffm.—Old Kilpatrick.
- Trichocolea tomentella*, Ehrh.—Inverkip Glen, Innellan, Ben Lomond, Carradale.
- Blepharostoma trichophyllum*, Dill.—Largs, Castle Semple, Tighnabruaich, Ben Lomond, Carradale.\*
- Lepidozia cupressina*, Sw.—West Kilbride.†
- L. reptans*, L.—Largs, Castle Semple, Blantyre Priory, Milngavie, Sandbank, Balloch, Arran, Campbeltown.
- L. Pearsoni*, Spruce.—Campsie.†
- L. setacea*, Web.—Cloch, Sandbank.
- Bazzania trilobata*, L.—Ben Lomond, Corrie (Arran).
- B. tricrenata*, Wahlenb.—Ben Voirlich.
- Kantia trichomanis*, L.—Barrhill, Loch Thom, Falls of Clyde, Campsie, Dunoon, Balloch, Bute, Carradale.\*

- K. Sprengelii*, Mart.—Fairlie, Gourrock, Campsie, Tighnabruaich, Helensburgh, Bute.\*
- K. arguta*, Mart.—Cloch, Corrie (Arran).†
- Cephalozia lunulaefolia*, Dum.—Wilsontown.†
- C. bicuspidata*, L.—West Kilbride, Castle Semple, Hamilton, Sandbank, Ben Lomond, Corrie (Arran), Campbeltown.
- C. Lammersiana*, Huben.—Largs, Loch Thom, Falls of Clyde, Milngavie, Balloch, Campbeltown.†
- C. connivens*, Dicks.—Cloch, Bute.\*
- C. curvifolia*, Dicks.—Falls of Clyde.
- C. heterostipa*, Carr. and Spruce.—Loch Humphrey, Ardrishaig.†
- C. Sphagni*, Dicks.—Loch Thom, Dunoon.
- C. divicarrata*, Dicks.—Auchinleck, Wilsontown, Loch Humphrey, Corrie (Arran), Tarbert (Loch Fyne).
- C. stelluifera*, Tayl.—Loch Thom.\*
- C. leucantha*, Spruce.—Tarbert (Loch Fyne).
- Scapania compacta*, Lindenb.—Largs, Kelly Glen, Campsie, Bute, Ardrishaig.\*
- S. subalpina*, Nees.—Darvel, Tarbert (Loch Fyne), Campsie, Dunoon, Ben Lomond, Ardrishaig.\*
- S. resupinata*, Dill.—Largs, Kelly Glen, Hamilton, Campsie, Dunoon, Helensburgh, Corrie (Arran), Tarbert (Loch Fyne).\*
- S. undulata*, L.—Largs, Loch Thom, Uddingston, Campsie, Tighnabruaich, Ben Lomond, Corrie (Arran), Carradale.
- S. purpurea*, Dill.—Largs, Castle Semple Loch, Campsie, Sandbank, Ben Lomond, Corrie (Arran), Tarbert (Loch Fyne).\*
- S. intermedia*, Hernot.—Darvel.††
- S. irrigua*, Nees.—Milngavie, Loch Humphrey, Lochgilphead, Corrie (Arran), Ardrishaig.\*
- S. curta*, Mart.—Barrhill, Loch Thom, Helensburgh, Ardrishaig.
- S. convexa*, Scop.—Campbeltown.
- Diplophyllum albicans*, L.—Largs, Castle Semple, Abington, Campsie, Sandbank, Helensburgh, Corrie (Arran), Tarbert (Loch Fyne).
- Lophocolea bidentata*, L.—Alloway Brig, Loch Thom, Falls of Clyde, Bute, Campbeltown.\*
- L. cuspidata*, Limpr.—Darvel, Loch Thom, Uddingston, Dunoon, Balloch, Campbeltown.

- Chiloscyphus polyanthus*, L.—Darvel, Castle Semple, Falls of Clyde, Campsie, Tighnabruaich, Helensburgh, Bute, Tarbert (Loch Fyne).\*
- C. rivularis*, Nees.—Castle Semple Loch, Loch Humphrey.
- C. pallescens*, Nees.—Loch Humphrey. †† .
- Mylia Taylori*, Hook.—Barrhill, Castle Semple, Dungavil, Campsie, Dunoon, Ben Voirlich, Tarbert (Loch Fyne).\*
- Plagiochilos asplenoides*, L.—Darvel, Kelly Glen, Falls of Clyde, Tighnabruaich, Ben Lomond, Corrie (Arran), Tarbert (Loch Fyne).
- P. spinulosa*, Dicks.—Largs, Inverkip, Dunoon, Ben Voirlich, Bute, Tarbert (Loch Fyne).\*
- P. punctata*, Tayl.—Ardrishaig.
- P. tridenticulata*, Tayl.—Dalmellington.\*
- Jungermania cordifolia*, Hook.—Campsie, Lochgilphead, Ben Lomond, Ardrishaig.
- J. pumila*, With.—West Kilbride, Lochwinnoch
- J. riparia*, Tayl.—West Kilbride, Cloch, Campsie, Helensburgh, Campbeltown, Ardrishaig.\*
- J. sphaerocarpa*, Hook.—Campsie.\*
- J. crenulata*, Sm.—Barrhill, Sandbank.
- J. gracillima*, Sm.—Beith, Loch Thom, Campsie, Dunoon. Helensburgh, Campbeltown.
- J. inflata*, Huds.—Largs, Loch Thom, Tarbert (Loch Fyne).
- J. turbinata*, Radi.—Mochra Hill, Johnstone.\*
- J. Mulleri*, Nees.—Ben Voirlich.\*
- J. bicrenata*, Schmid.—Ardrishaig.\*
- J. ventricosa*, Dicks.—Fairlie Glen, Loch Thom, Possil Marsh, Campsie, Loch Humphrey, Dunoon, Helensburgh, Corrie (Arran), Tarbert (Loch Fyne).\*
- J. incisa*, Schrad.—Cambuslang, Helensburgh, Tarbert (Loch Fyne).\*
- J. Lyoni*, Tayl.—Largs, Loch Thom, Falls of Clyde, Ardrishaig.
- J. gracilis*, Schleich.—Giffnock, Bute.
- J. Floerkii*, Web. and Mohr.—Largs, Beith, Loch Thom, Walston, Campsie, Loch Humphrey.\*
- J. minuta*, Crantz.—The Cobbler.
- J. orcadensis*, Hook.—Largs, Ardlui, Tarbert (Loch Fyne).\*
- J. atrovirens*, Schleich.—Cloch, Ardrishaig. ††

- J. porphyroleuca*, Nees.—Largs, Gourrock, Wilsontown, Milngavie, Campbeltown.
- J. subapicalis*, Nees.—Ardlui.††
- Nardia hyalina*, Lyell.—West Kilbride, Castle Semple, Campsie, Sandbank, Helensburgh, Corrie (Arran).
- N. obovata*, Nees.—Barrhill, Gourrock, Campsie, Dunoon, Ardlui, Campbeltown.\*
- N. compressa*, Hook.—Dunoon, Ben Voirlich.
- N. silvrettae*, Gottsche.—Falls of Clyde.††
- N. scalaris*, Schrad.—Largs, Loch Thom, Falls of Clyde, Campsie, Sandbank, Helensburgh, Bute, Campbeltown.
- Marsupella emarginata*, Ehrh.—Largs, Castle Semple, Campsie, Ben Lomond, Corrie (Arran), Tarbert (Loch Fyne).
- N. Funckii*, Web. and Mhor.—Ben Voirlich.
- M. ustulata*, Spruce.—Ardrishaig.††
- Acolea concinnata*, Lightf.—Ben Voirlich.
- A. obtusa*, Lindb.—Ben Lomond.
- A. crenulata*, Gottsch.—Ben Voirlich.
- Saccogyna viticulosa*, Mich.—Gourrock, Sandbank, Ardlui, Corrie (Arran), Tarbert (Loch Fyne).\*
- Fossombronina pusilla*, L.—Uddingston, Cumbernauld, Ardlui.†
- Blasia pusilla*, L.—Darvel, Loch Thom, Walston, Dunoon, Bute, Lochgilphead, Ardrishaig.\*
- Pellia epiphylla*, L.—Auchinleck, Gourrock, Abington, Campsie, Dunoon, Helensburgh, Corrie (Arran), Tarbert (Loch Fyne).
- P. Neesiana*, Gottsch Limpr.—Loch Humphrey, Cloch, Corrie (Arran).\*
- P. calycina*, Tayl.—Bute, Bellshill, Campsie, Lochgilphead, Ardrishaig.
- Aneura multifida*, L.—Cloch, Milngavie, Sandbank.
- A. ambrosioides*, Nees.—Hamilton, Dunoon.†
- A. latifrons*, Linbd.—Tarbert (Loch Fyne), Campbeltown.
- A. sinuata*, Dicks.—Cumbernauld, Campbeltown.†
- A. pinguis*, L.—Largs, Cloch, Cartland Crags, Campsie, Lochgilphead, Duntocher, Campbeltown.\*
- Metzgeria furcata*, L.—Darvel, Castle Semple, Falls of Clyde, Campsie, Tighnabruaich, Balloch, Bute, Campbeltown.\*
- M. conjugata*, Lindb.—Beith, Loch Thom, Tighnabruaich, Balloch, Tarbert (Loch Fyne),†

- M. hamata*, Lindb.—Barrhill, Ardlui, Tarbert (Loch Fyne). †  
*Marchantia polymorpha*, L.—Darvel, Uddingston, Campsie.  
*Conocephalus conicus*, L.—Largs, Cloch, Abington, Tighnabruaich,  
 Ardlui, Corrie (Arran), Campbeltown.  
*Reboulia hemispherica*, L.—Largs.  
*Pressia commutata*, Nees.—Kittochside, Ardlui, Ardrishaig.\*  
*Lunularia cruciata*, L.—Fairlie Glen, Cloch, Uddingston, Bute,  
 Campbeltown.\*  
*Riccia glauca*, L.—Castle Semple, Hamilton, Campsie, Balloch,  
 Campbeltown.  
*R. sorocarpa*, Beschoff.—Castle Semple. †  
*R. crystallina*, L.—Falls of Clyde.  
*R. tumida*, Lindenb.—Castle Semple. †  
*Anthoceros laevis*, L.—Mochra Hill, Ayrshire. †

## Birds of the Clyde between Glasgow and the Red Bridge, Uddingston.

By JOHN PATERSON.

[Read 30th June, 1903.]

THE banks of the Clyde for some miles east of Glasgow have long attracted naturalists as a favourable and accessible field for the pursuit of natural knowledge, but no account of the bird-life of the region has appeared. Mr. Gray's contributions to the ornithology of the West of Scotland contain some references to this district, and in MacDonald's *Rambles Round Glasgow*, Nos. II. and III., Carmyle and Kenmuir and Cambuslang and Dychmont respectively, there are some allusions to birds to be observed in the course of rambles by the banks of the river. In the *New Statistical Account of Scotland*, the accounts of the parishes of Cambuslang, Old Monkland, and

Bothwell, to all of which the river is in part a boundary line, though written by a good naturalist, the Rev. Wm. Patrick, contain practically nothing bearing on the life of the river; but his account of Hamilton parish includes a full and satisfactory account of its avi-fauna, which should be read by all interested.

The physical features of the river banks within the limits indicated in the title of these notes are well known to many members of this Society, and that the portions of the district nearest to Glasgow have been changed considerably by the influence of man is also a matter of common knowledge, but nothing can reconcile the Rambler or naturalist to the pollution of the river and the littering of its banks with the waste products of the manufactures carried on there. Students of bird-life know well that birds show great tenacity in holding on to certain localities, even such as are the scene of rapid change, and it is not till they are literally displaced that birds disappear from long-frequented haunts. Among physical features which retain some salient characteristics while surrounding aspects change, a river may be said to be one of the most constant, and it is consequently not surprising that such a great artery should continue to delight the student of Nature, in spite of the drawbacks which the increase in the population on its banks inevitably brings in its train.

For a dozen years past it has been my regular practice to spend a good deal of my leisure, in April and May especially, on the banks of the river, during the spring migration period. During autumn and winter my visits have been infrequent, but, through the kindness of my friend, Mr. Robert Wilson, any deficiency regarding these seasons has been made up by the data he has furnished me with.

Proceeding now to review the species observed, the Mistle-Thrush (*Turdus viscivorus*, Linn.) is very plentiful about Cambuslang, and I have found its nest on both banks of the stream. One nest above Carmyle, found on 13th April, 1901, was in a somewhat unusual situation, being placed on the top side of the main stem of a tree which was bent over the river—the nest resting flat on the horizontal, away from any lateral growths or supports. Considerable flocks are seen in autumn.

The Song-Thrush (*Turdus musicus*, Linn.) is not more common than its congener, the Mistle-Thrush, but Mr. Wilson has seen large flocks in green crops above Carmyle in autumn—the end of September and beginning of October especially.

The Redwing (*Turdus iliacus*, Linn.) is frequent in flocks up to thirty birds.

The Fieldfare (*Turdus pilaris*, Linn.) is to be seen regularly during the time of its stay in this country, and in April especially, at and opposite Daldowie, I have seen it regularly in flocks of a dozen, and ranging up to a couple of hundred individuals. Birds are well known to frequent certain places in preference to others that might seem equally attractive, and Mr. Wilson mentions Westthorn Haugh as specially favoured by the Fieldfare.

The Blackbird (*Turdus merula*, Linn.) is pretty common.

The Wheatear (*Saxicola cenanthe* (Linn.)) is to be seen during the spring and autumn migrations. I usually see it at least once in the spring, on a spit of sand and gravel, on a tree, or in the cultivated fields.

The Whinchat (*Pratincola rubetra* (Linn.)) I have seen at the Old Water-works opposite Belvidere, and Mr. Wilson has seen it at Dalbeth early in the autumn.

The Redstart (*Ruticilla phæniceus* (Linn.)), I have seen only once—opposite Kenmuir, 23rd April, 1892. Mr. John Robertson saw a pair near the Rotten Calder, 30th April, 1895, while Mr. Wilson has seen it on the return migration, 3rd August, 1898, at Farme.

The Redbreast (*Erithacus rubecula* (Linn.)) is quite common above Cambuslang.

The Whitethroat (*Sylvia cinerea* (Bechstein)) enlivens the hedges on the banks of the river in summer.

The Golden-crested Wren (*Regulus cristatus*, K. L. Koch) has been observed at Kenmuir—a small party early in October, 1898.

The Willow-Wren (*Phylloscopus trochilus* (Linn.)) is of course abundant, usually appearing in numbers towards the end of the third week in April.

Of the Wood-Wren (*Phylloscopus sibilatrix* (Bechstein)) I have but a single notice, and that quite recently, viz. :—On 23rd June,

1903, above railway at Carmyle, where it was heard singing by Mr. Robert Wilson.

The Sedge-Warbler (*Acrocephalus phragmitis* (Bechstein)) occurs in the willows and hedges that fringe the stream and its banks.

The Hedge-Sparrow (*Accentor modularis* (Linn.)) is conspicuous on the upper reaches.

The Dipper (*Cinclus aquaticus*, Bechstein) I have not seen much below Kenmuir, and I have missed it for a season or two. Seen by Mr. Wilson, however, in February, 1902.

The Long-tailed Titmouse (*Acredula rosea* (Blyth)) I have not seen in the district, but it nested, I was informed by Mr. Harkness, Cambuslang, in 1890 in Kenmuir Bank, and in a recent winter, till the New Year, small parties were regularly observed by Mr. Wilson above Carmyle.

The Great Tit (*Parus major*, Linn.) is common in the sylvan part, and the Coal-Titmouse (*P. ater*, Linn.) fairly common, according to Mr. Wilson, at Kenmuir in the autumn.

Of the Marsh Titmouse (*P. palustris*, Linn.), one was shot 26th September, 1898, Mr. Wilson tells me.

The Blue Titmouse (*P. caeruleus*, Linn.) is pretty common.

Like other sylvan species, the Wren (*Troglodytes parvulus*, Koch) is common in the upper reaches.

The Tree-Creeper (*Certhia familiaris*, Linn.) I first formed acquaintance with in this district. This was above Carmyle, exactly in the place that Hugh Macdonald suggested that it might be successfully looked for, but, curious to say, I have only seen it in this district on the occasion referred to.

The Pied Wagtail (*Motacilla lugubris*, Temminck) is common at all seasons. Mr. Gray has a note on the fact of this bird migrating southwards in autumn—"Immense numbers of Pied Wagtails are in this way observed travelling down the River Clyde at Glasgow. In September and October I have seen as many as three or four hundred assembled on the timber rafts floating between the two principal bridges spanning the river in the heart of the city" (*Birds of the West of Scotland*, p. 110).

The White Wagtail (*M. alba*, Linn.) was not known to occur in the Clyde area until I discovered it on the 14th of April, 1895, at Farme, and all local ornithologists are now well

aware of its annual appearance as a bird of passage in spring. It may be sought with some hope of success from the last two or three days of March till about the middle of May.

The Grey Wagtail (*M. melanope*, Pallas) is scarce, but it is to be seen regularly. It is much more common in winter, Mr. Wilson tells me, and he has seen 8 or 9 in the course of an afternoon in October.

The Blue-headed Yellow Wagtail (*M. flava*, Linn.) I saw in April, 1898, below Cambuslang on two successive days. It had probably come in the company of its congener the Yellow Wagtail (*M. raii* (Bonaparte)), which is one of our ornithological distinctions in this part of the country. Of this species a colony comes annually to the river east of Glasgow, where it is a conspicuous feature till the individuals scatter to the fields for nesting. Fifteen, twenty, or thirty birds may be seen between Farme and Kenmuir in the course of an hour's walk during the spring migration, and in autumn when they congregate for departure a flock estimated to number 250 birds has been recorded by Mr. Wilson. Of this flock about 100 were in the field on the ground, 100 perched on cornstalks, while about 50 were shooting out from the shelter of the banks on short fly-catching flights. For eleven consecutive years I have records of its first occurrence (chiefly between Farme and Cambuslang) between the 14th and 22nd of April, so that it is a pretty regular comer, but this year none appeared till May.

The Tree-Pipit (*Anthus trivialis* (Linn.)) is a regular but not numerous visitor to the sylvan parts of the river above Carmyle.

The Meadow-Pipit (*Anthus pratensis* (Linn.)) is a conspicuous bird of passage in April, and, according to Mr. Wilson, is quite common in winter. Many may be seen from Dalmarnock Bridge upwards in spring, sometimes in flocks up to twenty or more, and in summer a pair or two may still be seen in the fields or waste ground adjacent. It is interesting to realise, when the middle of May is reached, that the passage of the familiar moss-cheeper is over. These changes, from month to month, are a spice to observation.

In the *Proceedings* of this Society, Vol. II., page 169, October 31, 1871, in "Some Notes on the Injury done to Vegetation by

the Severe Frost of the 17th May, 1871," Mr. James Ramsay, then a Vice-President of the Society, who is still held in respectful remembrance by some of our members, said:—"Saturday, the 22nd April, was about as ungenial a day as ever I recollect, considering the time of year: cold and blustering, with constantly-recurring sleety showers; yet, on that Saturday afternoon I saw as many as a dozen Swallows (*Hirundo rustica*) skimming over the surface of the Clyde, just above the new Albert Bridge. The following day was no great improvement on its predecessor, as regards the weather; but, on that day also, I saw a perfect little flock of Sand Martins (*H. riparia*), with two or three Swallows amongst them, sporting over the Langside dam on the Cart." The Swallow (*Hirundo rustica*, Linn.) is still, of course, an abundant bird, usually appearing in the third week of April, but I have not seen any of the Hirundinidæ much below Dalmarnock Bridge, and think Mr. Ramsay's note on its appearance at the Albert Bridge very interesting at this date, and likely to get more so with the flux of time.

The House-Martin (*Chelidon urbica* (Linn.)) is very much scarcer, but to be seen regularly notwithstanding. It may be remembered that in the Extracts from an unpublished Ornithology of Glasgow, by the late Dr. John Grieve, which I arranged for the last part of the Society's *Transactions* issued, that gentleman stated of this species—"Their nests are to be found on almost every window fronting the Clyde." The Sand Martin (*Cotile riparia* (Linn.)) may be looked for during the first fortnight of April, and, no doubt, sometimes appears before March is out, though I have not been fortunate to find it so early—the 2nd of April being my earliest date. Like the Swallow, it is abundant during summer. No place can be more favourably situated than the banks of the river for watching the behaviour of the delightful family to which these birds belong.

The Greenfinch (*Ligurinus chloris* (Linn.)) is common, about Dalbeth especially; at any rate, I rarely miss hearing its cheerful song in that neighbourhood. Mr. Wilson tells me it is very common in large flocks in winter.

The Siskin (*Carduelis spinus* (Linn.)) I have only seen once, and that was in April thirteen or fourteen years ago. I was sitting on the right bank of the stream, opposite Farme, when a small flock

passed over from the left bank and alighted on the trees on the borders of Westthorn Haugh. Since that time Mr. John Torrance has reported its occurrence to me above Cambuslang.

The House-Sparrow (*Passer domesticus*, Linn.) and Chaffinch (*Fringilla cœlebs*, Linn.) are common. Of the latter I once found a nest, above Carmyle, which was studded over with bits of paper in default of lichens, which were not procurable.

The Linnet (*Linota cannabina* (Linn.)) I have a note of hearing once in a tree at Daldowie. It is practically unknown in the district in summer, but Mr. Wilson tells me that, in winter, it is pretty regular in its appearance on the left bank at Bogle's Hole Ford.

A Bullfinch (*Pyrrhula europæa*, Vieillot), was shot above Carmyle many years since, but this is the only occurrence I have heard of.

The Common Bunting (*Emberiza miliaria*, Linn.) is not rare, one or two being heard on all my visits in spring and summer.

The Yellow Bunting (*E. citrinella*, Linn.) is very common, and the same could formerly be said of the

Reed Bunting (*E. schœniclus*, Linn.), but the destruction of the willows by the riverside may have led to a diminution in its numbers—at any rate, the conclusion I have been led to by my observations in recent years, is that it is not now so common as it was.

The Snow-Bunting (*Plectrophenax nivalis* (Linn.)) I first made acquaintance with by observing a solitary bird, many years ago, just below Cambuslang. One Sunday, three or four years ago, in winter, when crossing what was formerly the Fleshers' Haugh, in Glasgow Green, I came on a small flock. It may be remembered that Mr. Gray said that it came sometimes to the Green in very large flocks in winter (*Fauna and Flora of the West of Scotland*, 1876). Mr. Wilson saw it on 26th December, 1901, opposite Young's Haugh.

The Starling (*Sturnus vulgaris*, Linn.) is of course common.

The Magpie (*Pica rustica* (Scopoli)) is still a characteristic bird. On the 8th of April, 1900, I saw twenty-three pies together opposite Daldowie, and on the 24th April, 1897, I had the curiosity in the course of a walk from Stonelaw to Cambuslang,

and thence by the river to the Red Bridge, to count the pies nests, and made out thirty-four—possibly I had missed one or two—and that fifteen pairs or more would nest in the stretch of country referred to in that year, is, I believe, a modest estimate.

The Jackdaw (*Corvus monedula*, Linn.) appears to nest about Daldowie—it is regularly seen and heard there. Mr. Wilson tells me he saw two of those mischievous birds mobbing a pie at its nest and driving it off, but the depredators were apparently unsuccessful through failing to find the entrance, and when last seen one of the daws was perched on the top of the nest—in possession, but baffled.

The Rook (*C. frugilegus*, Linn.) is common. Rookeries still exist at Dalmarnock House and Farme, but are very small affairs, and probably also at Belvidere, though I have not passed that spot this spring. There are, according to Mr. Watt's interesting Census of Glasgow Rookeries (*Trans. Nat. Hist. Soc. Glasgow*, VI., pp. 21-4), larger colonies at Westthorn, Easterhill, and Fullarton House on the right bank. Of the great rookery at Morrision there are now no remains, although five years ago there was a large colony there. The trees at this place have nearly all been felled, and the last nests I have a record of there were two in the spring of 1900. In that year also there were fifty nests at Carmyle, and at a point a little east of the same village, ten nests.

The Skylark (*Alauda arvensis*, Linn.) is common in the fields by the river.

The Swift (*Cypselus apus* (Linn.)) is to be seen regularly during its summer sojourn.

The Kingfisher (*Alcedo ispida*, Linn.) is still a feature of this much-frequented stream—from Farme to Daldowie at any rate—and has frequently essayed, with varying fortune, to nest in the last dozen years.

The Cuckoo (*Cuculus canorus*, Linn.) is occasionally heard but is not very common.

The Sparrow-Hawk (*Accipiter nisus*, Linn.) I have seen occasionally.

The Merlin (*Falco æsalon*, Tunstall), it appears, is still to be reckoned as a visitor to Glasgow Green. Mr. Lugton, the Curator of the People's Palace, tells me that in November last

a young male of this species was found sitting on a lamp post, in a dying condition, near the foot of James Street. This bird is now in the People's Palace. A week or two after the incident mentioned, under the last species, a female Kestrel (*F. tinnunculus*, Linn.), Mr. Lugton informs me, took up quarters above the doorway of the People's Palace, flying out between eight and nine in the morning and returning every evening about six. Towards February, she set out sometimes as late as noon, but always returning from the west not later than 6.15 p.m. On Saturday, 14th February, at five minutes to twelve, it fluttered down to the ground, and shortly after expired. This bird is also preserved at the People's Palace. Mr. Wilson tells me that he sees the Kestrel frequently in winter, and has observed four or five at a time hovering over Young's Haugh.

The Common Heron (*Ardea cinerea*, Linn.) I have seen only once, and this was at Daldowie, where its presence was resented by some magpies. It was settling on a tall beech. Mr. Wilson has on a rare occasion seen this species also.

The Mute Swan (*Cygnus olor* (Gmelin)) has occurred, Mr. Wilson tells me, above Cambuslang--possibly a straggler from the swannery at Hogganfield.

Mr. H. Boyd Watt has observed, on a single occasion, the Common Sheld-Duck (*Tadorna cornuta* (S. G. Gmelin)).

The Mallard, or Wild Duck (*Anas boscas*, Linn.), is regularly seen in winter, Mr. Wilson tells me, and I have seen it occasionally--once at Harvey's Dyke.

Teal (*Nettion crecca* (Linn.)) have been shot in Young's Haugh during a flood.

Mr. Harkness, formerly of Cambuslang, has told me of Wigeon (*Mareca penelope* (Linn.)) occurring in winter at the Thief's Ford; and Mr. Wilson saw this species at Bogle's Ford, December, 1897.

Mr. Gray, it may be remembered, referred to the Tufted Duck (*Fuligula cristata* (Leach)) being observed between the bridges in the heart of the city. "I have seen," says Mr. Gray, "small flocks of this bird, on two or three different occasions, flying at great speed up the River Clyde, a few feet above the surface of the water, and reaching even the Glasgow Bridge at the Broomielaw. On one occasion a beautiful male, accompanied

by two females, came up in this way, and pitched down on the river, close to the bridge, where they swam about in a half-bewildered state among the broken water caused by a steamer leaving the quay. The male went twice under the paddles of another steamer close at hand, and was at last shot, while his two more soberly dressed companions were allowed to escape. At another time I observed six or eight Tufted Ducks, headed by a splendid male, flying in a string up to the same place; but, not liking the appearance of so many revolving wheels in the water, they turned round just as they neared the arches of the bridge, and, after performing a beautiful curve, shot down the river with their usual rapidity." In the upper reaches it may occasionally be seen still, as Mr. Wilson tells me he saw a pair on the 25th of December, 1899.

The Golden-eye (*Clangula glaucion* (Linn.)) is occasionally met with in winter. Mr. Wilson has seen it on two occasions—on the 25th of February, 1899, on the Balloch Burn, and again on the 25th December, 1899.

The Ring Dove (*Columba palumbus*, Linn.) occurs chiefly above Cambuslang.

The Pheasant (*Phasianus colchicus*, Linn.) Mr. Wilson observed on one occasion, 24th November, 1900, at Bogle's Hole.

The Partridge (*Perdix cinerea*, Latham) is not rare in the fields and a few coveys frequent the haughs in winter.

The Corn-crake or Landrail (*Crex pratensis*, Bechstein) is common in summer.

The Moor-hen (*Gallinula chloropus* (Linn.)) occurs from the Balloch Burn upwards, Mr. Wilson says. I have seen it at Kenmuir and several times at Daldowie. It has been shot at Dalbeth.

The Coot (*Fulica atra* (Linn.)) has come under Mr. Hugh Wilson's observation—the only report I have of the species.

The Golden Plover (*Charadrius pluvialis*, Linn.) is common in the fields in winter.

The Lapwing (*Vanellus vulgaris*, Bechstein) is abundant at all seasons. Westthorn Haugh, Mr. Wilson tells me, is a favourite feeding place in winter.

Mr. Gray states, in the *Fauna and Flora of the West of Scotland*, 1876, that the Oyster-Catcher (*Hæmatopus ostralegus*,

Linn.) frequently follows the course of the river as far as Bothwell.

The Woodcock (*Scolopax rusticola*, Linn.) has been shot at Green Gotes and at the Balloch Burn.

The Common Snipe (*Gallinago cælestis* (Frenzel)) is common, in winter, especially, Mr. Wilson says, when there has been flooding of the country adjacent to the river-banks.

The Jack Snipe (*Gallinago gallinula* (Linn.)) is certain to be an annual winter visitor. Mr. Wilson knows of one shot in the upper reaches on 20th October, 1900, and of another occurrence on the Balloch Burn.

I saw a pair of Dunlins (*Tringa alpina*, Linn.) on the right bank, just below Cambuslang, on the 19th of May, 1900.

The Common Sandpiper (*Totanus hypoleucus* (Linn.)) is a delightful feature of the river in summer, usually appearing between the 10th and 16th of April. Obviously the birds first seen are in some instances on passage, as the observer may at that season see several one day and then none for several succeeding days. Mr. Robert Wilson has seen as many as twenty in a flock in August—an unusual circumstance it is believed.

The Redshank (*Totanus calidris* (Linn.)) is conspicuous in April but disappears about the middle of May. Occasionally, in hard weather in winter, Mr. Wilson has seen one or two, and he gives me the interesting information that early in the present year (1903) he saw a pair flying over the river one morning when he was crossing the Suspension Bridge, above the Jamaica Bridge.

Occasionally, in winter, Mr. Wilson has seen the Common Curlew (*Numenius arquata* (Linn.)). It is sometimes heard on migration—thus, on 6th May, 1900, at noon, I heard some passing north-east over Daldowie, and Mr. Wilson has seen it on 12th August.

A pair of Common Terns (*Sterna fluviatilis*, Naumann) was seen at Carmyle on 23rd June, 1903. [In the summer of 1904 I saw frequently, in the same locality, a pair of this species, which were probably nesting there.]

The Black-headed Gull (*Larus ridibundus*, Linn.), is a familiar bird on the river all the year round, even in the centre of the city, and among the shipping in the harbour.

The Common Gull (*L. canus*, Linn.) I have seen but once, on 23rd December, 1899, at a drain below Stockwell Bridge on the left bank.

The Herring-Gull (*L. argentatus*, Gmelin) is a regular winter visitor, in considerable numbers, among the shipping in the harbour, and flocks of several hundreds are to be seen occasionally at the same season, east of the city.

The Lesser Black-backed Gull (*L. fuscus*, Linn.) is represented by a colony which appears in the harbour towards the end of March and spends the summer there. It is regularly seen on the river, east of Glasgow, during the summer.

The Kittiwake (*Rissa tridactyla*, Linn.) I have seen but once, on 19th April, 1899, a mature bird, just above Bogle's Hole Ford. [On 27th April, 1904, I saw an immature example on the river below Cambuslang.]

The Razor-bill (*Alca torda*, Linn.) I have seen twice in the harbour—first, on 3rd February, 1894, during a westerly gale, the river being flooded and a high tide on; and, secondly, on the 8th of October of the same year during a pretty dense fog on the river.

The Little Grebe (*Podiceps fluviatilis* (Tunstall)) closes the list of eighty-six species. Mr. Wilson has reported two occurrences—one shot near the Balloch Burn on 25th December, 1899, and another seen near Cambuslang, 26th December, 1902.

The absence of some species from the list which might naturally be expected to appear in it, and the small number of others in some cases recorded, is in part at least to be explained by the banks of the river being used as a thoroughfare throughout their length, and frequently—on summer Sundays, for instance—being crowded with pleasure-seekers.

## The Alpine Primulaceæ.

By Dr. ROBERT BROWN.

[Read 25th August, 1903.]

THIS Order includes some of the most beautiful and interesting alpine plants. The majority of the genera are rich in colour, and the mode of growth and variety in form make them specially attractive. They are found in great profusion near the snow and in the detritus and on the rocks along the edge of glaciers, while the flat ledges and fissures in the precipitous faces of rocks give lodgment to many others.

The principal alpine genera are the *Androsace*, the *Primula*, and the *Soldanella*. There are many species of *Androsace*, some of which form dense, sponge-like tufts, while others grow in rosettes, having fairly long flower stems.

The flower may be white, pink, crimson, or yellow. The corolla is rotate, five-lobed, with a long tube. The arrangement is an umbel, surrounded with an involucre of bracts. The leaves are all radical.

There is one yellow species, *Androsace vitaliana*, Nüs. (= *Aretia vitaliana*, L.), with a creeping stem and linear leaves arranged in rosettes. This is found plentifully on the high peaks above Zermatt, generally in the trail of the melting snow. It is also found in Piedmont (Mont Cenis), the Tyrol, and the Pyrenees. It is, on the whole, rare.

*Androsace carnea*, L., *A. Wulfeniana*, Sieb., *A. Hausmanni*, Leyb., and *A. Hierii* (Hegetschw.), have pink or red corollas, are found on high, rocky situations, and are generally local and rare.

*A. villosa*, L., *A. lactea*, L., *A. obtusifolia*, and *A. Chamæjasme*, Host., have white flowers, and are frequent on high pasture slopes in Switzerland, the Tyrol, Austrian Alps, and the Pyrenees.

*Androsace imbricata*, Lam., *A. helvetica*, Gaud., *A. glacialis*, Hoppe, *A. pubescens*, DC., *A. Charpentieri*, Heer., and *A. pyrenaica*, Lam., have solitary flowers, and are mostly growing in dense tufts, *A. glacialis* being particularly striking by its broad,

flat, massed condition, the leaves practically hidden by the numerous almost stalkless flowers. On the grassy slopes of the Engadine 8,000 feet up, *Androsace Chamæjasme*, Host., is found growing luxuriously. In this species the leaf-stalk, calyx, and margins of the leaves are covered with woolly hairs. The corolla is white, with a yellow throat, and the leaves are arranged in open rosettes.

Another species frequently found on mountain pastures is *A. carnea*, L., with pink corolla, the long stem, flower pedicel, and calyx slightly hairy, while still more frequent is *A. lactea*, L., which is white, and the whole plant glabrous. Many hybrids are found, but on the whole the genus is noted by its very distinct species.

#### SOLDANELLA.

This genus comprises five distinct species on the Swiss and Austrian Alps, and they are generally found growing and profusely blooming along the edge of the melting snows. If the ground be fairly damp, the plants will be robust and very handsome; if the ground become rapidly dry, the plants shrivel and are small. They are popularly known as "The Snow Bells." The most common species is *Soldanella alpina*, L., found growing from 5,000 to 7,000 feet high. The leaves are reniform, entire, thick, glabrous, dark green. The flower stem, from 3 to 6 inches in length, is rough with sessile glandular hairs. The flowers are arranged in an umbel of two to five, and are of a rich blue or pink, the corolla being divided half-way down with linear segments.

Very like it is *S. pyrolæfolia*, Sch. In this species the leaves resemble *alpina*, but they are more crenate and incised at the base, having distinct veins on the upper surface. The leaf and flower stalks are glabrous. The other species closely resembling these two is *S. montana*, Willd. It is rather difficult to find any very distinctive characteristics in this plant. The leaves, however, have a striking violet colouring on their under surface. The peculiarity which ranks and places these three species by themselves is the long style and the umbellated inflorescence. The other two species are known by the short style and the solitary flowers. They are *Soldanella pusilla*, Baumg., and *S. minima*, Hoppe, and are small plants, with



is a very attractive species, which grows profusely from rocky fissures and ledges, and which seems a very definite and distinctive form. It has a lateral inflorescence, and the corolla is always a beautiful purple colour. It is a strong plant, with large, thick, ovate or slightly obovate leaves on long petioles. The leaves are irregularly toothed on their upper half. This plant is named—

- Primula viscosa*, All.  
 „ *latifolia*, Koch.  
 „ *hirsuta*, Vill.  
 „ *graveolens*, Hegetsch.

It is certainly not viscous, it is not markedly broad-leaved, and it is not specially hairy; and it is not strictly described by either authority, and would certainly not be recognised by their description as a true type of either. M. Bouvier, in his *Flora*, very satisfactorily gives a description of *P. graveolens*, Hegetsch, much in keeping with my specimens; but he ignores altogether in his list “*hirsuta*” and “*latifolia*,” making *graveolens* and *viscosa* distinct species. This seems a very reasonable and satisfactory elimination and definition. This plant I have repeatedly exhibited to the Society.

The species which I have collected and exhibited as *Primula viscosa*, Vill., is certainly distinct in many points from the last. The plant is smaller, the flowering stem is shorter, and the leaves are sub-orbicular, suddenly contracting into a short, broad petiole. The leaves are provided on the margin, and more or less on both sides, with glands which exude a viscous fluid, which makes the handling of the plant unpleasant.

The corolla is light pink or white, when pink having a white throat, and is odoriferous. The peduncles, the pedicels, and calyx are also exceedingly viscous, and are all covered with small glandular hairs. The inflorescence is that of an umbel, and not lateral. This species is named—

- Primula viscosa*, Vill.  
 „ *villosa*, Koch.  
 „ *hirsuta*, All.

It is found very plentifully on the rock faces above Davos, and also in the Engadine.

*Primula farinosa*, Linn., grows plentifully on many of the alpine slopes over 6,000 feet, and is very robust on wet ground.

*Primula longiflora*, All., is a large species, with an exceedingly long-tubed corolla. *Primula minima*, L., is a very small plant, usually one-flowered, and scarcely visible above the short grass on the high alps. The leaves are deeply crenate, shining, and obtuse, with mucronate teeth. I have found this on the Austrian mountains.

There are many hybrids among the Primulas, and much difficulty exists in all descriptions of these, for the variations are in many cases so slight and indefinite as to make it impossible to honestly create them distinct species. It is possible, however, to make a more accurate arrangement of species in this genus, and a clear description of each species, with its variations, would do much to make what at present is a difficult problem a pleasant and simple study.

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### On the Occurrence of the Schizopod, *Pseudomma roseum*, G. O. Sars, within the Clyde Sea Area.

By ALEXANDER PATIENCE.

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[Read 25th August, 1903.]

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#### SCHIZOPODA.

Family,	- -	Mysidae.
Genus,	- -	<i>Pseudomma</i> .

*Pseudomma*, G. O. Sars, Vid. Selsk Forandl, 1869.

*Pseudomma roseum*, G. O. Sars, Carcinolg Bidrag til Norges  
Fauna, 1870, p. 54, tab. 4.

SOME time ago I had the honour of showing and describing before this Society the Schizopod, *Macropsis Slabberi* (van Beneden), which I dredged in Loch Fyne last year.

*Macropsis* means the "long-eyed," the eyes being well developed and perched on stalks which, comparatively, are of a considerable length. On this occasion, however, I wish to draw your attention to a Schizopod belonging to the same family of the Mysidae, but in which the eyes are rudimentary.

I captured *Pseudomma roseum* off Largs, 35 fathoms, bottom mud. There was only one specimen (a female), and the tail part of another. The majority of the Schizopoda are quick-swimming creatures, small and fragile, and the method usually adopted for their capture is by means of the tow-net. My specimen was captured, however, by the shrimp trawl, and it was while sifting the mud through the fine sieves that I discovered this little treasure.

*P. roseum*, when alive, is a striking and very beautiful little creature, about half-an-inch in length, the colour being white, streaked with brilliant carmine. The form of the body is slender and nearly cylindrical throughout, the legs being very slender and fragile. The telson is linguiform, broadest at the base and tapering gradually towards the apex. My specimen differs slightly from that described by Sars in having two more terminal spines on the telson. This is, no doubt, merely a local variation.

The most striking characteristic, however, of this small Crustacean is the rudimentary condition of the eyes, "forming merely broad petaloid expansions of the ocular segment, partly connate in the middle, and not exhibiting the slightest trace of pigment or visual elements." According to Sars, however, there is a ramification of the optic nerve within the ocular plates.

These ocular plates occupy almost the whole breadth of the frontal margin, being separated in the middle by a small cleft. The outer edge is serrate.

In the rough drawing accompanying this paper I have shown the form and position of these ocular plates. As a comparison of this species with a Schizopod possessing well-developed eyes would be instructive, I have drawn underneath the head part of *Nyctiphanes norvegica*, G. O. Sars, which is abundant in the deep water of the Firth of Clyde, showing its large and finely developed eyes.

So far as I am aware, *P. roseum* has not yet been recorded

from the British seas, and apart, therefore, from its peculiar eye structure, it forms a most interesting addition to our Clyde Crustacean fauna. It has been recorded by Professor G. O. Sars from the coast of Norway in depths of 200-300 fathoms.

There are only five species in the genus *Pseudomma*. *P. roseum*, G. O. Sars; *P. affine*, G. O. Sars; and *P. truncatum*, Smith, are all northern species; while *P. Sarsii*, Suhm, and *P. australe*, G. O. Sars, are antarctic forms.

*P. roseum* closely resembles *P. Sarsii*, which has been dredged by H.M.S. "Challenger" in the Antarctic Ocean (Lat. 65° 42' S.; Long. 79° 49' E.) at the depth of 1,675 fathoms.\*

Dr. J. R. Henderson, in his paper on "The Higher Crustacea of the Firth of Clyde," read before the Society in 1885, records fourteen species only of Schizopoda.† Since that time the number has been slowly augmented, and the twenty-six species now on the list form a very large proportion of the whole number of species recorded from the British seas.

Of the Schizopoda recorded by Sars from the coast of Norway about eighteen to twenty species have not yet been found in our seas. They are mostly all deep-water species, but I have no doubt but with further systematic investigation we may yet be able to add many more of these interesting forms to the list of our Crustacean fauna.

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\* H.M.S. "Challenger" Reports, 1873-1876. Zoology, Vol. XIII., "Report on the Schizopoda," p. 191.

† Trans. Nat. Hist. Soc. Glasg., Vol. I. (N. S.), p. 325.

## Reports on Excursions.

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CALDER GLEN, LOCHWINNOCH, 28th March, 1903. — This excursion, which was conducted by Mr. John R. Lee, was intended for the special study of Mosses. The weather during the forenoon had been showery and dull, with a high wind, and the same state of matters continued throughout the afternoon, with occasional glimpses of sunshine. Whether the rather unpromising weather conditions deterred members from leaving the comforts of the city for a short time to face the blustering winds of March, or whether the special subject was an unpopular one, it is impossible to say, but at the hour of starting—2.31 p.m.—only two members had put in an appearance at St. Enoch Station.

However, undeterred by the climatic and other obstacles in their path, the party of two betook themselves to Lochwinnoch, and made their way to the glen of the Calder, where about an hour and a-half was spent in the woods along the edge of the stream.

With the exception of the Alder, Hazel, Elm, and Goat-Willow—all of which were in bloom—none of the deciduous trees exhibited much sign of returning vigour, most of the leaf-buds being rather backward for the season. In the woods the Lesser Wood-Rush (*Luzula vernalis*, DC.) was observed in full bloom and very luxuriant. Evidences were everywhere abundant of the heavy flooding, due to the exceptional rainfall of the past few weeks. One somewhat remarkable feature in this connection was particularly observed. The common Broad-leaved Garlic (*Allium ursinum*, L.) is very abundant in some parts of the glen, and at one place a large patch had been washed quite clear of the soil, large numbers of the plants being found with the bulbs exposed and hanging by their long, cord-like roots upon the bare face of the rocks.

No finds of special importance fall to be recorded, the

following being a list of the Mosses and Hepatics collected in the glen:—

- MUSCI.           *Brachythecium plumosum*, B. and S.  
                   *Eurhynchium myosuroides*, Schp.  
                   *Heterocladium heteropterum*, B. and S.  
                   *Fissidens adiantoides*, Hedw.  
                   *Fissidens bryoides*, Hedw.  
                   *Mnium stellare*, Reich.
- HEPATICÆ.       *Diplophyllum albicans*, L.  
                   *Kantia trichomanis*, L.  
                   *Lepidozia reptans*, L.  
                   *Lophocolea bidentata*, L.

KILPATRICK HILLS AND LOCH HUMPHREY, 18th April, 1903.—About twenty members and friends joined in this excursion, which was under the leadership of Mr. L. Watt. The party were glad to have with them Mr. William West, of Bradford, the specialist in Desmids. Meeting at Dalmuir Station, the members proceeded by the new pathway to Duntocher, observing on the way the remains of the ancient Roman wall. Passing through the village, a few photographs were taken of the lower falls of the burn, and thereafter a visit was paid to the dam, the water of which at one time drove the mill wheel. The dam is now a shallow pool, with a stretch of marshy soil—an excellent hunting ground for Hepatics. A few were obtained here and elsewhere during the ramble. The party then walked along the ridge of the hill to the new reservoir for Clydebank district, a large sheet of water showing a depth of 38 feet, which formerly had all run to waste. A cast of the dredge was made here for Desmids. The track was then along the burn to Loch Humphrey. On the stones in the burn at the Slacks a rather rare Lichen was found—*Nephromium laevigatum*, Ach. The loch was found to be very full, owing to the wet season. It is three-quarters of a mile long and a quarter of a mile wide at the broadest part. It is the reservoir for the town of Dumbarton. A little to the north of Loch Humphrey is the Fyn Loch, which is connected with the former by a small burn, controlled by a sluice. In dry weather the sluice is opened,

and the water from Loch Fyn, which also belongs to the Dumbarton Water Trust, helps to keep Loch Humphrey full.

Being so early in the season, little was to be seen about the loch, but on the moor a few Mosses in fruit were picked up. The view from the ridge was superb, extending from the Gleniffer Braes to the Clyde below Dunoon, and the fineness of the afternoon gave every bit of scenery a wonderful charm.

At the head of Bowling glen the Kestrel builds her nest, while the Sparrow Hawk is often seen hovering around. The Buzzard is also occasionally observed, though more commonly at the Lang Crags. From the head of the glen, all the way to the foot of the hill, the ground was carpeted with the little white flowers of *Eriophila vulgaris*, DC. Old Kilpatrick was reached in time for the 7.40 train home to the city.

Among the Birds seen were the Wheatear, Snipe, and Moorcock. The following Mosses were obtained amongst others:—*Andreaea petrophila*, Ehrh.; *A. Rothii*, W. & M.; *Polytrichum piliferum*, Schreb. Amongst Hepatics were *Riccia sorocarpa?* *Jungermania Floerkii*, W. & M.; *J. inflata*, Huds.; *Nardia scalaris*, Schrad.; *Marsupella Funckii*, W. and M.; *Lepidozia reptans*, L.; *Pellia epiphylla*, L.; *P. Neesiana*, G. and L.; *Aneura pinguis*, L.

The following measurements of trees were made by Mr. John Renwick and Mr. Richard M'Kay at Cochno House during the course of the afternoon:—

Beech to east of house, on east side of road—girth, 12 feet  $8\frac{1}{2}$  inches at 3 feet 6 inches; bole, 23 feet; height, 68 feet; spread to west  $51\frac{1}{4}$  feet, to east 53 feet =  $104\frac{1}{4}$  feet. Two large branches go off on opposite sides, the western one girthing 6 feet  $3\frac{1}{2}$  inches at 2 feet from trunk, the eastern one 5 feet  $9\frac{1}{2}$  inches at 1 foot.

Beech to north-west of house, in a wood—girth, 13 feet  $7\frac{1}{2}$  inches at 3 feet; bole, 5 feet. This tree has been struck by lightning and a very large branch broken.

Yew to north of house (female tree)—girth, 7 feet  $5\frac{3}{4}$  inches at 4 feet 6 inches; bole, 12 feet; height, 41 feet.

Ash near barn—girth, 9 feet  $6\frac{1}{4}$  inches at 5 feet; bole, 10 feet.

Scots Fir to west of house—girth, 7 feet  $6\frac{1}{2}$  inches at 5 feet; bole, 40 feet.

Oak to west of house—girth, 10 feet 5 inches at 2 feet 6 inches; bole, 9 feet.

Gean to south-west of house—girth, 7 feet 11 $\frac{3}{4}$  inches at 3 feet 6 inches; bole, 7 feet.

The increased growth in these trees is as follows:—

First Beech—diameter of spread, 4 $\frac{3}{4}$  feet in 8 years, equal to 7 inches per annum—girth, 6 inches in eight years, equal to  $\cdot 75$  inch per annum.

Second Beech—girth, 15 $\frac{1}{2}$  inches in 12 years, equal to 1 $\cdot 29$  inch per annum.

Yew—girth, 4 $\frac{3}{4}$  inches in 8 years, equal to  $\cdot 59$  inch per annum.

Scots Fir—girth, 1 $\frac{1}{2}$  „ 8 „ „ „  $\cdot 39$  „ „

Oak—girth, 4 „ 12 „ „ „  $\cdot 33$  „ „

Gean— „ 5 $\frac{1}{4}$  „ 8 „ „ „  $\cdot 66$  „ „

BARSKIMMING AND BALLOCHMYLE, 16th May, 1903. — The party on this occasion was under the leadership of Mr. James Whitton, Superintendent of Glasgow Parks. Mr. John Paterson has contributed the following report on the birds that were observed:—

“This proved an interesting excursion to the ornithologists present, the valley of the Ayr being notoriously rich in sylvan bird-life. Among the species observed were the Bullfinch (*Pyrrhula europæa*), of which a nest with two eggs was seen; the Blackcap (*Sylvia atricapilla*) and Garden Warbler (*S. hortensis*), the latter being fairly numerous; the Spotted Flycatcher (*Muscicapa grisola*); the Golden-crested Wren (*Regulus cristatus*), of which species two nests that were seen were respectively ten and sixteen feet from the ground; the Chiffchaff (*Phylloscopus rufus*); and Wood-Wren (*P. sibilatrix*). Jackdaws (*Corvus monedula*) were common, and Rooks (*C. frugilegus*) abounded. There is at Barskimming a rookery of great size, believed by Miss Fanny Anderson to be the largest in Ayrshire. To the lady just named the party was much indebted for information relating to the occurrence of the species above mentioned, and all present were much interested in her great intimacy with some quite wild birds, Chaffinches (*Fringilla cœlebs*) and Red-breasts (*Erithacus rubecula*) especially, which answered her calls and came to be fed by her.”

GARRION TOWER AND MAULDSLIE CASTLE, 30th May, 1903 (Conductor, Mr. John Renwick).—The forenoon was showery, and only eleven members and friends turned up. A very heavy shower was experienced at Garrion Tower, but the rest of the day was dry and warm. The party went by rail to Ayr Road Station, a place which derives its name from the fact that it is on the road from Edinburgh to Ayr *via* Strathaven. This road was made about 1817, when the bridge over the Clyde at Garrion was opened. Before that time there was no bridge over the Clyde between Lanark and Hamilton, a distance of fourteen miles.

The name of the station has recently been altered to Dalsersf, that of the parish in which it is situated.

The valley of the Clyde is here very deep; the station, about seven furlongs in a straight line from the river, and not near the summit, is about 250 feet above the stream.

This was the Society's first visit to Garrion Tower, but three members had visited it in 1900, and had measured four fine trees, all of them worthy of a place in the list published in the British Association Handbook, 1901. The figures relating to these and to others measured on this occasion are:—

GREAT MAPLE, *Acer Pseudo-platanus* L.

Bole, 16 ft. ; girth—May, 1903, 13 ft. 11 ins. at 5 ft.

ASH, *Fraxinus excelsior* L.

Bole, 48 ft. { Girth—May, 1900, 14 ft. 7 ins. at 5 ft. ; height, 88 ft.  
 ,, May, 1903, 14 ft. 8½ ins. at 5 ft.

Increase in 3 years, 1½ ins. = '50 in. per annum.

WALNUT, *Juglans regia* L.

Bole, 16 ft. { Girth—May, 1900, 11 ft. 6 ins. at 5 ft.  
 ,, May, 1903, 11 ft. 8 ins. at 5 ft.

Increase in 3 years, 2 ins. = '67 in. per annum.

OAK, *Quercus Robur* L.

Bole, 15 ft. ; girth—May, 1903, 13 ft. 10½ ins. at 5 ft.

COPPER BEECH, *Fagus sylvatica* L. var., *atro-virens* Duroi.

Bole, 8 ft. { Girth—May, 1900, 11 ft. 11 ins. at 5 ft.  
 ,, May, 1903, 12 ft. 3½ ins. at 5 ft. ; spread—103 ft. 4  
 ins. N. & S. ; 99 ft. 9 ins. E. & W.

Increase in girth, 4½ ins. in 3 years = 1·50 ins. per annum.

PLANE, *Platanus orientalis* L.

Bole, 11 ft. { Girth—May, 1900, 11 ft. 6 $\frac{1}{4}$  ins. ; spread, 62 ft. 3 ins.  
 ,, May, 1903, 11 ft. 9 ins.

Increase in girth in 3 years, 2 $\frac{3}{4}$  ins. = .92 in. per annum.

By the kindness of James Scott, Esq., of Garrion Tower, the party was waited on by his gardener. Under his guidance they were taken along a pathway by the side of the river through the lands of Garrion, Brownlee, &c., to Mauldslic. In the orchards the Orpine, *Sedum Telephium*, L., grew in great abundance, and the Wild Dyer's Weed, *Reseda Luteola*, L., was frequent.

The policies of Mauldslic Castle—the property of Lord Newlands—have been twice visited previously by the Society, namely, on 18th August, 1891, and on 11th March, 1893—on both occasions by way of Carluke. A report of the second visit is given in the *Transactions*, Vol. IV. (N.S.), p. 92. A few of the fine trees recorded then were measured on the present occasion, as follows:—

HORSE CHESTNUT, *Æsculus Hippocastanum* L.

Bole, 8 ft. { Girth—March, 1893, 10 ft. 2 $\frac{1}{2}$  ins. at 2 ft. 6 ins.  
 ,, May, 1903, 11 ft. at 2 ft. 6 ins.

Increase—9.50 ins. ÷ 10.2 years = .93 in. per annum.

BEECH, *Fagus sylvatica* L.

Bole, 5 ft. { Girth—March, 1893, 14 ft. 2 ins. at 2 ft. 3 ins.  
 ,, May, 1903, 15 ft. 7 ins. at 2 ft. 3 ins.

Increase—17 ins. ÷ 10.2 years = 1.66 ins. per annum.

WHITE POPLAR, *Populus alba* L.

Bole, 3 ft. { Girth—August, 1891, 18 ft. at 2 ft.  
 ,, March, 1893, 18 ft. 2 $\frac{1}{2}$  in. at 2 ft. ; spread, 102 $\frac{1}{4}$  ft.  
 ,, May, 1899, 19 ft. 4 ins. at 2 ft. ; height, 103 ft.  
 ,, May, 1903, 20 ft. 1 $\frac{1}{2}$  ins.

*Increase in Girth.*

1891-1899—16.0 ins. ÷ 7.4 years = 2.16 ins. per annum.

1899-1903— 9.5 ins. ÷ 4.0 years = 2.37 ins. per annum.

1891-1903—25.5 ins. ÷ 11.4 years = 2.24 ins. per annum.

Girth above first branch { August, 1891, 17 ft.  
 { May, 1903, 18 ft. 1 $\frac{3}{4}$  ins.

1891-1903—Increase—13.75 ins. ÷ 11.4 years = 1.20 ins. per annum.

Girth of first branch at 3 ft 6 ins. { May, 1899, 7 ft.  
 from main stem, { May, 1903, 7 ft. 3 $\frac{1}{2}$  ins.

1899-1903—Increase—3.6 ins. ÷ 4 years = .90 in. per annum.

WHITE POPLAR, *Populus alba* L.

Bole, 10 ft. {	Girth—March, 1893, 15 ft. 4½ ins. at 2 ft. 9 ins.; spread, 94½ ft.
	„ May, 1899, 15 ft. 10 ins.; height, 119 ft.
	„ May, 1903, 16 ft. 1¾ ins.

*Increase in Girth.*

1893-1899—5·50 ins. ÷ 6·2 years = ·89 in. per annum.

1899-1903—3·75 ins. ÷ 4·0 years = ·94 in. per annum.

1893-1903—9·25 ins. ÷ 10·2 years = ·90 in. per annum.WELLINGTONIA, *Sequoia gigantea* Torrey.

Girth—August, 1891, 10 ft. 2½ ins. at 1 ft.

„ March, 1893, 10 ft. 9 ins. at 1 ft.

„ May, 1903, 13 ft. 6½ ins. at 1 ft.

*Increase in Girth.*

1891-1893—6·50 ins. ÷ 1·2 years = 5·41 ins. per annum.

1893-1903—33·50 ins. ÷ 10·2 years = 3·28 ins. per annum.1891-1903—40·00 ins. ÷ 11·4 years = 3·50 ins. per annum.TULIP TREE, *Liriodendron Tulipifera* L.

Bole, 4 ft. 6 ins.; girth, May, 1903, 4 ft. 6 ins. at 3 ft.

The beautiful Gean Tree, *Prunus Avium*, L., is now past its best, the trunk is falling asunder, but is clasped together by iron bands. Fortunately, it was measured in May, 1899, when it girthed 13 feet 2 inches at 2 feet 3 inches, with a height of 52 feet, and a spread of 68½ feet; bole, 4 feet 9 inches. The increase in girth between August, 1891, and May, 1899, was 6½ inches—an average of ·85 inch per annum.

No White Poplars or Geans anything like these have been seen in any of our excursions.

Mr. John Paterson reports that the district visited is one of the best accessible from Glasgow in respect of the richness of its sylvan ornithological features. In Garrion Orchard, for instance, within a small space, the Marsh Tit, Bullfinch, Spotted Flycatcher, Garden and Blackcap Warblers were all seen or heard. The Garden Warbler was heard frequently in the course of the afternoon.

PUCK'S GLEN AND BENMORE, 13th June, 1903.—A small party of eleven, under the leadership of Mrs. Peter Ewing, visited

Kilmun with the intention of inspecting Puck's Glen, on the Benmore Estate, and, if time permitted, the estate of Benmore itself. They had been favoured with a very cordial permission from Mr. H. J. Younger, the proprietor. It was nearly 4 p.m. when the party reached Kilmun, and, as the glen lies about a mile and a-half further on, very little time could be spared on the road thither, though throughout its entire length it teems with interest both for the botanist and the geologist. An interesting archæological item also occurs in the shape of the old Collegiate Church, in the churchyard of which is the ancient resting-place of the Argyll family. An avenue of Limes and Maples leading up to the church gate is known as "The Twelve Apostles," though time and winter gales have made a gap or two in the apostolic ranks. At the end of this avenue *Anchusa sempervirens*, L., has established itself. The beauty of the trees fringing the roadway on both sides excited much admiration, a large-leaved Cotoneaster being most conspicuous, along with various extremely handsome and well-grown Pines.

Arriving at the Glen, which was entered just below the bridge that crosses the highway, the party proceeded upward, by way of the path which follows the windings of the stream, for about two miles, leaving it on the right near the summit of the hill, and descending by a path which emerges just opposite Benmore gates. Near the entrance, and well up the glen, *Saxifraga Geum*, L., occurs in great profusion. *Hymenophyllum unilaterale*, Bory, was found in abundance, and *H. tunbridgense*, Sm. in only one station. *Listera cordata*, R. Br.; *Aspidium lobatum*, Presl; *Carex pallescens*, L.; and *C. pulicaris*, L., were also observed. As the time occupied in traversing the glen left barely enough of a margin in which to catch the steamer at Kilmun, it was found impossible to attempt even a hurried visit to the estate of Benmore, which was very reluctantly abandoned.

BEN LAOIGH, 18th July, 1903.—Mr. Peter Ewing, F.L.S., who acted as conductor, has contributed the following report:—

"The weather, which is always an important factor in the success or otherwise of an alpine excursion, was on this occasion everything that could be desired. Owing to the detentions of a Caledonian train, I missed those of the party who had arrived

at Tyndrum by a West Highland train, and, after a vain search for them on the hillside, I decided to make some investigations on my own account among the detritus in the corrie, and work right up through it, and perhaps reach the top before any one had left it.

“Owing to the snow having lain so long in the corrie, the detritus was very loose and difficult to walk on, consequently it took me longer to make the ascent than I had expected, but by a fortunate accident, just as I reached the grass at the top of the rocks, three members of the Society made their appearance. It was a very narrow escape we had of missing each other. Had they been five minutes earlier, or I five minutes later, we should probably never have met. We had, of course, very little time to exchange remarks and do what we had to do, as I thought it best to finish the ascent before returning. One of the party did, indeed, lose his train, and if mine had not been late I should have missed it, too.

“Ben Laoigh, like others of our Perthshire mountains, is peculiar in having its plants very much localised and growing in unsuspected places, so that if one wants certain plants one must go where they grow, or be content with chance finds. The development of the phyllite schists in connection with this mountain flora would at first appear to support the theory lately advanced in this Society that alpine plants are very much confined to that rock formation. Their abundance in this case is, I am persuaded, due more to the moisture thrown over them from Stob Garbh than to the rock formation. In proof of this we find that the drier phyllite rocks on the western side are nearly barren, while the Mica-schistose rocks on the eastern side of Ben Laoigh are comparatively rich in alpine plants that are not found on the phyllites at all; and, again, such typical plants as *Arabis petraea* are found all over the mountain, from about 1,000 feet up to near the summit.

“In a paper read before this Society, 9th January, 1883, I showed that Ben Laoigh made a very good second to Ben Lawers. My investigations of both mountains since then leave me in still the same opinion. I have spent four days on or near Ben Laoigh this year, so that there would be no difficulty in my giving a very fair list of plants as seen by me this year on the

hill, but I will confine myself to the most important of those noted on the 18th, my research on the other days being very much confined to *Hepaticæ*.

“I may add that the season was a very late one. I have never seen so much snow lying on the hills in July during all the years I have wandered over them. In the Glen Lochay district I crossed hundreds of acres of snow, the patches being far too large to walk round about, and some of the fissures showed a thickness of not much under 100 feet, and the glissading down some of the patches was as pleasing an experience as the walking up others was laborious. There were a few pretty large patches on Ben Laoigh, which added very much to our knowledge of the conditions under which alpine plants exist and flourish. To see the alpine form of *Caltha minor* in flower within three feet of the snow, and in water at a temperature of  $3\frac{1}{2}^{\circ}$ , with the mountain still ice-bound about six inches below the surface, is interesting in the extreme. Let me now speak of the plants I saw, and try to give some idea of their condition—

*Thalictrum alpinum*, Linn., not in flower.

*Trollius europæus*, Linn., coming into flower.

*Draba incana*, Linn., only in flower.

*Silene acaulis*, Linn., very fine.

*Cerastium alpinum*, Linn., coming into flower.

*Sagina saxatilis*, Wimm., in flower bud.

*Alchemilla alpina*, Linn., in good flower low down.

*Sibbaldia procumbens*, Linn., in flower.

*Dryas octopetala*, Linn., in fine flower.

*Epilobium anagallidifolium*, Lam., in flower.

*Sedum Rhodiola*, DC., in flower.

*Saxifraga oppositifolia*, Linn., nearly over, but not in fruit.

*S. nivalis*, Linn., in flower bud.

*S. stellaris*, Linn., in flower.

*S. aizoides*, Linn., in flower bud.

*S. hypnoides*, Linn., coming into flower.

*Saussurea alpina*, DC., very late.

*Gnaphalium supinum*, Linn., mostly in flower bud.

*Hieracium holosericeum*, Back., flower bud.

*Pyrola rotundifolia*, Linn., no signs of flower.

*Bartsia alpina*, Linn., in good flower.

*Oxyria reniformis*, Hook, flower bud.

*Salix Arbuscula*, Linn. ; *S. herbacea*, Linn. ; *S. reticulata*,  
Linn., all late.

*Tofieldia palustris*, Huds., in flower.

*Luzula spicata*, DC., in bud.

*Juncus trifidus*, Linn. ; *J. castaneus*, Sm. ; *J. biglumis*, Linn.,  
not in flower.

*J. triglumis*, Linn., in flower.

*Rhynchospora alba*, Vahl., a few plants in flower.

*Kobresia caricina*, Willd., showing flowering stems.

*Carex dioica*, Linn. ; *C. atrata*, Linn. ; *C. rigida*, Good. ;  
*C. vaginata*, Tausch. ; *C. capillaris*, Linn. ; *C. pulla*,  
Good., all too young for collecting purposes.

“The grasses were unnoticeable.

“I picked up, in passing, a few of the rare alpine mosses for a  
friend, such as—

*Dicranum fulvellum*, Sm. ; *D. Starkei*, W. and M. ;

*D. falcatum*, Hedw. ; *D. Blytii*, B. and S.

*D. arcticum*, Schpr.

*Encalypta rhabdocarpa*, Schwg.

*Edipodium Griffithianum*, Schwgr.

“As to the *Hepaticæ* I can say very little, as I was taking  
the smaller forms principally, but I did pick up a bit or two  
of the larger hill plants, such as—

*Pleurozia cochleariformis*, Weiss.

*Bazzania tricrenata*, Lindbg.

*Blepharozia ciliaris*, L.

*Herberta adunca*, Dicks.

*Jamesonilla Carringtoni*, Balf.

*Pallavicinia Blytii*, Lindb.

*Metzgeria pubescens*, Schrank.

“And a few others.”

MARINE BIOLOGICAL STATION, MILLPORT, 15th August, 1903  
(Conductor, Mr. Alex. Gray).—The excursion to Millport on the  
15th instant was rather poorly attended, owing to the wet,  
stormy weather of that and the previous days. By the mid-  
day steamer only two members arrived, who, after inspection

of the Robertson Museum and tank room, proceeded on board the "Mermaid" amidst a downpour of rain, and steamed up the Largs channel to a point opposite Fairlie, where the eight-foot beam trawl was lowered to the bottom in a depth of 25 fathoms. The bottom deposit here is fine mud, inhabited by a rich and varied fauna. Flounder, sole, and other flat fishes are fairly abundant, and this channel is the principal fishing ground frequented by the small fishing smacks which are still permitted to use the beam trawl.

During the time our first haul was being taken, a good-sized bottle-nose Whale was observed blowing at a distance of about 200 yards; soon another appeared, and then another, and within a quarter of an hour no less than six individuals were seen within a radius of about a mile. It is probable from the slow, deliberate movements of the Cetaceans that the creatures were feeding, as were also large numbers of Guillemots, Gulls, and Gannets, which were grouped in flocks all over the channel. The Whales evinced no alarm, although passenger steamers passed within a few yards of some of them.

When our trawl had been dragged along the bottom for about half-an-hour it was taken on board, and the following amongst other animals were examined and noted:—Norway Lobster, *Nephirops norvegicus*; Swimming Crabs, *Portunus puber*, and *P. depurator*; Hermit Crabs, *Eupagurus bernhardus*, and *E. prideauxi*, the latter with the Cloaklet anemone, *Adamsia palliata*, attached to the outside of the shell in which the hermit lives. The Green Shore Crab, *Carcinus maenas*, was found with the Crustacean parasite, *Sacculina carcini*, attached to the abdomen. Many other Crustaceans were also taken, such as *Stenorhynchus*, *Inachus*, *Galathea*, and *Munida*.

The Sea Mouse, *Aphrodita aculeata*, Terebellids, Sabellids, and other Annelids were also secured. The Molluscs included *Buccinum*, *Fusus*, *Aporrhais*, *Turritella*, *Scaphander*, *Pecten*, *Cardium*, and *Nucula*. Amongst fishes, plaice, flounder, young cod, and *Cottus* were taken.

A second haul near the same ground brought up similar forms, with a fine specimen of the sea pen, *Pennatula phosphorea*, which is far more common in this part of the Clyde than was formerly supposed.

The "Mermaid" now steamed to Keppel Pier to pick up members arriving by later steamer. Seven were found waiting, and a run was made back to the old ground, in the hope of getting a view of the Whales again, but only one showed itself. A third successful haul of the trawl was taken, and the catch examined by the new arrivals, when a course was steered for the Marine Station, where the party were landed in time to catch their steamer for Glasgow. As the weather cleared up by 2 p.m., a very pleasant afternoon was spent.

PORTINCROSS AND FAIRLIE, 12th September, 1903 (Conductor, Mr. D. A. Boyd).—Eleven members of this Society proceeded by rail to West Kilbride, where they were met by five members of the West Kilbride Ramblers' Club. On leaving the village, some of the party ascended Crosshill, where a brief pause was made to enjoy the beautiful view from the summit, extending over many miles of land and sea. From the distant mountains of Cowal to the far-away hills of Carrick, a fair expanse of blue water, varied with rock-girt islands and bold promontories, lay shimmering in the mellow autumn sunshine, while on every side stretched golden fields of ripening corn almost ready for the reaper. It is very probable that the name of Crosshill (or, more correctly, "Corshill") and that of the adjoining hamlet of Corse (now a part of West Kilbride) may have been derived from the proximity of these places to a boundary cross of stone or wood such as were sometimes set up in mediæval times along the march line of ecclesiastical possessions. For the lands which immediately adjoin Crosshill are portions of the estate of Carlung and part of the lands formerly known as "Kilbryd-Cunynghame," which, along with other valuable properties, were granted in 1413, by Sir William de Cunynghame of Kilmaurs, in pure and perpetual alms, for the sustentation of three presbyters to celebrate divine service in the church of Kilmaurs, for the safety of his own soul and those of his parents, and of Henry de Cunynghame, the founder of the said church. In 1170 the church of Kilmaurs had been granted to the Abbey of Kelso, and the lands of Kilbryd-Cunynghame were thus within the jurisdiction of that monastery, while other parts of the parish of Kilbride were subject to the Abbey of Kilwinning. At the

period of the Reformation, however, these lands of Kilbryd-Cunynghame came into the possession of Alexander, fifth Earl of Glencairn, and were bestowed by him upon his kinsmen. The portion known as Carlung became the property of Hew Cuninghame of Watterstoun, ancestor of the Cuninghames of Carlung, with whose descendants it remained till 1799.

A whinstone quarry, noticed in the descent of Crosshill, afforded an excellent view of a section of the large trap-dyke which forms the nucleus of the hill, and has enabled it to withstand the levelling influence of glacial and other agencies. On the dry hillside, near the quarry, grew several plants of *Senecio sylvaticus*, L. Specimens of Borage (*Borago officinalis*, L.) and Gladdon (*Iris fatidissima*, L.) occurred on the roadside close to the garden at Yonderfields Farm, from which they had doubtless been cast out or had escaped.

At Portincross the party divided into two sections, according to their desire to return by an early or later train. Those who chose the latter alternative lingered beside the old weather-beaten castle, and recalled some of its historical associations. Through permission, kindly granted by the proprietor (Mr. William Adams), an opportunity was afforded for exploring the castle and ascending to the roof. With commendable care, Mr. Adams has recently made extensive repairs upon the building, which should have the effect of long preserving this interesting relic of bygone times from the fate which has befallen so many of the ancient baronial castles of Scotland.

From documentary evidence dating from the beginning of the seventeenth century, it is certain that at Portincross, as late as that period, there existed one of those steadings known as "Temple-lands," which are believed to have been bestowed upon the Knights-Templar during the period of crusading zeal, and afterwards came into the possession of the Knights of the Hospital of St. John of Jerusalem. As to the exact location of the "Tempill-Portincroce," tradition is silent, but we may surmise that it must have been somewhere very near the old castle and little rock-girt harbour, for it is to the promontory alone that the name Portincross is applied. And, seeing that the cross was very specially the landmark used by the Knights-Templar and Knights of the Hospital of St. John for indicating the

position and boundary of their lands, it is not improbable that the name Portincross (*Port-na-croise*, "Harbour of the Cross") may have been derived from a crucifix thus set up beside the Temple-land, and occupying so conspicuous a position as to be a familiar object to every mariner who passed to and fro in sight of the promontory of Ardneil. And so the little haven among the rocks may have become known as the "Harbour of the Cross."

In the course of the walk from Portincross to Hunterston many interesting plants can be observed, including Sea Campion (*Silene maritima*, With.), Bloody Crane's-bill (*Geranium sanguineum*, L.), Common Agrimony (*Agrimonia Eupatoria*, L.), Purple Loosestrife (*Lythrum Salicaria*, L.), Parsley Water-Dropwort (*Oenanthe Lachenalii*, C. Gmel.), Scottish Lovage (*Ligusticum scoticum*, L.), Brookweed (*Samolus Valerani*, L.), Sea-Blite *Suaeda maritima*, Dum.), Crow Garlic (*Allium vineale*, L., type and var. *compactum*, Thuill.), Lesser Sea-rush (*Juncus maritimus*, Lam.), Black Bog-rush (*Scheenus nigricans*, L.), Sea Club-rush (*Scirpus maritimus*, L.), &c. Between Hunterston and Fencebay the most notable plants to be seen are the celery-leaved Crowfoot (*Ranunculus sceleratus*, L.), Sea Holly (*Eryngium maritimum*, L.), and Ray's Knotgrass (*Polygonum Raii*, Bab.).

Through want of time and gradual failure of light, it was found impossible to examine the shore from Fencebay to Fairlie, which is known to be rich in maritime plants. But the walk along the road was by no means lacking in interest. On the one side, away across the water, rose the distant mountains, around whose purple summits dark shadows gradually gathered as the golden light of evening faded into deep red; while on the other side lay Southannan, with its memories of the Sempills, great lords and statesmen in their time, whose domains have long since passed into alien hands.

After tea at Fairlie the party returned by train from the Pier Station.

## Proceedings of the Society.

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SESSION 1902-1903.

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30TH SEPTEMBER, 1902.

Mr. Alex. Somerville, B.Sc., F.L.S., President, in the chair.

Mr. Archibald Park, 57 Dalhousie Street, and Mr. John Douglas, Mount Devon, Holmhead Road, Cathcart, were elected Ordinary Members.

A report on the Society's excursion, on 23rd August, to the Marine Biological Station at Millport, contributed by the Curator of the station, Mr. Alex. Gray, was read by Mr. J. J. Robertson (see page 87).

Mr. David Bruce exhibited the Manx Shearwater (*Puffinus anglorum*, Temminck), with its egg; and also the egg of the Fulmar Petrel (*Fulmarus glacialis*, L.), brought from the Flannan Isles. Mr. Bruce also read a paper descriptive of a recent visit to Loch Roag, Lewis, furnishing data, with descriptive explanation, regarding birds observed in the Outer Hebrides in nesting seasons during the last sixteen years (see page 5).

On behalf of Mr. George Paxton, there were shown fresh specimens of the Flax-dodder, *Cuscuta Epilinum*, Weihe. Mr. John Renwick, who exhibited the plant, read a short statement regarding this destructive parasite. He described the nature of the plant, mentioning that, without leaves or cotyledons or chlorophyll, and, except at the commencement of its career, without root, the Dodder twines round the stem of its host, attaching itself by means of haustoria or suckers, and through these it absorbs the juices of the host. Then he stated:—

“Mr. George Paxton has sent this specimen to me from the West of Scotland Experimental Farm at Holmes, Kilmarnock, and I exhibit it on his behalf, along with some photographs of the plant twining round its host. I shall give a brief account

of the Dodders, and their occurrence in our district, as recorded, and read letters from Rev. Dr. Landsborough and Mr. John Borland regarding the records in Arran and Ayrshire.

“The records, apparently referring to what is now called *Epilinum*, so far as I can ascertain, are:—

“Hopkirk—*Flora Glottiana*, 1813—‘*C. Epithymum*, on heath and thyme—rare; on stalks of flax, about Hamilton and Woodhall.’

“Patrick—*Indigenous Plants of Lanarkshire*, 1831—‘*C. europaea*, on flax, at Cameron, New Monkland—rare.’ ‘*C. Epithymum*, on flax, at Hamilton, but I have not seen it there myself;’ as if he had seen the other.

“Rev. D. Landsborough, LL.D., Kilmarnock, supplies the following information regarding Arran and Ayrshire:—

“(New) *Statistical Account of Kilbride Parish, Arran*, written 1837, revised 1840. List of rarer plants given by Rev. David Landsborough, Stevenston, includes *C. europaea*.

“The plant appears under the name of *C. europaea*, in the first edition of *Excursions to Arran*, by Rev. D. Landsborough (father), published in 1847, but in the second edition, published in 1857, it is given thus:—‘*Cuscuta Epilinum*, Lamplash, among flax.’ So also in the third edition, published by Rev. D. Landsborough (son).

“A list of the plants of Ayrshire, published in 1872 by the late Mr. Borland, Kilmarnock, the late Mr. Duncan, Troon, and the Rev. D. Landsborough, Kilmarnock, gives—‘*C. Epilinum*, parasitic on furze, Troon, B,’ showing that the plant had been found by Mr. Borland.

“Hennedy, in his *Clydesdale Flora*, the first edition of which was published in 1865, says—‘*C. europaea* and *C. Epithymum* are both noticed, the latter in Hopk. *Fl. G.*, and both in *Patr. Ind. Pl. Lan.*, as having been found on flax: may they not be *C. Epilinum*?’ He says of *Epilinum*—‘Rare, parasitical on flax, not native, but introduced with flax-seed,’ gives ‘near Chryston’ as a locality, and quotes ‘Mr. Duncan’ as an authority for it having been found ‘near Kilsyth,’ and Landsborough for ‘Arran.’

“In the fifth edition, 1891, the editor, the late Professor King, has a note to the species—‘extinct.’

“The *British Association Handbook*, 1901, does not give *C. Epilinum* at all, but gives ‘*C. Epithymum*, Ayr, G, Hooker; K, Duncan.’

“‘G’ would include Hamilton, New Monkland, Chryston, Kilsyth; ‘K’ would include the neighbourhood of Ayr and as far north as Prestwick, but not Troon, which is in ‘F’ as is also the ‘Experimental Farm.’ Lamlash is in ‘E.’”

On behalf of Mr. Andrew Gilchrist, Mr. Alex. Somerville, B.Sc., F.L.S., exhibited a fresh specimen of the Blue Pimpernel, *Anagallis caerulea*, Schreber (*vide* Mr. Arthur Bennet, F.L.S.), found growing as a casual at Darvel, Ayrshire.

On behalf of Mr. E. W. Hunnybun, Huntingdon, and of Mr. Arthur Smith, F.L.S., Grimsby, the President exhibited dried specimens of the Scarlet Horned Poppy, *Glaucium phoeniceum*, Curtis, grown this year at Grimsby and Huntingdon, at the latter place from seed collected in Jersey by Mr. J. Piquet. The plant occurs throughout Southern Europe, but in Britain must be looked on as an alien.

Mr. Alexander Gray, Curator, Millport Station, showed an enlarged figure of a minute and rare calcareous sponge, *Leucoselenia lacunosa*, Bowerbank (= *Grantia lacunosa*, Johnston), dredged in 25 fathoms’ water, on hard ground, between Lochranza and Skipness, attached to the test of *Ascidia mentula*, O.F.M. The species had not previously been recorded from the Clyde Estuary.

Mr. William Stewart exhibited a collection of fresh Fungi, sent to him from Glen Urquhart, and offered remarks regarding these.

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28TH OCTOBER, 1902.

Mr Alex. Somerville, B.Sc., F.L.S., President, in the chair.

This being the Fifty-first Annual General Meeting of the Society, the Secretary read the

#### REPORT OF THE COUNCIL (1901-1902).

*Meetings.*—Eleven Ordinary Meetings were held during the session, but it is to be regretted that the attendance was rather below the average. A conversazione to commemorate the Jubilee of the Society was held in December; this was very

largely attended both by members and friends, and by delegates from other societies, and the meeting was in every way successful (see Vol. VI., page 363).

*Excursions.*—Eight Ordinary and two Evening Excursions were held, and it is pleasing to report that the attendance was much better than during the previous session.

*British Association.*—The Society continues to be enrolled amongst the corresponding societies of the Association.

*Membership.*—The membership of the Society is as follows:—

Honorary Members,	-	-	-	-	19
Corresponding Members,	-	-	-	-	41
Life Members,	-	-	-	-	25
Ordinary Members,	-	-	-	-	220
				—	245
					—
Total,	-	-	-	-	305

During the session there were added:—

Honorary Members,	-	-	-	-	7
Corresponding Member,	-	-	-	-	1
Ordinary Members,	-	-	-	-	7
Life Member,	-	-	-	-	1

*Associates.*—The number of Associates remains at fourteen.

*Finance.*—The Hon. Treasurer (Mr. John Renwick) submitted his Annual Statement of Accounts, duly audited. This was found to show a balance at the credit of the Ordinary fund of £96 12s. 6d., and of the Life Members' fund of £147 (see page 120).

*Transactions.*—The Hon. Editor (Rev. G. A. F. Knight, M.A., F.R.S.E.) reported that Part II. of Volume VI. was issued to Members in summer. He was engaged in bringing out the next part of the same volume, and hoped it would soon be ready for distribution.

*Library.*—The Hon. Librarian (Mr. James Mitchell) stated—“The interest of the Members in their Library continues unabated. The returns for the year show a very slight falling off in the number of volumes issued, being 310, compared with 358 last year. The number handed out in Session 1900-01

being a record, it is found that the number issued during the session just ended is over the average of the previous five years. Part II. of Volume VI., which was issued to the Members during the month of September, is now being sent to the various British Societies and Institutions with which the Society exchanges publications. The usual number of exchanges have been received during the past year. These now include nearly all the Scottish Societies of importance which issue publications.

“Ten volumes have been presented the Library during the past year by Members and friends, and to them our best thanks are tendered.

“Eleven volumes have been added by purchase during the same period.

“The Foreign and Colonial publications received during the session have, as usual, been placed in the Mitchell Library, where they may be consulted or borrowed at any time during the hours when the Library is open.

“The books in the Society’s Library are all in good condition. The *Transactions* and magazines are all bound up to date.”

The Reports were all unanimously approved of and adopted, and cordial thanks accorded to all the Officials who during the year had carried on their special work in the interests of the Society.

The following were appointed as Office-bearers of the Society to fill existing vacancies in the Council:—

Mr. Peter Ewing, F.L.S., as President. Mr. Somerville, whose term of office expired at this meeting, stated that Mr. Ewing had been alone nominated for the position of President. On being unanimously elected, Mr. Ewing took the chair, and, in returning thanks for the honour, referred to the influence of the Society upon his work as a naturalist, and said that he owed the active interest he had taken in botanical work almost entirely to this institution. He also spoke in very high terms of the ability and earnestness shown by the retiring President, Mr. Somerville, and stated that to his enthusiastic labours the present prosperous condition of the Society was in great measure owing.

Dr. T. Beath Henderson was elected Vice-President; Dr. Robert Brown, Hon. Secretary; Mr. John Renwick, Hon.

Treasurer; Mr. James Mitchell, Hon. Librarian; Rev. G. A. Frank Knight, M.A., F.R.S.E., Hon. Editor of *Transactions*; Mr. John J. Robertson, Mr. A. B. Motherwell, Mr. Alex. Ross, and Mr. J. W. Reoch, Members of Council; and Mr. James Jack and Mr. Joseph Sommerville, Auditors.

Mr. Walter Buchanan, Duncutha, Tollcross, and Mr. Philip Jerome Bell, 11 Carnarvon Street, were elected Ordinary Members.

Mr. Charles Kirk sent for exhibition fine specimens of the following birds:—A Cream-coloured Wigeon (*Mareca penelope*, L.), from Kilmalcolm; Reeve (*Machetes pugnax*, L.), from Slamannan; Pomatorhine Skua (*Stercorarius pomatorhinus*, (Temminck), female, from Midross, Luss, male from Skipness; Honey-Buzzard, (*Pernis apivorus*, L.), from Kilfinan, Loch Fyne; and Great Skua (*Stercorarius catarrhactes*, L.).

Mr. John Paterson, who showed the specimens, mentioned that this variety of Wigeon was rare, but in winter the species was found in considerable numbers in the Glasgow district; that the Reeve was now practically extinct as a breeding species in this country; that the Honey-Buzzard was very rare, had handsome eggs, and fed on the larvæ of bees and wasps; and that the Pomatorhine Skua, was often melanotic in plumage, was not very numerous in the Clyde area, and does not breed in this country.

A case of Lizards, Insects, and Scorpions from the Soudan, purchased at Wady Halfa, Second Nile Cataract, was sent for exhibition by Mr. Paul Rottenburg, LL.D.

On behalf of Mr. William George Barclay, Perth, there was exhibited by Mr. Alexander Somerville, B.Sc., F.L.S., the Bracteate Marsh Sedge, *Carex divisa*, Hudson, from near Montrose; and the exhibitor read a paper regarding the refinding of this plant in Forfarshire in 1901, after an interval of ninety years since George Don's time, thus restoring it to a place in the flora of Scotland.

Mr. A. Patience brought forward for exhibition a number of Clyde Crustacea, belonging to the sub-order Decapoda and to the genus *Crangon*, and described the distinctive peculiarities of each species.

Dr. Robert Brown, Hon. Secretary, read a paper on "Botanis-

ing on the Dolomites and Swiss Alps during last Summer," and exhibited a large number of dried plants gathered at the time. He stated that his botanical work began on Mount Pilatus, near Lucerne, in June. Here he found that, as in Britain, the season was very late, and the spring flowers were at their best in the lower altitudes, but the meadows were not so rich with colour, nor were the Alpine plants so advanced, as in former years. On Pilatus the snow occupied the upper third, and snowstorms were almost of daily occurrence, so that the real Alpine area was almost unworkable. But from 4,000 to 5,000 feet up, below and alongside the mountain woods and in the exposed small hill meadows, there were many things of botanical interest. Specially plentiful were the strong and well-developed orchids, *Cephalanthera xiphophyllum*, Rehb., and *C. grandiflora*, Bahgt., *Habenaria bifolia*, R. Br.; and many beautiful specimens of *Ophrys apifera*, Huds., usually a very rare plant, were found on the mountains and by the side of the lake. In the densest shade of the wood, growing loosely amongst the masses of decaying leaves, were small colonies of *Neottia nidus-avis*, Reh., standing like ghosts in the gloom of the overshadowing branches. On gently lifting the soft plant, the root came easily away, a mass of succulent fibres knotted and interwoven like the branches in a nest. In the open were many fine specimens of *Pedicularis foliosa*, L., a handsome and striking species generally growing in sloping pasture and always in local colonies. *Rosa alpina*, L., was in full bloom, alongside of bushes of *Coronella emerus*, L. High up on the wooded slopes *Ranunculus lanuginosus*, L., the rather rare, hairy, yellow-flowered ranunculus; and near it *Arum maculatum*, L., the flowers of which were almost over. While far up amongst the snow, amid a howling snowstorm, a perfect garden of *Narcissus poeticus*, L., was discovered in full bloom, and apparently all the better of the rough handling of Nature. *Ranunculus alpestris*, L., was plentiful, and *Aquilegia vulgaris*, L., and *A. atrata*, Koch, were in full bloom. The ordinary Gentians were found all around—*G. verna*, L., *bavarica*, L., *acaulis*, L.—intermixed with numbers of *Primula farinosa*, L.

From Lucerne, Dr. Brown made his way to Innsbruck by the Brenner Pass, and thence to Cortina in the heart of the Dolomite country in the Ampezzo Valley. Cortina stands 4,000 feet above

sea level, is 20 miles from a railway station, and  $3\frac{1}{2}$  miles from the Italian frontier. The River Boite runs through the valley, flanked by meadow lands, which gently slope up to the perpendicular rocky walls of towering dolomite that hem in the landscape. At the bases of the crags many interesting botanical specimens were obtained. The meadow slopes were covered with masses of *Paradisica Liliastrum*, Bertol (= *Anthericum Liliastrum*, L.) with large funnel-shaped white flowers about two inches long. The plant is rare, but is found in Carniola, Carinthia, the Jura, and the Pyrenees, as well as in the Tyrol. A colony of these plants in bloom forms a very beautiful and attractive sight. Patches of *Polygonatum officinale*, All. (= *Convallaria Polygonatum*, L.) with stems about 6 inches long, and with flowers larger than those of *P. multiflorum* and generally solitary, were seen among the rocks. Here also were a large number of the very rare and strictly local *Orchis globosa*, L., easily detected by its pink or purple flowers arranged in a dense hemispherical spike. *Anemone trifolia*, L., sometimes with blue flowers, was blooming profusely on all the slopes. A straggling shrub, with large pea-like yellow flowers, never before discovered anywhere by Dr. Brown, was tentatively identified with *Cytisus hirsutus*, L. A plant resembling *Veronica alpina* in appearance turned out to be *Pæderota bonarota*, L. It has a blue corolla, the calyx and bracts being purple, and the flowers are arranged in terminal heads or spikes. *Scrophularia Hoppei*, Koch., a rather rare species of Figwort with purple corollas, was local at 5,000 feet. *Horminum pyrenaicum*, L., was common in the meadows; *Aronia rotundifolia*, Pers., the Snowy Medlar, higher up; and at the base of the snow *Anemone hepatica*, L., was in flower, intermixed with *Soldanella alpina*, W.

*Orchis sambucina*, L., a very rare yellow orchid, grew high on the Caprile Pass, and *Cypripedium Calceolus*, L., was detected blooming in loose gravelly detritus far up the mountain side. The rare *Pedicularis rosea*, Wulf., and *P. elongata*, Kern, specially local in the Dolomite country, were both come across. Where the snow was melting, *Soldanella pyrolæfolia*, Kotsch, a rare species, and *S. minima*, Hoppe var. *alba*, were discovered in some abundance.

Of true Alpine plants, which were difficult to obtain on account

of the accumulation of snow, the following were recorded:—*Arabis alpestris*, Schleich, var. *hirsuta*, Koch; *A. serpyllifolia*, Vill.; *Draba nivea*, Sant., *Thlaspi rotundifolium*, L., *Ranunculus Phthora*, Crntz.

A visit to the Lower Engadine yielded *Coronilla varia*, L., *Astragalus Onobrychis*, L.; *Hyoscyamus niger*, L., *Melampyrum cristatum*, L., the most handsome species of the cow-wheat family; and *Myosotis hispida*, Schlecht. *Delphinium consolida*, L., and *Adonis autumnalis*, L., were found along the borders of cultivated fields.

In the Upper Engadine *Oxytropis Halleri*, Bunge, and *O. sordida*, DC., were blooming freely, both being rare species. Around Samaden many plants were collected, such as *Androsace lactea*, L., *Plantago alpina*, L., *Festuca violacea*, Gaud., *Pedicularis recutita*, L., *Hieracium villosum*, L., *Dracocephalum Ruy-schianum*, L., *Celoglossum viride*, Hartm., and among the wooded slopes *Gentiana lutea*, L., and *G. purpurea* intermixed with *Veratrum album*, L.

Near Pontresina, *Saxifraga bryoides*, L., *S. oppositifolia*, L., *S. elongata*, Engl.; and *S. exarata*, Vill., were discovered in flower. Fine plants of *Arnicium clusii*, Koch., and *Bupleurum stellatum*, L., were also obtained, along with *Linaria alpina*, Mill., and its variety, *unicolor*, all blue. *Achillea moschata*, L., is used as a remedy for many ailments among the country people, and forms the principal ingredient in the popular liqueur "Iva." Its taste and odour resemble that of the camomile plant. *Saxifraga androsacea*, L., *S. pygmæa*, Han., *Draba frigida*, Sant., and *Gagea Liottardi*, Schult, were obtained about 7,000 feet up amongst the snow, along with hundreds of perfectly formed specimens of Edelweiss. On the Padella were found thousands of the very rare *Ranunculus parnassifolius*, L., a discovery which seems to show that Nature has her own quiet spots, quite out of reach of the tourist or the Swiss native, wherein she preserves from extinction plants which seem otherwise doomed to be exterminated. Dr. Brown concluded by a glowing reference to the beauty of these Alpine valleys when carpeted from side to side with myriads of the brightest coloured flowers, and stated that these regions were for botanists an unending source of enjoyment and delight.

27TH NOVEMBER, 1902.

Mr. Peter Ewing, F.L.S., President, in the chair.

Mr. James Laird, 6 North Court, St. Vincent Place, was elected an Ordinary Member.

The President intimated that he had received for the Society's Library, from Dr. Ferguson, Kinmundy, two books, viz. :—"The Great North of Scotland Railway Guide," by Wm. Ferguson, LL.D., and "Twelve Sketches of Scenery and Antiquities on the Line of the Great North of Scotland Railway," by George Reid, R.S.A., with illustrative letterpress by Wm. Ferguson, LL.D.

By arrangement, Mr. Ewing vacated the chair at this stage, and Mr. Alex. Somerville, B.Sc., F.L.S., the late President of the Society, presided during the remainder of the evening. After saying a few words commendatory of the work of Mr. Ewing as a distinguished botanist, he introduced the lecturer of the evening, William Ferguson, Esq., of Kinmundy, D.L., LL.D., F.L.S., F.G.S., F.S.A.Scot.

Dr. Ferguson then delivered his lecture, the title of which was "Reminiscences of the Early Days of the Society," and, in an exceedingly interesting address, gave a description of the starting of the Society in 1851, when he was privileged to be one of twelve men who founded the institution (see page 9). For fully an hour Dr. Ferguson kept his hearers deeply interested in his graphic representation of the early days of the Society, and at the close Mr. Peter Ewing, F.L.S.; Mr. Murdoch, F.R.Ph.S.E., Secretary of the Geological Society; and Professor Graham Kerr, F.G.S., all spoke in the highest terms of the kindness of Dr. Ferguson in coming such a distance at his advanced age to deliver so delightful a lecture.

The meeting, which was largely attended, ended in a vote of thanks to the chairman, moved by Dr. Beath Henderson.

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23RD DECEMBER, 1902.

Mr. Peter Ewing, F.L.S., President, in the chair.

The President delivered a short presidential address, thanking the Members for the honour they had done him in electing him to the position he now occupied. He referred to the noble

traditions of the Society for work accomplished in the past, and mentioned how, when any call had been made for special scientific work to be done, again and again it had been the lot of this, the premier society of the city in the domain of natural history, to carry out the scheme. He urged the Members, especially the more recently enlisted, in their several departments of biology, to take a livelier interest than ever in the ordinary meetings of the Society, and by the exhibition of specimens and the reading of papers to keep up the status of the Society, and make it a truly educational power. He referred to the fact that Glasgow has now a Civic Herbarium in the new Art Museum, and volunteer workers on behalf of that collection are ardently desired. Room would be found in the museum for specimens of the whole fauna and flora of the land draining into the Clyde, but dates of capture and localities must in all cases be given.

The following were elected Ordinary Members:—Mr. J. Graham Kerr, B.A., F.G.S., M.B.O.U., Fellow of Christ College, Cambridge, Professor of Natural History in the University of Glasgow; Mr. Edward J. Bles, B.A., B.Sc., Demonstrator in Zoology, University of Glasgow; Mr. Richard Prosser, Buxton Villa, Shawlands; Mr. W. E. Frost, J.P., Ardwick, Crieff; Mr. James Swanson, M.A., M.B.C.M., F.F.P.S.G., Norwood, 101 St. George's Road.

On behalf of Mr. Robert S. Miller, Greenoakhill, Broomhouse, Mr. R. S. Wishart, M.A., exhibited the Egg of a Tortoise. The tortoise had died on 3rd September, and was buried on 22nd September, three feet deep. It was left in the ground till 5th December, and, when then dug up, all that was found was the shell, a few bones, and four eggs, which had the appearance of bladders.

On behalf of Mr. Charles Kirk, there was exhibited by Mr. John Paterson a specimen of the Glossy Ibis, *Plegadis falcinellus*, L. The bird was shot near Port Ellen, Islay. Mr. Paterson added some interesting details about the exhibit, especially in regard to its distribution and nesting.

On behalf of Mr. Arthur Bennett, F.L.S., Corresponding Member, there were exhibited and referred to by Mr. Alex. Somerville, B.Sc., F.L.S., specimens of a Milkwort, *Polygala*,

from Grassington, West Riding of Yorkshire, where it was discovered by Mr. John Cryer in May this year. The plant has been named *P. amarella*, Crantz (= *P. amara*, L.) by Professor R. Chodat, of Geneva. *P. amara* had not previously been detected in Britain, though plentiful in Switzerland. Dr. Robert Brown and the President followed with remarks on the British and Continental species and forms of *Polygala*.

Mr. Joseph Somerville exhibited a specimen of Ash (*Fraxinus excelsior*, L.) showing abnormal development of cork warts, and gave explanation of the possible cause of these growths.

Mr. R. S. Wishart, M.A., read a paper entitled "Experiments on the Thickening of some Tree Stems," and exhibited a number of interesting specimens illustrating the effects of pressure on the stem surface, and also injury to the natural growth and contour of the stem (see page 18).

The President referred to the deaths which had recently occurred of Members of the Society, viz.:—Mr. Thomas E. Buckley, B.A., F.Z.S., M.B.O.U., Rossal, Inverness; Mr. Andrew Arbuckle, 4 Farme Loan Road, Rutherglen; and Mr. John Young, M.D., Professor of Natural History in the University of Glasgow, who in the early days of the Society was an active member, and at one time President.

The following additions to the Library were intimated:—By gift: from Mr. John Fleming, Sir Archibald Geikie's *The Scenery of Scotland*; and Richard Jefferies, *The Gamekeeper at Home*.

From Mr. James Mitchell, Montague Brown's *Tawidemy and Modelling*; Samuel Smiles' *Life of a Scotch Naturalist, Thomas Edvard*; Thomas Southwell's *The Seals and Whales of the British Seas*.

From Mr. John Anderson, Sir J. D. Marwick's *The Water Supply of the City of Glasgow*.

From the Local Committee at Belfast, *British Association Handbook Guide to Belfast, 1901*.

By purchase: Robert Newstead's *Monograph of the Coccidae of the British Isles*, vol. i. (Ray Society).

A. D. Michael, F.L.S., *British Tyroglyphidae* (Ray Society).

27TH JANUARY, 1903.

Mr. Peter Ewing, F.L.S., President, in the chair.

Mr. Alex. Murray, 153 Queen Street, and Mr. James Somerville, Jun., 1 Caledonian Terrace, Cambuslang, were elected Ordinary Members.

Mr. Alex. Somerville, B.Sc., F.L.S., exhibited the Soft Prickly Shield Fern, *Polystichum angulare*, Presl., from Ayrshire, Renfrewshire (1861), Cumbrae (1863), Arran (1863), and Kintyre, with specimens of *P. aculeatum*, Roth., and *P. lonchitis*, Roth., for comparison. At the same time Mr. Somerville read a paper, "On the genus *Polystichum*, Roth (*Aspidium*, Swartz), in part, with special reference to *P. angulare*, Presl., and to its distribution in Scotland." After giving some interesting details regarding ferns in general, he described more particularly the peculiarities of the Shield Ferns, and specially directed the attention of the meeting to *P. angulare*, because of the fact that it was a plant becoming rare, to such an extent that many good Scottish botanists had never seen it growing. Mr. Somerville went on to say—

"I show specimens gathered forty years ago by Mr. P. Neill Fraser, of this Society, on Great Cumbrae Island, where I fear it is now quite extinct, and also from Lochranza, Arran, in which island I am doubtful if it is now to be found. I also show specimens obtained many years ago at Inverkip, Renfrewshire, where, and along the coast to Skelmorlie, it used to be plentiful. Dr. Thomas Scott, F.L.S., records it from above Greenock, and Mr. D. A. Boyd from Portincross, Ayrshire; and Mr. John Smith, Kilwinning, also is acquainted with three spots in Ayrshire where it occurs. I show a specimen obtained by myself last year in the extreme south of Ayrshire.

"Perhaps the most interesting of the sheets shown is that of specimens gathered by me in the woods at Skipness, in the Kintyre peninsula, in 1899. This record of the plant, with the exception of one from Lochgilphead, noticed in Moore's *Nature-Printed Ferns*, published forty-four years ago, and of which there seems to have been no subsequent confirmation, is, according to Professor Trail, the only record from Argyllshire, or from any part of the West of Scotland north of Arran.

Mr. Charles T. Druery, F.L.S., President of the Pteridological Society, who has seen my Skipness specimens, says, as his label attached shows—'This is *P. angulare*, beyond a doubt, despite the locality.'

"The only other counties in Scotland from which *P. angulare* seems to be definitely recorded, and which, with one exception (viz., the first), are given in Professor Trail's *Topographical Botany of Scotland*, are Kirkcudbright (in the parish of Kells); Wigtown; both these as recorded by Mr. James M'Andrew, Roxburgh; and Berwick, at Pease Dean, where Rev. Dr. Paul states it to be abundant; and there is also an old doubted record from Midlothian.

"In Ireland, which seems to have a congenial soil and atmosphere for the growth of the plant, we find it occurring, according to Præger's *Irish Topographical Botany*, in every county, and in England it is also widely distributed, being recorded from Cornwall and Northumberland, and from many intervening counties."

Reference was then made to the points which distinguish the three species of Shield Fern, *P. lonchitis*, *P. aculeatum*, and *P. angulare*, and the differences between the latter two were briefly diagnosed as follows:—

*P. aculeatum*—glossy in appearance: rigid in texture: pinnales wedge-shaped, almost sessile: the *pinnae* diminishing gradually downwards. *P. angulare*—lax, drooping: the teeth of the leaves long-awned: the base of the pinnales obtuse, and shortly but distinctly stalked.

Mrs. Peter Ewing exhibited *Juncus tenuis*, Willd., from Argyllshire, and read a paper giving some interesting details regarding the distribution of the plant (see page 22).

Dr. Robert Brown exhibited a collection of Swiss Alpine Plants, amongst them being several specimens of the Swiss *Carex frigida*, All., from different altitudes, on which he contributed a short paper. He stated that this *Carex* is very plentiful in the Swiss mountains, and is found in greatest profusion and perfection about 6,000 feet up. It is generally growing on the banks of running streams, or on the soft wet slopes, where the roots have freedom to sink and spread. Very often it is found in the company of *Carex atrata*. When by the running

water, where the roots have plenty of moisture, it grows tall and fairly strong, sometimes reaching two feet in height. When the inflorescence is large and heavy the slender stem bends down, and frequently will be found in great numbers leaning over on the water's surface, the flowering tops dipping into and rising out of the moving stream. On the wet hillsides the plants grow luxuriantly also, but wherever seen in full development the slender stem is bent in its upper half, the inflorescence waving about in the wind.

Higher up on the drier wind-swept slopes this *Carex* gets dwarfed, the stem remains upright, and the inflorescence is rigid and erect. Looked at as it grows on the soft river bank or mountain slope, the plant is very attractive. Its flat soft leaves are bright green, the stem is exceedingly slender, and mostly gracefully curved, so that the flower heads hang down, and as these have fairly long stalks, and are of a clear shining black in colour, and have the roughened feathering appearance and shape of a bottle brush, it naturally attracts at once the notice it deserves.

The root is strong, its fibres sinking deeply, and in many plants is stoloniferous. The stem is roundish, but slightly angled, and very slender. Leaves flat, linear, short, sometimes slightly scabrous, as is also the stem at the top. The male spikelet is solitary, oblong in shape, dark brown or, in some, black. The female spikelets, 3 to 5, oblong, dense, generally with long peduncles, black or blackish, the lowermost one distant, with a longer peduncle. Sometimes the upper spikelets are clustered, and, as a rule, they are all pendant. The bracts are foliaceous, all shorter than the head, with long sheaths. The utricle or fruit is long, lanceolate, trigonous, black, with a divided beak, slightly ciliated, and longer than the glume. The glumes are oblong, lanceolate, acute, blackish, with a lighter edge and median nerve.

It was stated that *C. frigida* seems a very distinct species, and is essentially alpine, being rarely found under 6,000 feet. It has been repeatedly assigned a close relationship to *C. binervis*, but while it has undoubtedly many points of similarity, in others it is quite distinct. Dr. Brown then entered upon a description of the more striking specific

characteristics of the true *C. frigida*, as compared with those of the so-called Scottish *C. frigida*, and concluded by saying, "I cannot find that there is any ground for believing that the Swiss *frigida* is represented in this country, but I am convinced that, if carefully examined and compared, the so-called Scottish *frigida* will be found to be a variety of the well-known *C. binervis*."

Dr. Johnstone Macfie read a paper entitled "List of Birds observed at or near Davos in the winter of 1901-1902." (See page 25).

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24TH FEBRUARY, 1903.

Mr. Peter Ewing, F.L.S., President, in the chair.

Mr. Joseph Russell, The Knowe, Port-Glasgow, and Mr. William Mackay, Woodbourne, Giffnock, were elected Ordinary Members of the Society.

Mr. T. N. Johnston, M.B., C.M., delivered a lecture on "The Bathymetrical Survey of the Scottish Fresh-water Lochs." The lecture, which was fully illustrated by a very beautiful series of photographs shown on the screen, entered with detail into the elaborate work which the Survey is attempting in mapping, sounding, and thoroughly exploring all the fresh-water lochs of Scotland. The temperatures at various depths, seiches, currents, bottoms, flora, fauna, and chemical constituents of the lochs are all being investigated, and a full and interesting description was given of the work already accomplished. Sounding and other apparatus used by the Survey were also exhibited.

Mr. James Murray, who had arranged to read a paper, "Notes on the Pelagic Life of the Lochs," gave a few details of the practical results of the investigations in the faunal department of the work, but, on account of the lateness of the hour, was obliged to postpone the reading of his paper to a future occasion. A very cordial vote of thanks to the lecturer, Dr. Johnston, was moved by Professor Barr, and warmly accorded by the large audience present.

Mr. J. Ballantyne exhibited, on behalf of Mr. James Lyle, M.A., Bloemfontein, South Africa, the following:—

1. Nest of Finx (Dutch for "Finch"), a species of Weaverbird.

2. The flower and fruit of the Blue Gum Tree,  
*Eucalyptus globulus*, L.
3. The Capetown Spider.

The following additions to the Library were reported:—

By gift, from Mr. Alex. Somerville, B.Sc., F.L.S.—*Nature Studies (Plant Life)*, by G. F. Scott Elliott, M.A., B.Sc., F.L.S.

By gift, from Mr. James Mitchell—*The Structure and Life of Birds*, by F. W. Headley, M.A., F.Z.S.; and *Mammals, Living and Extinct*, by W. H. Flower, F.R.S., and R. Lyddeker, F.L.S.

By purchase—*Anderson and his Journals*, 2 vols., by M. A. Anderson and E. Cowes.

*Life of Louis Agassiz*, by A. C. Agassiz.

*Travels among the Great Andes of the Equator (Supplementary Appendix)*, by Edward Whymper.

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13TH MARCH, 1903.

Mr. Peter Ewing, F.L.S., in the chair.

The meeting was a special one, held in the Large Hall, to hear a lecture by Mr. Gerald Leighton, M.D., F.R.S.E., Editor of *The Field Naturalist's Quarterly*, author of *British Serpents*, on "The Haunts and Habits of some British Reptiles," with illustrations (limelight) from life.

Dr. Leighton said that his object in this lecture was to draw attention to some of the more interesting processes which were to be observed in our reptiles, and to do this in some detail, rather than to attempt the impossible task of describing the whole group. Accordingly, after having given a brief sketch of the distribution of reptiles in the British Isles, he proceeded to discuss first of all the process of Hibernation. In this condition respiration is almost suspended, and the beating of the heart is extremely slow and irregular, often unappreciable. Digestion is totally stopped, and the temperature of the reptile sinks to that of its surroundings. If disturbed during this state, death usually results. Dr. Leighton next dealt with the process of sloughing, pointing out that it consisted essentially of two parts—the physiological separation of the outer epidermic covering from the true skin, and, secondly, a mechanical part, that in which the serpent made an effort to throw off what had now become an incubus. The slough will be cast entire or

in pieces according as to whether the surface rubbed against, in the effort to remove the slough, were smooth or otherwise. Next, the effect of adder venom was described, and the factors upon which the results of a bite depend were discussed. The effect depends chiefly upon the dose of venom injected, the cases which recover being those in which the fatal dose was not thrown into the circulation.

Dr. Leighton concluded his lecture by throwing upon the screen a series of fifty views of British reptiles, taken from life, and depicting the various habits and haunts of the snakes and lizards in Great Britain. He also exhibited a number of specimens of adders, ring snakes, smooth snakes, and lizards, together with some remarkable specimens of large sloughs of boa constrictors and pythons which had been cast perfectly whole.

The lecturer, having answered a number of questions put by the audience, was accorded a hearty vote of thanks.

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### 31ST MARCH, 1903.

Mr. Peter Ewing, F.L.S., in the chair.

Mr. John Renwick gave notice of a motion to amend the rules of the Society as follows:—"That, in constitution of the Society, Chapter 8, Paragraph 6, the word 'seven' be altered to read 'five,' and the paragraph shall read 'five members of Council shall form a quorum.'" He explained that the necessity for this change arose out of the difficulty of securing a quorum at the meetings of Council.

On behalf of Mrs. David Robertson, Millport, Mr. Renwick exhibited specimens of *Lithothamnium lichenoides*, Foslie (= *Melobesia lichenoides*, Harvey), new to Scotland. These calcareous algae were collected in rock pools at Port Logan, Galloway, many years ago. Harvey records it from the coast of Cornwall, West of Ireland, the coasts of Galway, Clare, and Cork. Mr. E. A. L. Batters, in *A Catalogue of the British Marine Algae*, published in 1902, records it from the coasts of Cornwall, Devon, Dorset, Hants., Isle of Man, West Coast of Ireland, and Channel Islands. Mrs. Robertson was congratulated upon her having established a new record for Scotland.

Dr. T. B. Henderson exhibited a Sea Snake, *Euhydrys curtus* (Boul.). He described its structure, and, comparing it with the land snakes, showed how it was specially adapted for progres-

sion in water. After tracing its development, Dr. Henderson gave several instances of the effect of the poison in bites by water snakes.

Mr. Alex. Patience read a paper entitled "Note on the occurrence of the Schizopod, *Macropsis slabberi* (van Beneden), within the Clyde Sea Area," and exhibited specimens of this and of some other species of Schizopods. He stated, "I obtained two specimens (a male and a female), by means of the tow net, while dredging off Aoidh Rock, Loch Fyne, in about 34 fathoms. In the same tow-netting were quite a number of specimens of another mysid, viz., *Schistomysis ornata* (G. O. Sars). *M. slabberi* is characterised by enormously developed eyes, elevated on extremely long and nearly cylindrical eye-stalks. It is distinguished from all others of this family by the structure, in the males, of the first antennæ. At the apex of the peduncle, besides the two flagella and the usual setose appendage, there is a fourth appendage, which consists of a long narrowly conical basal process, ending in a very long seta. The telson is short; its extremity projected beyond the lateral margin in a triangular form; the apex, however, is rounded. This schizopod has been recorded from the Firth of Forth, and also from Falmouth. In a letter from my friend, Dr. Thomas Scott, F.L.S., of H.M. Fishery Board, he informs me that it has been taken from the stomach of a fish captured in the Solway Firth. I have now to record its occurrence in Clyde waters." All the more important features of *Macropsis* were shown in a blackboard sketch.

Mr. Peter Macnair, Keeper of the Natural History Collections in the Glasgow Museum, read a paper on "The Alpine Flora of the Scottish Highlands, and the Geological Factors in its Origin and Present Distribution." The lecture was beautifully illustrated by lantern slides showing Scottish alpine scenery and alpine plants, photographed *in situ*. At the outset he referred to the history of the discovery of these plants in the Scottish Highlands, and to the work of such early observers as Stuart amongst the Breadalbane Mountains, and Don in the Clova district. A number of plants were shown that had been gathered by Don about the beginning of the last century, which had recently been presented to the Kelvingrove Museum.

The general character of the alpine flora of the Scottish

Highlands was then briefly described, and it was pointed out that there were certain areas in the Highlands very much richer in alpine plants than others; thus, on a series of mountains stretching from Ben Lui, on the confines of Perthshire and Argyllshire, north-eastwards through Meall-Ghaordie, and along the ridge bounding the north of Loch Tay, and including such high peaks as Craig-na-Caillich, Meall-nan-Tarmachan, Beinn Ghlas, and, highest of all, Ben Lawers, and from Breadalbane north-eastwards into Clova, we find an exuberant development of alpine plants. This tract of ground was defined as the Ben Lawers ridge. The alpine character of the plants on this series of mountains had long been well known, and accurate records had been made of the different species. The second group of mountains begins also at Ben Lui, and stretches northwards by the heads of Glen Lochay and Glen Lyon, and includes the following mountains:—Cam Chreag, Creag Mhor, Beinn Heasgarnich, and others. This was defined as the Mamlorn ridge. The flora of this ridge had not been worked to the same extent as that of Ben Lawers, but what plants had been gathered tended to show that the mountains approached very closely to the Ben Lawers type.

Before proceeding to discuss the present distribution of the alpine plants in the Highlands, the much wider subject of the origin of the alpine flora was discussed in some detail. It was pointed out that the tendency of recent investigation was to show that it had survived that period of intense cold in the British Isles. It was also contended that the migration of these plants could only have taken place by means of a land connection, and that the alpine flora was at first a lowland flora which was driven inch by inch and yard by yard to the hills, and eventually to the highest mountains.

In concluding, the present distribution of the alpine flora in the Highlands was dealt with, and it was shown that the richest mountains, namely, those on the ridges just described, coincided with the outcrop of a certain group of schists known geologically as the Ben Lawers phyllites. The minute structure and chemical composition of the schists were described, and it was shown that the structure known geologically as *ausweichung*, or strain slip, was perhaps the most important factor in determining the

present existence of alpine plants on these mountains. This structure was caused by the intense folding to which the rocks had been subjected, and by the development of a series of minute divisional planes crossing the earlier foliation. The effect of these minute divisional planes was to make the schists exceedingly friable, so that they became easily disintegrated, and thus formed a suitable soil for the nourishment of the alpine flora. Further, it was pointed out that the importance of the mechanical structure of the schists in the distribution of these plants is conspicuously shown in the great cliffs of phyllite covered with an exuberant alpine vegetation, and that upon these cliffs many of the alpine plants are anchored like limpets to a rock.

There can be no doubt that this outcrop of schists has been the most important factor in the determination of the present distribution of our alpine flora. Other factors, however, enter in, such as altitude, meteorological and physical conditions, &c., while the subject is further complicated when we bear in mind that the Mamlorn and Ben Lawers ridges must have acted as secondary centres of dispersal from which these plants have been distributed in the more immediate neighbourhood of these two areas. Chemical analyses of typical specimens of the Ben Lawers phyllite have been made by Prof. Sexton, of the Technical College, Glasgow, and, when these have been more fully considered, it is to be hoped that they will throw still further light upon the part which these schists have played in the distribution of the alpine plants.

The President intimated that the statutory date of the meeting of the Society not being suitable for a lecture on "Fresh-water Algae," by W. West, Esq., F.L.S., he had made arrangements with the Microscopical Society of Glasgow to have the lecture delivered under their auspices on the date of their meeting, viz., Tuesday, 14th April, at 8 p.m.

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28TH APRIL, 1903.

Mr. Peter Ewing, F.L.S., President, in the chair.

Mr. Thomas Wishart, 234 Crown Street, Glasgow, was elected an Ordinary Member.

A report of the Society's excursion to Calder Glen was handed

in by Mr. John R. Lee (see page 77), and that to Kilpatrick Hills by Mr. L. Watt (see page 78).

On behalf of the Rev. J. E. Somerville, B.D., F.S.A.Scot., there were exhibited, from the heights above Pont St. Louis, Mentone, fresh specimens of the Ligurian Snowflake, *Leucojum hiemale*, DC. (= *L. nicaeense*, Ardoino), a species much smaller than the two Snowflakes known in this country, and bearing a star-like white flower of much grace and beauty. Apart from its appearance, the plant is interesting from the extremely limited geographical area of its occurrence, viz., one mile by about thirteen on the French Riviera, on elevated ground, behind Nice, Villafranca, and Monaco.

On behalf of Mr. Stanley Guiton, St. Helier's, Jersey, there were shown by Mr. Alex. Somerville, B.Sc., F.L.S., a series of fresh and dried specimens of *Romulea Columnae*, Sebast. and Mauri, from Jersey, a small crocus-like plant of the iris order, whose corm and stalk are deeply sunk in the soil, causing the purplish flower to blossom on the ground. It is the *Trichonema bulbocodium* of Smith. The plant is found on all the larger Channel Islands, but in Britain has obtained a footing only at Dawlish, in Devonshire, and at Polruan, in Cornwall. Mr. Guiton also exhibited from Jersey beautifully dried specimens of the small crucifer, *Hutchinsia petraea*, R.Br., and of the rare little early tufted grass, *Mihora verna*, Beauvais.

Mr. James Whitton, Superintendent of Public Parks, read a paper entitled "Meteorological Notes and Remarks upon the Weather during the year 1902, with its General Effects upon Vegetation" (see page 27).

On behalf of Mr. Thomas Scott, LL.D., F.L.S., of H.M. Fishery Board, Aberdeen, there was read by Mr. Alexander Patience a paper on "Some Entomostraca from the Gulf of St. Lawrence" (see page 46). These small crustacea were part of the collection of the late Dr. Robertson, Millport, and were handed over by Mrs. Robertson to the Kelvingrove Museum.

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26TH MAY, 1903.

Mr. John Paterson, Vice-President, in the chair.

Mr. Andrew Wilson, 419 Victoria Road, and Mr. John J. Greig, 6 Rosebery Terrace, were elected Ordinary Members.

The Chairman made reference to the loss the Society had

sustained through the death of its Corresponding Member, Rev. Hugh Macmillan, D.D., LL.D., F.R.S.E., &c., of Greenock, speaking of his high attainments in natural history, and of the many and varied works which had been the product of his versatile pen. He proposed that the Society should send a letter to his widow expressing the universal sorrow with which the members regarded the removal by death of one of their most distinguished members. The vote of sympathy was unanimously passed. Mr. Alex. Somerville, B.Sc., F.L.S., also testified to the great literary distinction and high character of the deceased.

Mr. Somerville then addressed the meeting briefly on the subject of the proposed memorial to the late George Don, the celebrated botanist, whose remarkable discoveries of rare plants (in Forfarshire in particular) had been for many years ridiculed as being untrue, but whose veracity and forwardness in botanical research had now been thoroughly established. He explained how there had been a movement to erect a memorial to this pioneer in his native town of Montrose as a kind of tardy repentance and reparation for the slight which had been so long resting on his name. He urged that the proposal should be liberally supported by the members.

Mrs. Ewing exhibited a Gall produced on the root of the Alder by *Frankia alni* (Wor.). It is known as the *Mycodomatia* or "fungus chambers" of the Alder. *Frankia alni* affects such plants as possess a well-developed and normal root-system, and also characteristic outgrowths, which may increase to very large tubers, with surfaces resembling a bunch of grapes. In the cells of the middle layers of the primary root cortex of these growths, coils of very fine fungus threads are sheltered; these extend year after year into the younger parts of the enlarging tubercles, and gradually disappear in the older parts. The species of fungi which produces these tubercles has been provisionally distinguished as *Frankia alni* (Wor.). Woronin described them first on the Alder, Warming on the *Eleagnaceæ*, and Möller proved their fungal origin. Their relations with the host plants are supposed to be symbiotic, but what the significance of these structures may be for plants possessing chlorophyll, and furnished with normal roots is as yet unknown. It is said that plants which have grown well for years in water cultures do not

show them. Hiltner, after a series of experiments, states that first-year alders, without tubercles, do not thrive well in soil free from nitrogen, nor do they take up nitrogen from the atmosphere; when, however, provided with root-tubercles they assimilate nitrogen. It has also been shown that the tubercle fungus is at first parasite on the alder, only becoming of use to the plant when the tubercles are fully developed.

Mr. John Renwick exhibited a large collection of Eucalyptus from Australia, with samples of timber and oil. These were sent by Mr. James Steel, and included twelve different species.

Dr. T. Beath Henderson exhibited a specimen of the Green Lizard, *Lacerta viridis*, Gray, and gave some interesting details as to its mode of life.

Mr. R. S. Wishart, M.A., sent for exhibition a specimen of the Water Soldier, *Stratiotes aloides*, L., from the Loch of Forfar. In a note he remarked—

“This plant is rarely found in Scotland. In Hooker’s *Students’ Flora* it is said of it that it is ‘naturalised in the East of Scotland.’ An edition of Withering’s *Flora*, published in 1835, gives as its Scottish habitats ‘Duddingston Loch, Loch of Forfar, and Loch of Clunie.’ In the opinion of a local botanist, the *Stratiotes* was introduced into the Loch of Forfar by a former proprietor of the ground, but it has been growing there from ‘time immemorial’ as far as concerns anyone now alive.

“It is a striking plant, growing as it does in the water. The leaves are all radical, sword-like, and sharply prickly on the edges. It is from its leaves that the generic name is derived, as well as the English name ‘Water Soldier.’ It is a veritable soldier, furnished with an array of swords all round. The generic name is simply the Greek word *στρατιώτης*, a soldier, or a citizen on military duty. I am not aware of this plant occurring anywhere in the West of Scotland.

“*Stratiotes* belongs to the Hydrocharidaceae, an order which is so largely represented by the *Elodea canadensis* in all our canals, as well as in many rivers and marshes.”

Mr. Peter Ewing, F.L.S., read a paper entitled “Remarks on a List of Hepatics of the Clyde Area,” in which he stated—“In the following list there are 58 plants not formerly recorded for the West Lowlands in the eighth edition of the *London*

*Catalogue of British Plants*, 21 not formerly recorded for Scotland, and 6 new to the British Flora" (see page 52).

30TH JUNE, 1903.

Mr. Peter Ewing, F.L.S., President, in the chair.

Mr. John Renwick read a report of the Society's excursion to Garrion and Mauldslie on the 30th May (see page 81), and Mrs. Ewing sent her report of the excursion to Puck's Glen and Benmore on 13th June (see page 83). Both reports were interesting, and some very beautiful photographs illustrative of several of the scenes visited were exhibited by Mr. Reoch.

The President exhibited *Gymnosporangium juniperinum*, L., a fungus found on the stem of the Juniper, and contributed the following note on the exhibit:—

"*Gymnosporangium juniperinum*, L., belongs to the family of the Uredinæ, or Rust Fungi, one of the families included in the alliance of the Basidiomycetes. It is a heteroecious fungus, the æcidium or promycelium stage being produced on the Mountain Ash (*Pyrus Aucuparia*), the teleutospore, or resting stage, on the common Juniper (*Juniperus communis*).

"In the Uredinæ a basidium, or 'small pedestal,' as the name implies, arises from the cell of the teleutospore, and this basidium is transversely septate, four cells being cut off at the end of the tube, away from the spore. Each of these cells produces a little process, and from each process a conidium is abstricted. In all the other families of the Basidiomycetes the teleutospores are suppressed, and the basidia are directly continuous with the hyphæ of the fungus. The conidia do not arise laterally, but from four processes at the top of an unsegmented basidium. The teleutospores appear towards the end of the vegetative period.

"The projecting lobes on the Juniper consist of masses of these teleutoscopes imbedded in mucilage. When wet they swell up, the basidia are produced, and the conidia abstricted; the conidia are then blown away, and if their fate should be to alight on the leaves of the Mountain Ash, they proceed to penetrate the tissue, and produce the æcidium stage.

"This is not the first time this fungus has been exhibited before the members of this Society. In the year 1883 I find

that Mr. Peter Cameron exhibited specimens of the æcidium stage under the name of *Roestalia cornuta*, and again, in 1884, in a paper entitled 'The Heteræcism of the Uredines,' by the late Mr. Robert Turner, it is referred to several times—probably with illustrations."

Mr. Ewing also exhibited a large collection of fresh alpine plants from Ben Cailleach. These included *Saxifraga oppositifolia*, L., *S. stellaris*, L., *S. hypnoides*, L., *S. nivalis*, L., *S. azoides*, L., *Silene acaulis*, L., *Epilobium alpinum*, L., *Listera cordata*, R. Br., *Poa alpina*, L., *Luzula spicata*, DC., and *Dryas octopetala*, L.

Mr. John Paterson read a very interesting paper on "Birds observed on the Clyde between the Broomielaw and the Red Bridge below Uddingston," and gave a list, with many additional particulars, of eighty-six different species (see page 58). There was a general feeling of astonishment that such a number of species of birds should be found haunting the Clyde so near the city.

A letter was read from Mr. H. P. Macmillan, Edinburgh, acknowledging, on behalf of his mother, receipt of the letter of condolence sent by the Society to the widow of the late Rev. Hugh Macmillan, D.D., LL.D., F.R.S.E., a distinguished Corresponding Member of the Society, in which thanks were expressed for the sympathy shown in the recent bereavement.

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25TH AUGUST, 1903.

Mr. Peter Ewing, F.L.S., President, in the chair.

The President read a report of the Society's excursion to Ben Laoigh on 18th July (see page 84).

Mr. John Renwick read, on behalf of Mr. Alex. Gray, a report of the excursion to the Marine Biological Station, Millport, on 15th August (see page 87).

The Rev. G. A. Frank Knight, M.A., F.R.S.E., sent for exhibition *Pecten incomparabilis* (Risso). [= *P. testae*, Bivona] and for comparison *P. tigrinus* (Müll) and *P. striatus* (Müll). He also contributed the following notes on this rare mollusc:—

"The specimens of *Pecten incomparabilis* I exhibit were sent to me by Mr. Alfred Leicester, of Southport, some time ago, in exchange for some of the rarer Hebridean mollusca. Mr. Leicester

had dredged them in 1893 off the Isle of Man, between Port-Erin and the Calf, in about 25 or 30 fathoms. The Liverpool Marine Biological Association has a station at Port-Erin, and it was whilst some members of the committee were working out the marine fauna of the district that the shells were discovered. Only a few at most were obtained, some being sent to Canon Norman and to Mr. J. T. Marshall, who both identified the mollusc as *P. incomparabilis*. The shell has suffered from a frequent change of name. Forbes and Hanley, in their *British Mollusca*, call it *Pecten furtivus* of Lovèn; but Jeffreys, in his *British Conchology*, names it *Pecten testae* of Bivona, in honour of Signor Testa, a conchologist at Panormo, in Sicily. The Revised List of the British Marine Mollusca, prepared by a committee of the Conchological Society of Great Britain and Ireland in 1901, restored the earlier name, *Pecten incomparabilis* of Risso.

“Jeffreys (*Brit. Conch.*, vol. ii., p. 68) says—‘This beautiful species differs from *P. tigrinus*, with which it is sometimes found, in the following particulars:—The shell is broader, flatter, and thinner; the ribs, when they occur, are scaly or prickly; the punctures are very strongly marked and arranged in squares; the beaks are much less prominent and raised; the ears are not so unequal; and the inside margin is seldom crenulated. Forbes and Hanley considered it to be a variety of *P. striatus*, but Malm has satisfactorily shown some of the points of difference between these two species. I have never seen an intermediate form, although I have examined many hundred specimens of *P. striatus* and about fifty of *P. testae*, with a view to the comparison. The present species has some of the sculpture of *P. tigrinus* and the shape of *P. striatus*. The colouring of *P. testae* is more bright and vivid than that of the other two.’

“The shell is one of our rarest British Pectens. Forbes and Hanley record it as having been obtained in Loch Fyne by M'Andrew, at Galway by Barlee, and at Exmouth by Clark.

“Jeffreys gives Shetland (Lerwick), in 40 and 50 fathoms; Skye; Larne, County Antrim; Birterbuy Bay, County Galway; and Guernsey—all discovered by himself.

“Since the publication of the works of these authors, the

rare mollusc has been again obtained in Loch Fyne and at Oban by Canon Norman; at Lochboisdale, in South Uist, by Mr. Alex. Somerville, in 20-70 fathoms; off Sutherlandshire by Baillie; off Shetland by the late Mr. Frank Coulson, Finnartmore, Kilmun; while Professor J. R. Henderson has dredged one recent valve in Lamlash Bay in 10 fathoms. To these have to be added this discovery of the shell near the Isle of Man.

The foreign range of *P. incomparabilis* extends from Norway to Algeria and the Ægean Sea: but the Mediterranean examples are usually much smaller than those from the North Atlantic. I am not aware that the shell has been exhibited at any previous meeting of the Society."

Mr. P. J. Bell brought two specimens of a *Pecten*, dredged between Portincross and Cumbræ, and since identified by Mr. Knight and by Dr. G. W. Chaster as undoubted *Pecten incomparabilis*. Their being taken alive in this much-dredged bit of the estuary is very interesting.

Mr. John Smith sent for exhibition a specimen of the Petty Whin, *Genista anglica*, L., from Leadhills Dod, Lanarkshire. The plant was in fruit. The President and others gave particulars as to the localities where this plant is to be found, and interesting facts were brought forward as to its dispersion throughout the country.

Mr. Peter Ewing, F.L.S., exhibited a number of the rarer Hepaticæ which he had collected in the North of Scotland during recent years, among which were:—*Mastigophora Woodsii* (Hook.); *Cephalozia sphagnum* (Dicks.); *C. denudata* (Mart.); *Nardia scalaris* (Schrad.); *Plagiochila punctata* (Tayl.); *Scapania ornithopodiodes* (With.); *Jungermania orcadensis*, Hook.; *Metzgeria conjugata*, Lindl.

Mrs. Ewing exhibited a fine specimen of *Arctostaphylos Uva-Ursi*, Spreng.

Dr. Robert Brown read a short paper on Alpine Primulaceæ, with special reference to the genera *Soldanella*, *Androsace*, and *Primula*, and exhibited specimens from each genus from the Swiss and Austrian Alps (see page 70).

A paper was read from Mr. Alex. Patience "On the occurrence of the Schizopod, *Pseudomma roseum* (G. O. Sars), within the Clyde Sea Area." It is the first reported discovery of this crustacean in British Seas, and its appearance in Clyde waters is peculiarly interesting (see page 74).





# PUBLICATIONS

OF THE

## NATURAL HISTORY SOCIETY OF GLASGOW.

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TRANSACTIONS  
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OF GLASGOW

(INCLUDING THE PROCEEDINGS OF THE SOCIETY).

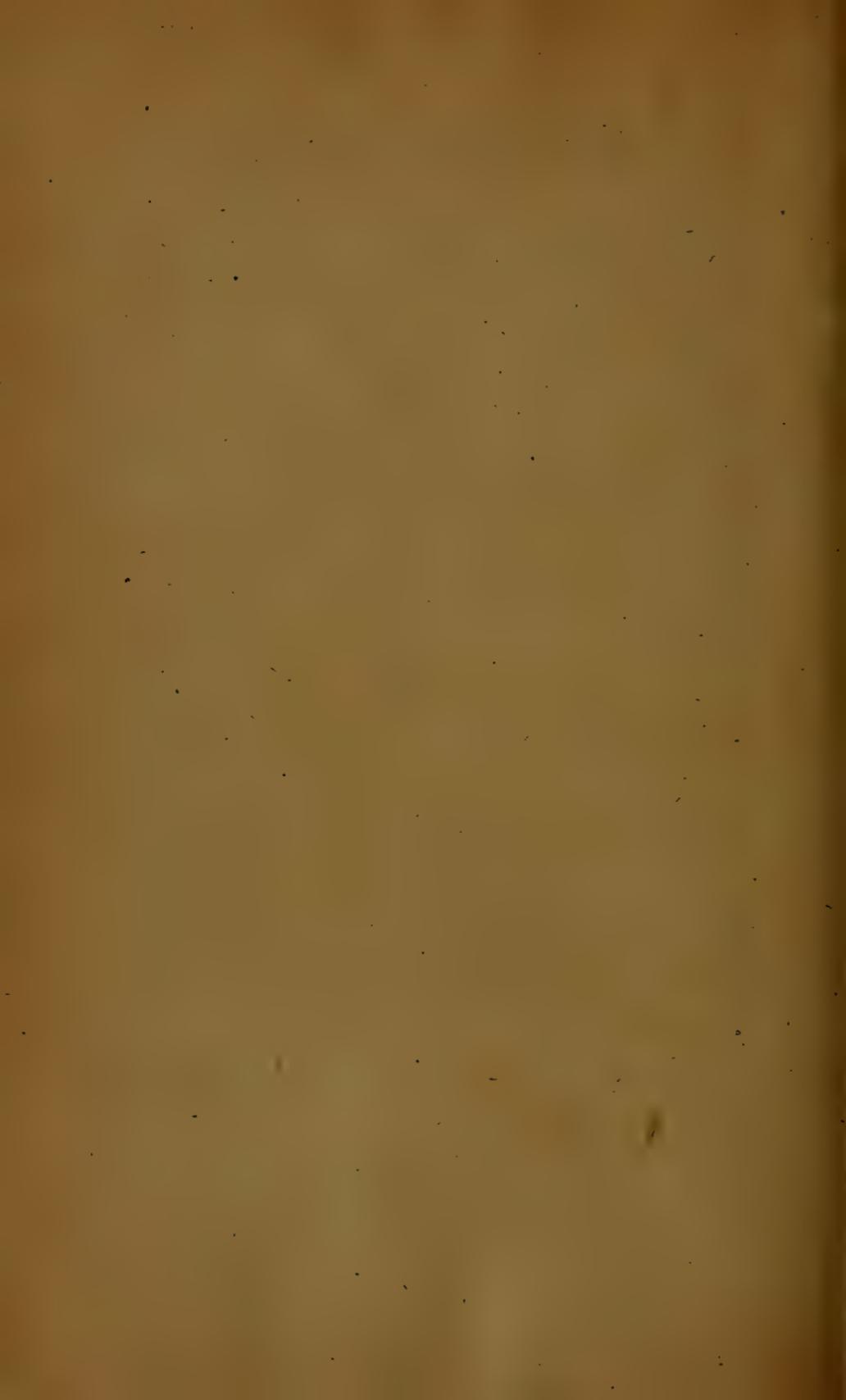
VOL. VII. (NEW SERIES.) PART II.

1903-1904.

WITH TWO PLATES.



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TRANSACTIONS  
OF THE  
Natural History Society of Glasgow.

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Notes on Botany in the University of Glasgow in the  
18th Century.

By Professor F. O. BOWER, Sc.D., F.R.S.

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[Read 17th November, 1903.]

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SINCE there have recently come into my hands, from various sources, data bearing on the early history of botany in Glasgow, I thought that they might be threaded together into a contribution to our society. I only regret that I was not better informed at the time when I wrote an historical sketch on botany in Glasgow as my contribution to the British Association Handbooks, for I now find that we can safely state that a garden for instruction in botany existed in Glasgow as early as 1704, a much earlier date than I had previously thought. In the article for the handbook I remarked—"The first botanic garden in Glasgow was in the precincts of the old college in the High Street, where a piece of ground was set apart for the cultivation of plants for teaching, but no detailed account of it or of its contents remains." Through the kindness of the Clerk of Senate of Glasgow University, who has charge of the records, I am now in possession of a number of extracts prepared by Mr. Coutts which do not, it is true, give any connected account of the botanical establishment, but, as it is not probable that any such full account will ever be available, I submit these for what they are worth, recording at the same time my indebtedness to Mr. Coutts.

EXTRACTS FROM THE RECORDS OF GLASGOW UNIVERSITY,  
TOGETHER WITH OCCASIONAL EXPLANATORY NOTES.

"*4 July, 1704.*—The Faculty enact that part of the great yard, and of the yard behind the gardener's house, be improved for amenity of the college and for improvement of students in knowledge of botany."

The minute of appointment of John Marshall as instructor in botany, in 1704, runs thus:—"The Faculty having resolved to prosecute their own act of July 4th anent the improvement of some parts of their great yard for botany and a physic garden do now think it necessary to name one who shall have the charge and oversight thereof, and who may instruct the scholars who shall apply to him for the study of botany, and being informed that John Marshall, chirurgeon in Glasgow, is capable of discharging that trust, and being specially recommended by the Dean of Faculties letter, therefore the Faculty does nominate the said John Marshall to the said employment."

[*Note.*—This John Marshall was the son of Patrick Marshall, surgeon, Kilsyth. He is believed to have studied in Paris about 1677, and he afterwards became a member of the Faculty of Physicians and Surgeons of Glasgow, and settled to surgical practice in the city. He began to teach botany in 1704, and he probably enjoyed the grant made by Queen Anne in 1708 to the "Professor of Botany." The title "Professor" was more loosely applied then than it is now, being often accorded to scholars appointed to teach. It seems probable that Marshall continued to teach botany till about the time of his death in 1719. After this botany did not maintain its position as a subject with a separate teacher, but for about a century it was conjoined with anatomy as a double chair. This is stated in the Calendar to have been founded in 1718, but the name of Thomas Brisbane, the first tenant of the chair, does not appear in the sederunt of any meeting till 1720. It is therefore probable that the double chair originated after the death of Marshall.

"*4 Sept., 1704.*—Faculty appoint John Marshall, surgeon in Glasgow, to be keeper of Botanic Garden. He is to instruct the students who apply to him for the study of botany, and to have a salary of £20 a year, with suitable allowance for a gardener to work under him."

"*22 Sept., 1708.*—Queen Anne granted £210 yearly from the civil list of Scotland to provide salaries, or augmentation of salaries, to Principal and Professors of Glasgow University, and

allocated £30 yearly of this sum to the 'Professor of Bottany' (*sic*). There seems to have been an actual professor or teacher to whom the £30 was assigned. It does not look like a grant to a prospective or hypothetical professor.

"29 Sept., 1720.—Degree of M.D. granted to Andrew Graham, tutor to the Marquis of Graham, who had studied medicine, especially botany, a long time in this university."

"13 Feb., 1721.—Students who are sons of noblemen allowed to have a key to the great garden, and to the physic garden, on promising not to allow the use of it to others, and to redeliver it at the end of session."

"19 Sept., 1727.—Commission of visitation ordain that the Professor of Botany and Anatomy teach botany yearly, from the 15th of May to the first day of July, if five students offer, and that Dr. Brisbane, present Professor of Botany and Anatomy, is obliged to teach anatomy as well as botany. He is to begin to teach anatomy as soon as ten students offer, and if no such number offer before 1st November, to prelect publicly on anatomy once weekly till 15th May, when he begins to teach botany." [*Note*.—The time here specified for teaching botany is the earliest instance of a separate summer session.]

"15 April, 1741.—Proposal raised, but not settled, to turn the present physic garden into a bowling green, and to allow a suitable part of the great garden for a physic garden." [*Note*.—There is no conclusive statement that the bowling green was formed or the site of the physic garden changed.]

"31 May, 1754.—Committee appointed to consider proposal by Dr. Hamilton and Dr. Cullen regarding the great garden, to make it more useful for the study of botany, and about getting a good gardener." [*Note*.—This suggests that the physic garden had been moved to the great garden; on the other hand, the entry is consistent with a mere extension of the physic garden, which had been found to be insufficient for its purpose.]

"5 April, 1762.—Application from Professor Wilson (who more than twelve years before had been appointed type-founder to the university) that the college erect a type-founding house for him in the college grounds, for which he is to pay rent. The application was agreed to, and it was resolved to build the type-founding house in the little garden adjoining the physic garden."

"8 April, 1762.—Alexander Adams, who keeps the physic garden for £6 a year (which is considered too little), is to have the college garden rent free on his keeping it in good order. The rent hitherto got was barely sufficient to pay expense of keeping."

"1 June, 1765.—Small accounts of 15s. 9d. and 19s. 6d. paid for work in physic garden."

"10 June, 1775.—Alexander Adams, gardener, allowed 15s. for tools for botanic garden." [Very frequent references after this, only a selection of which are here noted.]

22 Dec., 1783.—On question of appointing college gardener Prof. Hamilton recommends Robert Lang.

12 Jan., 1784.—Lang appointed. His duties specified among the rest to take care of the physic garden.

"29 Nov., 1784.—On the recommendation of Professor Hamilton the college allow 40 carts of dung for manure to the physic garden."

"26 Oct., 1786.—The wall of the college churchyard where it is bounded by the physic garden is ruinous. The college to pay half the cost of rebuilding. The wall, or part of it, is to be raised higher, being at present too low, in consequence of which the physic garden receives damage."

"11 June, 1787.—The Professor of Botany having represented that it is quite necessary for rendering the botanical garden useful that there should be some fresh earth or clay carted into it and laid upon the surface, and some new physical plants bought for it, the Faculty appoint the garden committee to cause the same to be done at an expense not exceeding five pounds sterling for this current year."

"10 Dec., 1787.—Payment ordered of £3 12s. 9d. for plants for botanical garden and 8s. for utensils."

"11 March, 1788.—On the application of Professor Hamilton £5 allowed for fresh lime and dung for botanic garden and for plants."

"10 June, 1788.—Professor Hamilton represented that the college gardener had much extra work on account of improvements in progress in the botanic garden, and the faculty agreed to allow him £2 additional for this year."

"8 June, 1789.—In consideration that the necessary employ-

ment for the gardener in the botanical garden had much increased lately, so that there would be full employment for a gardener all the year, the meeting engaged for the full services of Robert Lang, at the wages of £17 a year, with the grass of the college garden, valued at £8, an allowance of £1 for tools, and a house rent free."

*1 May, 1790.*—Professor William Hamilton, who died 13 March, 1790, directed that his anatomical preparations and apparatus for teaching anatomy and botany should be offered to the university at valuation, as also his hot-house in the botanic garden. In certain eventualities (which did not happen) he directed £200 to be paid to the university, to be laid out in forming a botanical garden.

*"10 June, 1790.*—The Faculty agree to have Hamilton's hot-house valued, though they have not decided to purchase."

*28 Feb., 1791.*—Hamilton's trustees offer preparations and hot-house to the college for £298; college offer £243.

*3 March, 1791.*—Trustees decline the offer, and the college adhere to their former decision, but allow the trustees to remove the preparations and hot-house. It appears that the hot-house was purchased by Jeffray, Hamilton's successor, so that it may still have been useful as part of the botanical equipment.

*10 June, 1793.*—New insurance policy taken out, in which the chemical laboratory (insured for £250, with £50 for apparatus) is described as situated on the west side of the present botanical garden.

*21 May, 1799.*—Dr. Jeffray, in London, writes that the business for which he went there would not allow him to return by 1st June, when he intended to open the botany class, and that he proposed to employ Dr. Thomas Brown, as a person qualified and ready to begin and continue the business of his class till he should return. The Principal and Professor Findlay were appointed to converse with Dr. Brown, and if he agree to the measure to order an advertisement in the Glasgow papers that the botany class will be opened on the day Brown shall agree to begin. The Clerk was instructed to write to Jeffray and ask him how long he requests leave of absence, and to state that the Faculty agree to employ Dr. Brown to open the botany class as soon as he can. The Faculty also wish to have

settled what consideration Jeffray is to pay Brown for teaching the class."

*3 June, 1799.*—Letter from Jeffray stating that his stay in London would depend on the will of the Committee of the House of Commons by whom he had been summoned, and that he would settle matters with Dr. Brown.

*7 May, 1800.*—Meeting considered letter from Dr. Jeffray, and were of opinion that it would tend to the advancement of medical science in the university if anatomy and botany were taught by different persons. They think Dr. Thomas Brown, whom Dr. Jeffray recommends, is well qualified, and they allow Dr. Jeffray to employ Dr. Brown to teach botany as long as it shall seem expedient, and the Faculty agree the more willingly because they understand that Dr. Brown proposes to give lectures on agriculture. Dr. Brown to have no claim on the college funds for teaching the class. This was Dr. Thomas Brown, M.D., Edin., 1798, surgeon to the Royal Infirmary, Glasgow, 1804-1810, and physician, 1824-1828. He lectured for some years on botany in the university before the foundation of the chair in that subject. He succeeded to the estate of Lanfine in 1829, and died in 1853, leaving his collections to the Universities of Edinburgh and Glasgow in equal shares.

On the 2nd April preceding, the Faculty had fixed the fee for several classes, including that of botany, at three guineas, but they now thought it would not be expedient that the fee for botany should be so high, and fixed it at two guineas.

*5 June, 1800.*—£10 to be paid to Dr. Jeffray for plants and manure for the botanic garden for two years ending 1st May, 1800.

*10 June, 1808.*—A disposition by James Burns to the Principal and Professors of the ground intended for a botanic garden was given in, and the Faculty authorised payment of the price.

*1 March, 1809.*—Four acres of Blythswood land, intended for a botanic garden, let for pasture for this summer for £14.

*17 April, 1809.*—The Faculty agreed to allow Dr. Jeffray £20 this session for supplying the botany class with plants.

*25 April, 1810.*—Dr. Jeffray allowed £20 for supplying the botany class with plants this session.

*29 April, 1812.*—£20 allowed to Dr. Jeffray for plants for botany class.

*12 Nov., 1813.*—An offer by William King, plumber, for a lot of ground in old botanic garden next High Street; about a third of the whole, at 22s. 6d. per square yard, to be accepted. Dr. Jeffray protested.

*26 Nov. 1813.*—William King's ground in the old botanic garden described as to be laid out at least 60 feet along the north-east of Blackfriars Wynd, and running northward from the wynd till it joined the back wall of the burying ground, where the type foundry came in.

*15 Dec., 1813.*—The Principal and Professors Young, Richardson, and M'Turk to inspect ground in old botanic garden and report regarding a proposal to feu it. At next meeting (20 Dec.) it was agreed to delay consideration of feuing.

*10 Jan., 1814.*—The Principal to treat with offerers for old botanic garden with a view to obtain a better price.

*14 Jan., 1814.*—James Taylor's offer of £1 2s. 6d. per square yard for remainder of old botanic garden accepted, with a condition (as there was in the case of King) that an additional sum should be payable in the event of a street being opened through the garden.

*31 March, 1814.*—The Principal and Drs. Jeffray, Mylne, and M'Turk appointed to get the ground intended for a new botanic garden properly fenced.

*2 May, 1815.*—£20 allowed for this session for "botanic plants" for teaching the class.

*6 May, 1816.*—The Faculty consent to Dr. Jeffray appointing Robert Grahame to teach the botany class. The usual allowance of £20 granted for the purchase of plants.

*29 April and 12 May, 1817.*—Agreed between the Faculty and the committee promoting the formation of a botanic garden that the Faculty contribute at least £2,000, made up thus—(1) £60 a year for feu to Campbell, of Blythswood, so long as the feu continues, or £1,200 if the ground can be bought up; (2) proceeds of sale of ground near Woodside belonging to the college, intended for a botanic garden, to be disposed of before the end of 1818, guaranteed to yield at least £300; (3) the remaining sum required to make up £2,000 to be paid on completion of the arrangement. The Faculty stipulated that at least £4,000 should be otherwise raised by those promoting the scheme. The Faculty

to nominate annually three directors, of whom the professor of botany to be always one. The professor of botany, or college lecturer, to give at least one course of lectures each season in the public room to be erected in the garden, and to have exclusive right of lecturing there, though other public bodies or individuals might receive such specimens as could be spared from the garden for the purpose of lecturing elsewhere. The Faculty unanimously agree that on the death of Mary Hamilton (Mrs. Cochrane) £2,000 should be appropriated from the legacy of the late Mr. Hamilton to replace the money advanced for the proposed botanic garden. [Note.—The college had the reversion to a considerable sum left by Mr. Robert Hamilton, a foreign merchant, but subject to the life-rent of his sister, Mrs. Cochrane. It is thought probable, though not entirely verified, that this Mr. Hamilton was a relative of Dr. Hamilton, professor of anatomy and botany before Dr. Jeffray.]

In 1818 Dr. Robert Graham was appointed Professor of Botany in Glasgow University, the separate chair having been founded by the Crown in that year. Dr. Graham held the chair only for some two years, when he was transferred to the chair of Botany in Edinburgh. He was succeeded by Sir William Hooker.

---

From the information contained in these notes the following brief story may be constructed of the botanical activity in the old college during the 18th century.

In 1704 space in the old college garden was allotted for botanical purposes, and a gardener provided. In the same year an instructor was appointed, probably for the first time. In 1708 the salary of this official was increased from Crown endowment. But in 1718 the instructorship in botany was merged in the professorship of anatomy, founded in that year by the Crown, and the two subjects remained officially conjoined for exactly one century, till the separate professorship of botany was founded by the Crown in 1818.

The teaching of the science as it was in the 18th century naturally took place in the summer; the course opened about the middle of May, an arrangement which seems to have led to the first establishment of a summer session in the university.

Meanwhile the tenure of the ground set apart for the botanic garden was not secure ; in 1741 the physic garden was in danger of being converted into a bowling green ; whether this was ever carried out is uncertain ; in any case there was an extension, or a migration into the great garden ; but probably the collection was not well kept up, for in 1754 steps were taken to improve it, and to get a good gardener. But still only small sums were allowed for upkeep. It is possible to gain some rough idea of the sort of garden it was from a plan taken about 1770, from memory, by Professor Hope, of Edinburgh. This must have been the elder Hope—John Hope, born 1725 ; M.D., Glasgow, 1750 ; Professor of Medicine and Botany in Edinburgh, 1761-1786. The plan being framed from memory, it related probably to what he saw in his student days, and if so it would represent the scene as it was not later than 1750. This plan was found among the papers of Professor Hope by Professor Bayley Balfour and sent by him to be placed among the records of the Botanical Department. The small squares in the north-east corner probably indicate glass houses, one of which, it will be seen, faces south.

It happens that we are able to locate this physic garden exactly in the grounds of the old college from an old plan dated 1775 which is in the Corporation Galleries. From this, by permission of the museum authorities, I am able to reproduce a part (Plate III.), which shows the physic garden to have been to the south of the church, a position which was also indicated on the feuing plan, in the possession of the university, of a later date.

The extent of the ground occupied cannot have been great, since only part time of one man was devoted to it, but in 1789 we find that the work of the garden having much increased, the whole time of one man was employed. In the following year, on the death of Professor William Hamilton, the negotiations as to his hot-house indicate that some glass had previously been in existence, possibly that shown in Professor Hope's plan, so that the garden was not merely an herbaceous plot.

Towards the end of the century the spread of the city, and the consequent increase in value of the college land, seem to have again led to a flitting. The last entry of a disbursement on behalf of the garden is in June, 1800. The actual date of feuing of the old garden in the college was 1814, but it seems to have

*Plan from memory of the Botanic Garden at Glasgow taken*

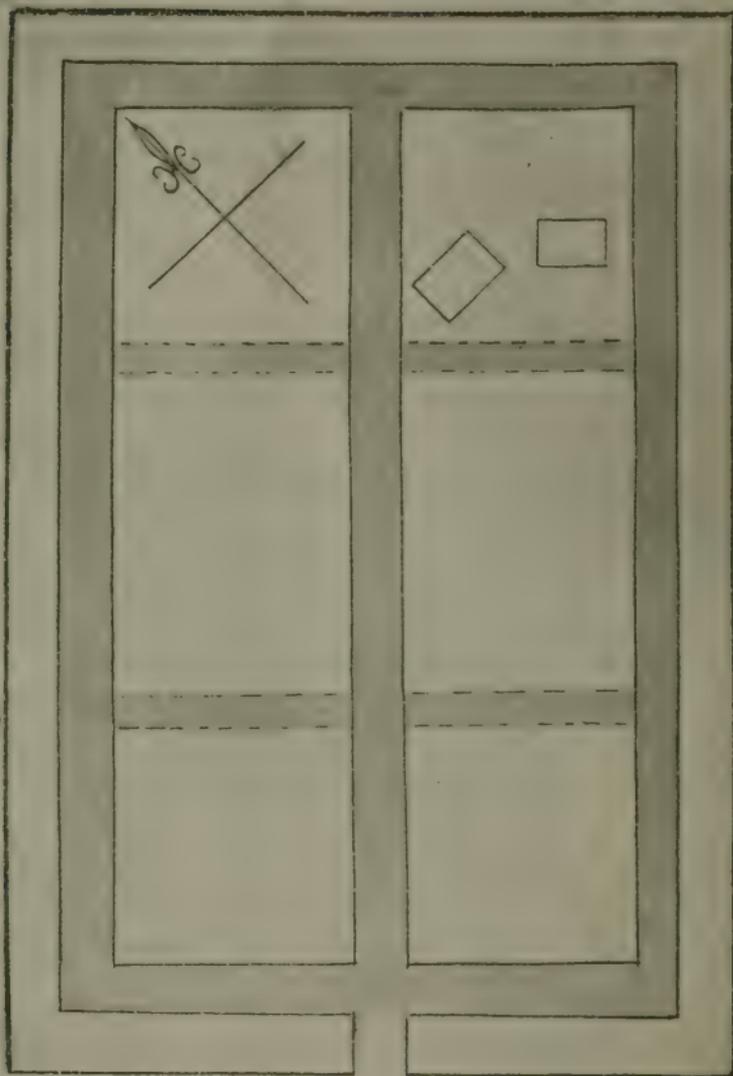


FIG. I.

Copy of a Plan from memory of the Botanic Garden at Glasgow, taken about the year 1770. This was found by Professor Bayley Balfour among a lot of old papers which belonged to John Hope, who was Professor of Botany in Edinburgh, 1761 to 1787. The written description at the bottom of the paper is believed to be in the handwriting of John Hope.

ceased to serve its purpose as a botanic garden very shortly after 1800, for after that date come items paid for "supplying plants for the class of botany." It appears that when the old garden was cut up for building, no new garden was at once established. It seems indeed doubtful whether either the "Blythswood land," acquired in 1809, or the "ground near Woodside," mentioned in 1817, were ever really established as a botanic garden, though steps were taken to do fencing: for the payments for "the usual allowance of £20" continue till 1816.

Meanwhile a movement on the part of the citizens was in progress, in which the Crown and the College joined, and this resulted in the charter of the Royal Botanic Institution, and the establishment of the botanic garden at Sandyford, opened to the public in 1819. The collection of some 3,000 species, grown in the garden of Dalbeth, the property of Mr. Thomas Hopkirk, was given by him to the institution, and formed the basis upon which the scientific collection of the new garden was founded. From an unavailing memorial drawn up to the Treasury in 1822, by Professors MacGill, Mylne, and Hooker, soliciting aid to the funds of the institution, it appears that nearly eight acres of ground had been procured, walls and conservatories and other accommodation erected, and gardens containing 9,000 species of plants, many of them rare and curious, laid out and planted in a style at once ornamental and suited to scientific purposes. The annual expense for maintenance was stated at £500, and there was a debt of £1,500. A copy of the plan of this garden, dated 1825, is given as Plate IV.

All that now remains to mark the site of the old Sandyford garden, which was absorbed by streets and buildings shortly after 1842, is a tablet on a building to the north of Trinity Congregational Church, Claremont Street. The history of the present garden which replaced that at Sandyford is so well known that it calls for no further remark.

Private physic gardens existed from time to time about Glasgow, for the supply of medicinal plants—for instance John Wodrow, M.D., who died in 1769, had a physic garden, to the upkeep of which the Faculty of Physicians and Surgeons contributed annually: it was situated on the east bank of the Molendinar Burn, about where St. Andrew's Square now is. Another

private garden was that of Mrs. Balmano, situated on the Deanside Brae, now known as Balmano Street; she kept a drug shop at the sign of the Golden Galen's Head. Her son, John Balmano, M.D., Edinburgh, 1798, died in 1840.

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## SYLLABUS OF LECTURES IN BOTANY.

By Professor HAMILTON, Glasgow.

[*Note.*—There were three professors of anatomy and botany of that name in Glasgow during the 18th century, viz. :—Robert Hamilton, 1742-1756; his brother, Thomas Hamilton, 1757-1781; and William Hamilton, son of Thomas, 1781-1790 (father of Sir Wm. Hamilton). As there is no Christian name attached to this syllabus, nor any date, it is difficult to decide to which of these the syllabus is to be ascribed. From internal evidence I should think probably to one of the later two; the syllabus certainly dates from the 18th century. This MS. was sent to me by Professor Bayley Balfour for the records of the Botanical Department of Glasgow University.]

*Lecture 1.*—Introductory.

*Lecture 2.*—History of botany.

*Lecture 3.*—A general account of the great classes of natural productions. An attempt to define plants and distinguish them from animals and fossils, and to point out those powers and properties which we find in animals and which exist in plants, and those that are lost in the lower animals. The general uses of plants. The age and size of plants.

*Lecture 4.*—Plants considered in their simplest state when enclosed in the seed. Anatomy of seeds. Uses of the parts. Effects of vegetation on seeds. Causes of vegetation in seeds.

*Lecture 5.*—Structure of plants. Structure of roots. Striking of the root. Branching of the root. Effects of this, and some observations on the choice of the soil necessary for trees.

*Lecture 6.*—General uses of the root. Convertible into branches. Fibres on its surface. Growth of the roots. An examination of bulbous roots.

*Lecture 7.*—Parts of root. Bark, wood, pith. Bark. Examination of cuticle. Examination of parenchyma. Examination of the bark proper.

*Lecture 8.*—Vessels of the bark. Sap vessels. Proper vessels. Wood. Fibres of wood. Distribution similarly to those of bark.

*Lecture 9.*—Vessels of wood. Sap and proper vessels. Air vessels. Pith. Similarity to arechyma.

*Lecture 10.*—Trunks. Origin from the seed. Increase. Causes of its growth. Structure—in animals—in biennials—in perennials. The last the proper example of the parts—bark, wood, and pith.

*Lecture 11.*—Bark—into cuticle. Parenchyma or cellular substance. True bark. Structure of cuticle. Structure of cellular substance.

*Lecture 12.*—Structure of the true bark. Vessels. Sap vessels. Proper vessels. Wood in different plants.

*Lecture 13.*—Structure of the wood. Vessels of wood. Air vessels. Structure of the pith. An examination of Linnaeus' and Sir John Hill's theories.

*Lecture 14.*—On the growth of plants. 1st, growth in breadth. Theories with regard to this. Experiments to prove that the wood is formed from the inner bark.

*Lecture 15.*—Growth of bark. 2nd, growth in length. An attempt to explain how this is produced. Layers of the wood. Production of branches. Some observations on engrafting.

*Lecture 16.*—Structure of leaves. Budding. Cuticle. Vessels. Fibres. Cellular substance. Colour and its causes.

*Lecture 17.*—An examination of the effects plants produce on the air. Of the power they have of making the air pure. An attempt to prove that this arises from the air being taken into the sap vessels for the nourishment of the plant, where, the noxious parts being left, the air is thrown out pure. That it is only particular kinds of noxious air that can be thus rendered pure. That this is similar to the water taken in by the root impregnated with the nourishment of the plant.

*Lecture 18.*—An examination of the power plants have in fouling the air; an attempt to prove that this arises from the air being taken into the air vessels; that this is similar to the breathing in animals; that the same effects follow; that the heat of plants arises from this as in animals.

*Lecture 19.*—Some effects of the leaves. Perspiration. Secretion. Absorption of light drawing nourishment to the part of

the plant. Examination of the fluids of plants. An examination of the fluid that nourishes them. An attempt to prove that water is not the nourishing fluid, but only the vehicle. The dissolved parts of vegetables and animals, the nutritious part.

*Lecture 20.*—The same subject. Observations on soil. Observations on manures. Do all plants live on the same nourishment? That the fluid is changed by the vessels in the different parts of the plant. Properties of sap. Motion of the sap in the vessels.

*Lecture 21.*—These motions explained. Its motion from the root upwards. Its motion from the leaves downwards. Is there a circulation in plants? An examination of the *Succus Proprius*. Does it move like sap? Is it the same in different parts of the same plant? An examination of the moving fibres of plants.

*Lecture 22.*—An examination of the flower. Parts of the flower.

*Lecture 23.*—Same subject continued.

*Lecture 24.*—An examination whether there are sexes in plants.

*Lecture 25.*—Same subject. Observations on mule plants.

*Lecture 26.*—Classification. Observations on its use. An explanation of Linnaeus' arrangement.

*Lecture 27.*—Same subject.

*Lecture 28.*—Same subject.

*Lectures 29, 30, 31, 32, 33.*—Explanation of terms for the genera.

*Lectures 34 to 44.*—Reducing plants to their genera.

*Lectures 44 to 45.*—Explanation of terms.

*Lectures 46 to 50.*—Reducing plants to their species.

*Lecture 51.*—An account of the different systems of botany.

*Lecture 52.*—On natural arrangement.

*Lectures 53 to 56.*—An examination of the Cryptogamia—their parts, flowers, &c: their genera and species from specimens.

*Lecture 57.*—Use of the knowledge of vegetation in gardening. Use of arrangement in pointing out the properties of plants.

*Lecture 58.*—On the plants in this country capable of being substituted in medicine for foreign plants. On the indigenous plants that may be used in manufactures.

Notwithstanding that it is not possible to say to which of the professors of the name of Hamilton this syllabus of lectures is due, nor to state the date at which they were given, there are points of interest in them which well justify their being put into print. What is chiefly notable is that so large a proportion of the lectures was devoted to anatomy and to physiology. When we reflect that the lectures cannot have been long subsequent to, and possibly even before, the discovery of oxygen, the interest of the physiological part is increased. Anatomy, a part of the science which in the early days was peculiarly a British branch, is naturally well represented. It is no matter for surprise that a large part of the course was devoted to descriptive work, while the small proportion given to the Cryptogams was only what might have been expected at a time when the knowledge of them was still in its infancy. The whole balance of the course, of which these notes form only the slightest sketch, may be considered eminently satisfactory. Probably the teaching of Botany in our University was well abreast of the period at which these lectures were given.

#### DESCRIPTION OF PLATE III.

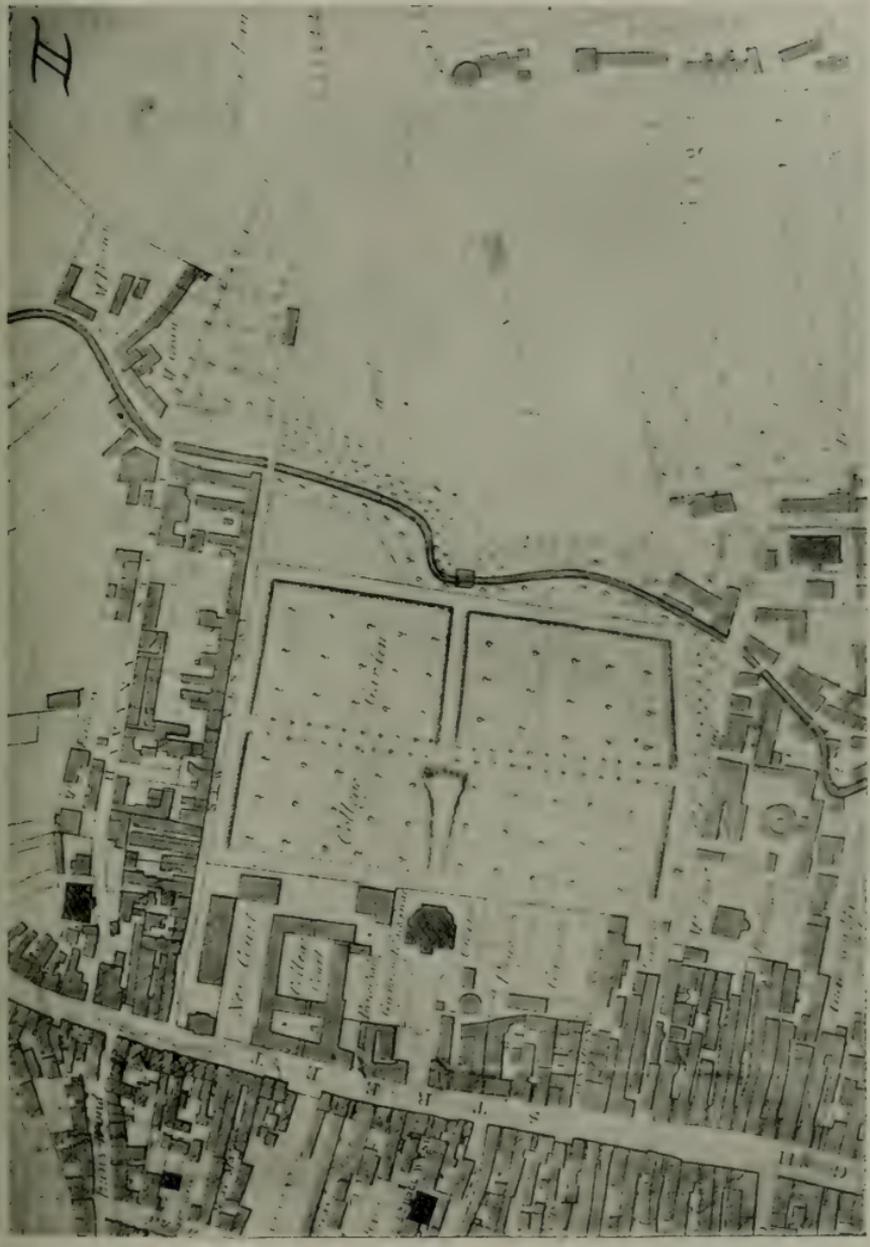
Part of a plan of the "City of Glasgow, Gorbells, and Caltoun, from an actual survey by John M'Arthur, surveyor in Glasgow, 1778." A copy of this plan is in the Corporation Museum in Kelvingrove, and the figure has been taken from it by permission of the Authorities of the Museum.

#### DESCRIPTION OF PLATE IV.

Plan of the Royal Botanic Garden of Glasgow, at Sandyford, taken from the Catalogue of Plants, published in 1825—Sir W. J. Hooker, LL.D, being then Professor of Botany and Mr. Stewart Murray the Superintendent of the Garden. The following is the key to the numbers on the plan:—

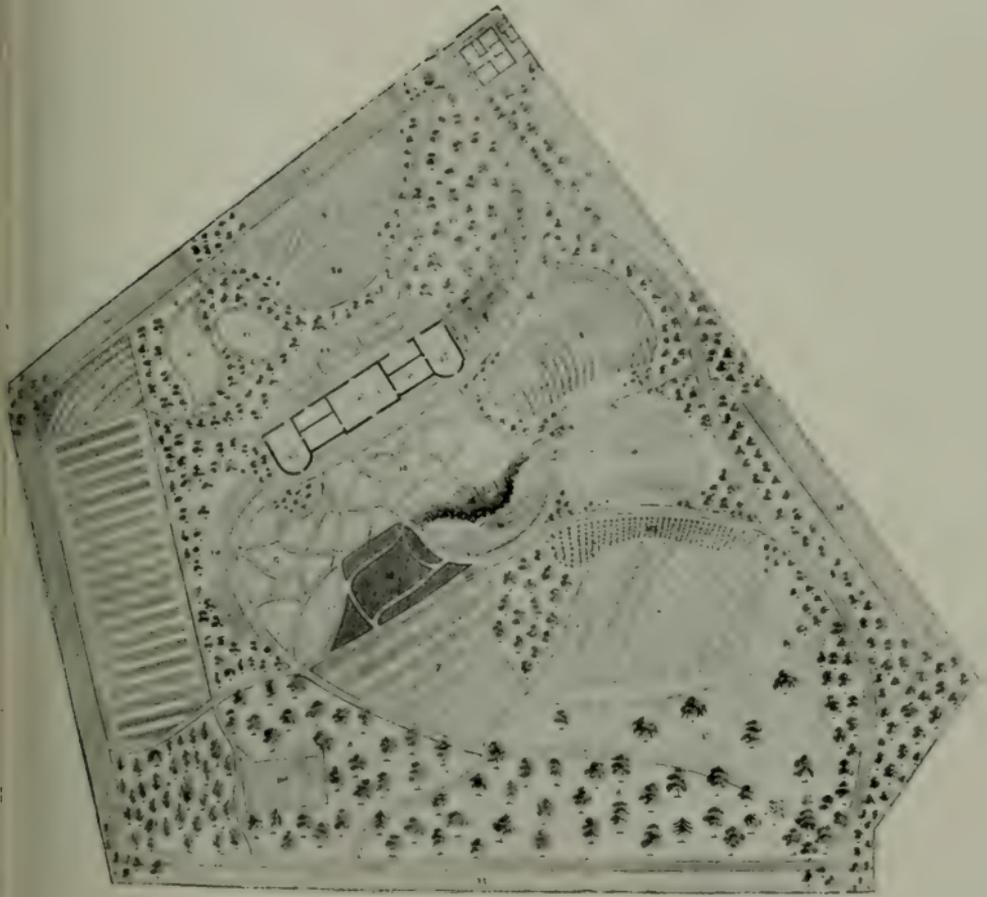
1. General Collection of Herbaceous Plants.
2. Grasses.
3. Collection to illustrate the Linnæan System.
4. Collection to illustrate the Natural Method of Jussieu.
5. British Collection.

6. Medicinal Plants.
7. Plants used in Agriculture and Commerce.
8. Forest Trees.
9. Willows.
10. Borders for Annuals.
11. Biennial Collection.
12. Esculent Vegetables.
13. Grass and Shrubberies.
14. American Plants.
15. Aquarium.
16. Rock for Alpine Plants.
17. Collection of Roses.
18. Flower Borders.
19. Beds for Carnations, Auriculas, Anemones, &c.
20. Variegated Plants.
21. General Alpine Collection.
22. Summer Station for Greenhouse Collection.
23. Shrubs.
24. Forcing Beds, Frames, &c.
25. Greenhouse.
26. } Stoves.
27. }
28. Smaller Collection of Medicinal Plants.
29. Inclosure for cultivating Rare, and particularly North American Plants.
30. } Borders for Duplicates to keep up the Collections.
31. }
32. North Entrance from Sandyford Road, Lodge, and Lecture Room.
33. Queen Mary's Yew.
34. South Entrance from Dumbarton Road.



Part of Plan of City of Glasgow (1778) showing position of Physic Garden in College Grounds.





Plan of Royal Botanic Garden, Sandyford, Glasgow (1825).



## The Sylviidæ of Solway.

By ROBERT SERVICE, M.B.O.U.

[Read 23rd February, 1904.]

## THE BRITISH SYLVIIDÆ.

List of Species. Those species found in Solway are marked.\*

1	<i>Sylvia nisoria</i> ,	-	-	-	The Barred Warbler.
2	„ <i>cinerea</i> ,	-	-	-	Whitethroat.*
3	„ <i>hortensis</i> ,	-	-	-	Garden Warbler.*
4	„ <i>orpheus</i> ,	-	-	-	Orphean Warbler.
5	„ <i>curruca</i> ,	-	-	-	Lesser Whitethroat.*
6	„ <i>atricapilla</i> ,	-	-	-	Blackcap.*
7	„ <i>sub-alpina</i> ,	-	-	-	Sub-Alpine Warbler.
8	„ <i>provincialis</i> ,	-	-	-	Dartfort Warbler.
9	„ <i>galactodes</i> ,	-	-	-	Rufous Warbler.
10	<i>Phylloscopus viridanus</i> ,	-	-	-	Green Willow Warbler.
11	„ <i>sibilatrix</i> ,	-	-	-	Wood Warbler.*
12	„ <i>trochilus</i> ,	-	-	-	Willow Warbler.*
13	„ <i>rufus</i> ,	-	-	-	Chiff Chaff.*
14	„ <i>proregulus</i> ,	-	-	-	Pallas's W. Warbler.
15	„ <i>superciliosus</i> ,	-	-	-	Yellow-browed Warbler.
16	<i>Hypolais icterina</i> ,	-	-	-	Icterine Warbler.
17	„ <i>polyglotta</i> ,	-	-	-	Melodious Warbler.
18	<i>Acrocephalus aquaticus</i> ,	-	-	-	The Aquatic Warbler.
19	„ <i>phragmitis</i> ,	-	-	-	Sedge Warbler.*
20	„ <i>palustris</i> ,	-	-	-	Marsh Warbler.
21	„ <i>streperus</i> ,	-	-	-	Reed Warbler.
22	<i>Luscinola Schwarzii</i> ,	-	-	-	Radde's Bush Warbler.
23	<i>Locustella luscinioides</i> ,	-	-	-	Savi's Warbler.
24	„ <i>nævia</i> ,	-	-	-	Grasshopper Warbler.*

British, 24; Solway, 9.

## INTRODUCTION.

The subject of this memoir was suggested to me by my friend, Mr. John Paterson, and he termed it, in advance, "The Sylviidæ of Solway." Left to myself, I should most likely have entitled it "The Warblers of Solway," for they stand pre-eminent amongst all the feathered choir as the family that offers us musical strains of surpassing sweetness.

The British Sylviidæ are twenty-four in number, and of these we have in Solway only nine. Eleven of the British species are visitants of more or less rarity, and another one, Savi's Warbler, formerly a breeding species, has become extinct. All of them are quietly coloured birds, unobtrusive browns, greens, and greys prevailing.

In the aggregate, when their summer quarters are fully occupied for the season, they are an enormous host, and, being almost exclusively insectivorous, their presence is extremely beneficial.

With the exception of the Dartford Warbler, which is stationary, all the others are true migrants, leaving us entirely in winter, except an occasional stray individual of the Blackcap and the Chiff Chaff, that sometimes maintains a precarious existence in the south-west corner of England.

Without further preliminaries, I proceed to the consideration of the Solway species.

## THE SYLVIIDÆ OF SOLWAY.

## I.—THE WHITETHROAT.

(*Sylvia cinerea*.)

Dear to our heart as a bird's-nesting boy were the nest and eggs of the Whitethroat, and even yet there is no sense of satiety in the interest with which I find and examine the beautiful nest home of this species. There is a wonderful variety in the coloration of the eggs, and quite as wide a range of variation in their shapes and dimensions. Some are large and long, others small and round; some almost green in ground colour, others nearly white; spots are of all dimensions, and, as the case may be, thickly or sparsely dotted on the

eggs. In the nursery grounds about Dumfries, where there are some hundreds of acres so occupied, the Whitethroat is a very familiar bird. Breaks of young trees, of almost any sort, that have attained a height of two feet or more, but especially those of Thorns and Larch, Oaks and Privets, are certain to have one or more pairs in each. Either when building the nest or feeding young, a few minutes observation will show anyone where the nest is, as the old birds are constant in their visits to it. Freedom from molestation will doubtless account for this absence of shyness. And when the period of brooding comes, the nest can be found almost as easily, for the non-sitting bird is constantly in attendance within a few yards. At this time the male seems to be a living embodiment of the idiocy and clownishness that characterise the males of all the animated creation when under the influence of the mysterious emotion of love. He will fly straight up and descend perpendicularly, spread his tail, puff out his head feathers, make grotesque movements with his wings, all the while jerking about, and uttering disjointed, chattering fragments of song which are anything but musical in our ears, but that doubtless charm the mind and solace the bosom of his devoted brown-coated little mate, brooding down in the herbage where the sunshine is filtering through the foliage. Occasionally he will compose himself and rest from his capers sufficiently to sing a song devoid of any well-balanced melody, but which, at any rate, comes from a full heart of joy.

All the livelong summer days are occupied in searching for insects, and great quantities of the lepidopterous larvæ are consumed. When the early fruit ripens, a few currants and raspberries are taken, more by way of a corrective to a flesh diet than for any mere feeding purpose.

The Whitethroats come to us in almost full song, from late in April till almost the end of May, and they are then in full and bright plumage. After nesting is over the moult takes place, and no greater contrast is possible than betwixt the bright, clean, and tight plumage they wear on arrival and the dirty, dilapidated, and disreputable dress they possess in August. It always seems to me that many of the adults leave us before completing their moult; but, be that as it may, they

then become excessively shy and inconspicuous in early autumn, and they emigrate so unostentatiously that we seldom realise them to have gone unless we go searching specially for them.

In my experience I have never found the slim, thin, flimsy nests that many writers describe this species as building. Most of them are very substantially woven together, and I have never seen any approach to the slight fabrics made by some Blackcaps and Garden Warblers.

## II.—THE GARDEN WARBLER.

(*Sylvia hortensis*.)

The next bird on my list is one of great interest. There can be no doubt, I think, that the annual abundance or the reverse of the Garden Warbler depends on some meteorological influence acting upon the migration movements. During the past season of 1903, for instance, three pairs were under my daily observation in a rough, bushy part of one of our nursery grounds, where, during most of June, from six o'clock in the morning, or earlier, till after mid-day each day, the constant flood of melody that came from these three males was astounding in its volume and attractive of general notice. I never saw but one pair there before, and none at all in most seasons. Last summer the same thing happened very generally over our area.

In no district is the Garden Warbler ever so numerous as the Blackcap, and it does not, in the main, frequent the same haunts. It is more a bird of rough shrubbery parts of policies and gardens, and is not so often seen as the Blackcap in regular copses and young plantations. It comes to us late in May—in fact, early June is not too late for it. Its splendid outburst of music is the usual announcement that it has arrived. To my ear its song is far more melodious, richer, and finer than that of the Blackcap. In saying this I know I am at variance with many eminent authorities, most of whom, after the Nightingale, rate the Blackcap as the finest British songster. Be that as it may, personal predilections must be taken into account. In most of the Garden Warbler's nests I have found, the eggs have been visible through the structure, and from this I opine that we in Solway have a somewhat peculiar race of the species.

As already indicated, the annual numbers of this species vary much with us. I have known summers in which it was scarcely seen, and others, such as 1903, when it was fairly abundant. Any enquiry into the yearly numbers of such species as this is a neglected branch of ornithology, and one the elucidation of which would lead to valuable results.

No other of our birds (with an exception presently to be noted) so defies close scrutiny as this bird. We may, if hidden in the undergrowth before the bird comes into the thicket, snatch a few minutes' close observation before it sees one, but the chances are against even this. Put the glasses on an individual, and the next moment the bird will get behind a leaf, or slip through the nearest bit of dense vegetation, and hardly a twig will move, so smoothly does it thread its way.

I have never known of more than one brood in the season, and somehow both parents and young move off so silently after fledging that it is only on comparatively rare occasions that I have been able to note autumnal appearances.

There is strong evidence that this and some other Sylviidæ have greatly increased, and are still increasing in numbers. Amongst other evidence that is available, I may instance that of Dr. Heysham, in whose time the Garden Warbler was a rarity, who found his first nest at Botchergate, only a mile or two over our boundary, on 2nd June, 1797.

### III.—THE LESSER WHITETHROAT.

(*Sylvia curruca.*)

This is a most elusive species. Much as I have desired it during these last few years, I have been unable to "collect" a specimen! And yet I have seen and heard it, but without acquiring the tangible and irrefragable evidence of a skin.

When I was a boy I found one nest of the Lesser Whitethroat in the fork of a branch of a hazel bush overhanging the Cargen Pow, on the farm of Conhuith, an egg from which I still have in my collection. In later years I had the pleasure of examining a nest of young on Dalscairth, some three miles from Dumfries, and at various dates I have both seen and heard this species. The late Rev. H. A. Macpherson and others have found this bird breeding in Eskdale, where its status, I believe,

is much the same as it is in Cumberland, of which it is written that "the Lesser Whitethroat is a very scarce summer visitant, tolerably established in the Lake District, and breeding irregularly in the north of the county" (*Birds of Cumberland*, p. 6).

It may be that this species has a distaste to flying oversea, and so it journeys along over English land, and continues its way across the border into Eskdale, without deviating westwards across the firth in any but exceptional instances. It is probable that the sparse colony in Eskdale is the most northerly breeding limits of the species in Great Britain at present, but, like others of the Sylviidæ, it may any summer extend its bounds.

#### IV.—THE BLACKCAP.

(*Sylvia atricapilla*.)

When Sir William Jardine wrote his *History of British Birds*, in 1844, he said of the Blackcap that "in our locality (that is, Dumfriesshire) it has only appeared within these few years, which may be perhaps owing to the gradual increase of more extensive shrubbery and plantations, giving it suitable food and retirement" (*Brit. Birds*, Vol. II., p. 130).

Nowadays it is not at all scarce, and is of general distribution in copsewoods and other suitable situations. In years when the Garden Warbler is abundant it outnumbered the Blackcap, but the numbers of the Blackcap do not fluctuate so markedly, and in most years it is decidedly more abundant than the Garden Warbler.

Although not quite so unapproachable as the other, the Blackcap seems to frequent spots deeper in the recesses of copses and plantations, the tangled thickets of briars, brambles, and wild roses met with in extensive game covers being most favourite haunts.

It arrives much earlier than the Garden Warbler, and I have noted fine old males by mid-April busy feeding amongst the opening buds on a sunny morning, when immigration was much in evidence, chirping and hopping about the branches with erected hood, in a particularly lively manner, and showing no trace of the fatigue which some sentimental writers are so fond of weaving into the phenomena of the migration movement.

They stay long with us in Kirkcudbrightshire, in autumn

eating rowans, and evidently enjoying the moist warmth of our westerly exposures at that period of the year. I have often seen them well into November, and a female captured on 29th November, 1881, in a garden in Maxwelltown, where it was feeding on rowan berries, is now amongst the other specimens on the table.

This species is the most frugivorous of the British Sylviidæ, and so long as berries of any sort are to be got it seems to prefer them to insects. But let me guard against giving any countenance to the assumption that it is a berry destroyer in any such sense as the charge could be maintained against the Blackbird and the Thrush.

Although personally I prefer the song of the Garden Warbler, yet the full-throated strains that issue from this bird during the first hours of daylight of a June morning are exquisite in the extreme.

#### V.—THE WOOD WARBLER.

(*Phylloscopus sibilatrix*.)

This is a bird of curiously irregular distribution. Where it is found it is usually fairly common, and it appears to be confined to Oak or Spruce plantations or their immediate vicinity. And yet all Oak and Spruce woods do not harbour it, for I know many where it is not found. With us in Solway it occupies a rather narrow belt of country in contiguity to the bare hillside or sheep-farm districts. Outside of this particular locality it is in rather isolated colonies, mostly in wooded glens of the small streams.

Twenty years and more ago I used to find it pretty regularly within a radius of a few miles from Dumfries. Then it wholly disappeared, and only within three or four years has it returned in scanty instances to its old haunts.

It is a pretty and lively, but not at all obtrusive, species. The most distinctive feature of its voice is the long-drawn trill which it emits at the end of its song. Some small boys of my acquaintance, who are possessed of sufficiently high-pitched vocal powers, can imitate this striking, thrilling sound to perfection. The nest is said never to be feather-lined, but, apart from this, its densely small purple-spotted eggs are unmistakable, and not to be confounded with any other British species.

## VI.—THE WILLOW WARBLER.

*(Phylloscopus trochilus.)*

Of all the birds that make their summer home with us, the Willow Warbler is surely one of the most attractive. It seems to have greatly increased in numbers during the last score of years. With the expansion of the emerald-green buds of the larch we may look for the arrival of this most lively little bird, nor are we ever disappointed. Soon its pretty song is heard from every hedgerow, and every bush holds the singer. Thenceforth, from mid-April till nearly June, wave after wave of Willow Warblers comes along. It is interesting to notice how for some days we see almost the same birds in their accustomed places. Then at daylight some morning there are scores where only one pair of birds were to be seen the previous evening. Gradually, or suddenly, these thin off until there remain only those who are going to stay with us the summer through. Again and again there is a successive influx, until by the time the first comers have their beautiful domed and feather-lined nests filled with eggs, the last of the most northerly-going migrants has flown past.

The songs of the Willow Warblers make up a very large amount of the volume of sound during the season of song. In a once much-discussed and much-quoted article, Canon Kingsley described the song of the Willow Warbler as being so sad that one could hardly listen to it without tears. That was a mere imaginative libel on the bird, for no other songster has in reality so cheerful and charming a little carol, or such clear and melodious ringing notes.

From a practical point of view it is one of the most useful species we have. What legions of insects are destroyed by it during its summer sojourn! And some of the insects of which it is fondest are amongst the greatest and most insidious foes of the cultivator—I refer to the myriad numbers of the Aphidæ and their kindred.

Usually situated on the ground level, I have at times found the nest of this bird placed as much as five feet up in a thick

hedge or dense bush. Its nesting form and site are, however, pretty steady and fairly free from abnormality, and there can be no mistaking its nest, although the eggs are often difficult to distinguish from those of its cousin, the Chiff Chaff—the species that next comes up for consideration.

## VII.—THE CHIFF CHAFF.

(*Phylloscopus rufus.*)

Few observers have sufficient confidence in their own eyes, or sufficient grasp of specific distinctions, to be able to differentiate the Chiff Chaff off-hand from the Willow Warbler when seen at large in the wilds. The greater darkness of the legs, the equal lengths of the second and sixth primaries, and the more rounded wings of the Chiff Chaff are characters that render the two birds easily distinguishable one from the other. So sayeth a great cabinet-ornithologist (Sharpe's *Brit. Birds*, Vol. I., p. 212), and in calling him so I disclaim any intention whatever of indulging in a sneer. Far from it. But let anyone constantly in the habit of handling skins, and thoroughly conversant with the specific differences betwixt the Willow Warbler and the Chiff Chaff, be called upon to observe these respective species in life and motion, and his knowledge of such structural characters will avail him nothing at all. He will notice, of course, a lesser size and a dingier coloration in the Chiff Chaff, but no more than he will find in a comparatively small party of Willow Warblers. The field ornithologist will bring in to his aid another set of distinctions not to be found in the dried skin, and he will note, like his brother from the museum drawers, that anatomical characters in this instance are of no use. But to the practised observer the more upright carriage or bearing, more jerky movements, more alert appearance, thinner voice and more querulous tones, and the regularly repeated double notes of *cheep chip* (all being slight but dependable differences or peculiarities) will enable him to correctly diagnose the species under observation.

I wonder if it is in accordance with the observations of others that the Chiff Chaff and the Wood Warbler do not occur together

in their summer quarters? The Willow Warbler occurs, certainly, with both, but I have a strong idea, not positively affirmed, that the Chiff Chaff and the Wood Warbler occupy different grounds.

Like most of the Sylviidæ, this species varies greatly in numbers one year with another. It is the least abundant of the genus *Phylloscopus* in Solway.

#### VIII.—THE SEDGE WARBLER.

(*Acrocephalus phragmitis*.)

Is the only representative of the group of Sylviidæ that break the continuity of the sylvine habits of their congeners by frequenting, more or less exclusively, the vicinity of marshes and the banks of water courses. It is specially common throughout Solway, where suitable haunts for it are so abundant. During the later spring and the summer months it enlivens, with its constant song and constantly visible movements, many a spot that would otherwise be rather dreary.

Its song is most characteristic, and differs widely from all others. Were it not for the irritating habit of interpolating a harsh, grating note every few bars, its song would rank as the sweetest we have in Scotland. Specially grateful to the ear is its sound when heard during the nocturnal hours in the crepuscular light of our northern mid-summer, on the banks of some wild and lonely moorland burn.

A fact in the life-history of this species that I do not remember having seen any allusion to is that, wherever there is an extensive haunt, a party of about a score, or often more, of non-breeding birds will generally be found consorting together in a loosely attached flock throughout the whole season.

#### IX.—THE GRASSHOPPER WARBLER.

(*Locustella naevia*.)

A singular species, and the shyest and most retiring of all our birds—one of which few, except bird students, ever notice the existence. If Scotland was a country into which ornithologists were entering for the first time, how many years would elapse before this species was discovered?

It is not at all rare, but cannot be said to be of frequent occurrence, and some apparently most suitable spots hold it not. At one time I held the belief that it was found only in a few of the furze-topped dells, filled with rough growths of nettles and other rank vegetation, behind the openings of the cliffs along shore. Later experience upset that view, for it is found fully more numerous far inland, at the foot of ranges of hills that environ the area of Solway on the north and west. Nor is it a stranger in the intermediate country, but it shuns cultivation. Specially favoured spots are young thickly grown plantations of five or six years' growth.

Soon after break of day is the most favourable time to see and hear this somewhat curious bird. It will then show itself freely, sitting on the top of some tall stem, and reeling its strange song for a considerable time.

That completes the very meagre list of the Sylviidæ found, as yet, in Solway. As compared with other parts of the British Isles, we are not so badly off so far as breeding species are concerned, for only three others are found elsewhere in the kingdom. These are the Reed, the Marsh, and the Dartford Warblers, and none of them is ever likely to cross the borders. However, we in Solway are without a single record of the rare, and scarce, visiting species that come along in the migration streams. When remote outposts like the Shetlands and St. Kilda have been visited by such good things as the Green Tree Warbler and the Sub-Alpine Warbler, a large and important area like that of Solway may well demur to the seeming neglect with which Nature treats it in the matter of visiting Sylviidæ!

The Diptera of Clyde, being a List of Species of the Families Platypezidæ, Pipunculidæ, Syrphidæ, and Conopidæ, not recorded in Mr. P. H. Grimshaw's List (Fauna and Flora, &c., of Clyde, 1901), and of additional localities for most of the Uncommon Species there recorded.

By ROBERT HENDERSON.

[Read 31st May, 1904.]

THE new species are marked thus (\*), and only new localities are given for the remaining species.

Classification and nomenclature.—Verrall, British Flies, Vol. viii., 1901, and List of British Diptera, 1901.

Abbreviations.—Holy Loch = head of Holy Loch at the mouth of the River Eachaig; Blairmore = small glens and woods by the roadside between Blairmore and Gareletter Point; Crookston = banks of the White Cart and waste ground adjoining Barrhead Road; Monk. Cl. = south bank of Monkland Canal, near Cardowan; Cambuslang = south bank of Clyde, from railway bridge at Carmyle to Newton; Cadd. Wild. = Cadder Wilderness.

Fam. PLATYPEZIDÆ.

- \**Platypeza atra*, Mg.—Two ♂♂, Hamilton High Parks, on leaves of Rhododendron, 29th August, 1903.

Fam. PIPUNCULIDÆ.

- \**Verrallia villosa*, v. Ros.—One ♂, Frankfield Loch, 10th June, 1900.
- \**Pipunculus unicolor*, Ztt.—One ♂, Murroch Glen, 7th June, 1902.
- \**Pipunculus campestris*, Ltr.—  
One ♀, Frankfield Loch, 21st June, 1903 (A. Ross).
- \**Pipunculus sylvaticus*, Mg.—One ♂, Hawkhead Est., 28th June, 1903.

## Fam. SYRPHIDÆ.

- \**Pipiza noctiluca*, L., - - Gorge of Avon; Holy Loch; 25th May—24th July.
- \**Pipiza bimaculata*, Mg., - - Gorge of Avon, 25th May, 1901. Two ♂♂ (R.H.); one ♂ (A. Ross).
- \**Orthoneura nobilis*, Flin.—One ♂, Holy Loch, 6th July, 1903.
- Liogaster metallina*, F., - - Creokston; Monk. Cl.; 14th June—24th July.
- \**Chrysogaster virescens*, Lw.—  
One ♂, Holy Loch, 7th July, 1903.
- \**Chrysogaster solstitialis*, Flin., - 6th July—30th Aug. Holy Loch; Dundonald Glen; Blairmore.
- Chilosia sparsa*, Lw., - - Murroch Glen, 7th June, 1902, and 6th June, 1903.
- Chilosia antiqua*, Mg., - - Murroch Glen, 19th July, 1902.
- \**Chilosia longula*, Ztt., - - Holy Loch, 12th July, 1903.
- \**Chilosia pulchripes*, Lw., - - 21st April—31st July. Craigton Wood, Milngavie; Possil Marsh.
- Chilosia variabilis*, Pz., - - 25th May—29th July. Gorge of Avon; Holy Loch.
- Chilosia illustrata*, Harr., - - 18th July—17th Aug., Monk. Cl.; Possil Marsh; Gourock; Baldernock; Tarbert (A. Ross).
- Chilosia albitarsis*, Mg., - - 14th — 24th June. Possil Marsh; Frankfield Loch.
- \**Chilosia Bergenstammi*, Beck., 16th—19th Aug. Troon.
- \**Chilosia vernalis*, Flin., - - So. bank Forth and Clyde Canal, near Old Kilpatrick. One ♀, 6th May, 1900.
- \**Chilosia proxima*, Ztt.—One ♂, Holy Loch, 6th July, 1903.
- \**Chilosia cynocephala*, Lw.—  
One ♂, Monk. Cl., 8th June, 1902.
- \**Platychirus scutatus*, Mg., - 3rd May—30th Aug. Troon; Frankfield Loch.

- Platychirus angustatus*, Ztt., - 8th June—9th Sept. Blairmore; Holy Loch; Cambuslang; Crookston; Ardmore Point; Murroch Glen; Monk. Cl.
- Pyrophæna granditarsa*, Forst., 19th July—11th Aug. Holy Loch; Strone; Blairmore; Possil Marsh; Monk. Cl.; Murroch Glen.
- Pyrophæna rosarum*, F., - - 6th July—31st Aug. Colintrave; Blairmore; Holy Loch.
- Melanostoma scalare*, F., - - 19th May—2nd Sept. Ardmore Point; Colintrave; Loch Libo; Ardentinny; Cambuslang; Loch Eck; Baldernock; Troon; Calderwood Glen; Hawkhead Est.; Tarbert (A. Ross).
- \**Ischyrosyrphus glaucius*, L., - 9th July—2nd Aug. Glen Massan; Blairmore; Glen Finart.
- Ischyrosyrphus laternarius*, Müll. 26th July—20th Aug. Blairmore; Dundonald Glen.
- Catabomba pyrastris*, L., - - 19th July—12th Oct. Monk. Cl.; Strachur; Crookston; Cadd. Wild.; Stepps; Troon; Blairmore.
- \**Catabomba selenitica*, Mg., - 7th Sept.—12th Oct. Stepps. About a dozen specimens, and both sexes (R. H. and A. Ross).
- \**Syrphus albostrigatus*, Fln., - 14th July—18th Aug. Ardentinny; Troon.
- \**Syrphus tricinctus*, Fln., - 24th May—25th Aug. South Bar (A. Ross); Stepps; Troon; Blairmore; Hawkhead Est.

- \**Syrphus venustus*, Mg., - - 19th May—13th June. Cam-  
buslang (A. Ross); Cadder  
Wild.; Monk. Cl.; South  
Bar; Cartland Crags.
- \**Syrphus lunulatus*, Mg., - - 19th July—18th Aug. Troon  
Blairmore.
- \**Syrphus annulipes*, Ztt.—One ♀, Loch Eck, 13th July, 1901.
- \**Syrphus torvus*, O.—S., - - 10th May—11th Oct. Strachur;  
Blairmore; Glen Massan;  
Bishop Loch; Loch Eck;  
Gorge of Avon; Craigton  
Wood; Stepps; Murroch  
Glen; South Bar.
- Syrphus annulatus*, Ztt.—One ♀, Hawkhead Est., 28th June,  
1903.
- \**Syrphus lineola*, Ztt., - - 28th June—18th July. Blair-  
more; Hawkhead Est.
- \**Syrphus vittiger*, Ztt., - - 29th July—31st Aug. Tarbert  
(A. Ross); Troon; Holy  
Loch.
- Syrphus grossulariæ*, Mg., - - 6th July—16th Sept. Tarbert  
(A. Ross); Murroch Glen;  
William Wood; Troon;  
Blairmore; Holy Loch.
- \**Syrphus vitripennis*, Mg., - - 13th July—12th Oct. Comm.  
and gen. dist. This form  
would most likely be included  
with *Syrphus ribesii* in Mr.  
Grimshaw's list.
- Syrphus latifasciatus*, Mcq., - - 15th May—6th Sept. Possil  
Marsh; Blairmore; Holy  
Loch; Hawkhead Est.; Colin-  
traive; Murroch Glen; Gorge  
of Avon; Troon; Frankfield  
(A. Ross).
- \**Syrphus corollæ*, F., - - 19th July—12th Oct. Monk.  
Cl.; Troon; Stepps; Blair-  
more; Gartcraig.

- Syrphus luniger*, Mg., - - 2nd May—28th Sept. Possil Marsh; Gartcraig; Frankfield; Blairmore; South Bar; Holy Loch; Loch Thom (A. Ross).
- \**Syrphus bifasciatus*, F., - - 24th—29th May. Gorge of Avon; South Bar.
- Syrphus cinctellus*, Ztt., - - 19th May—15th Sept. Holy Loch; Blairmore; Ardentiny; Glen Massan; Fiddler Gill; Troon; Stepps; South Bar; Cadder Wild.(A. Ross); Tarbert (A. Ross).
- Syrphus cinctus*, Fln., - - 24th May—26th July. Blairmore; South Bar; Hawkhead Est.
- \**Syrphus auricollis*, Mg., - - 18th—31st Aug. Troon.
- Syrphus punctulatus*, Verr.—  
   One ♂, Cartland Crags, 13th June, 1903.  
   One ♀, Hawkhead Est., 28th June, 1903
- \**Syrphus guttatus*, Fln.—One ♂, Holy Loch, 6th July, 1903.
- \**Syrphus umbellatarum*, F.—  
   One ♀, Blairmore, 26th July, 1903.
- Syrphus compositarum*, Verr., - 6th July—18th Aug. Loch Eck; Holy Loch; Glen Finart; Blairmore; Tarbert (A. Ross).
- Syrphus arcticus*, Ztt.—One ♂, Blairmore, 18th July, 1903.
- \**Sphaerophoria scripta*, L.—  
   One ♂, Cartland Crags, 13th June, 1903
- Sphaerophoria menthastri*, L., - 15th July—25th Aug. Loch Eck; Colintrave; Troon; Glen Massan.
- \*                                   var. *teniata*, Mg., 4th—31st. July. Blairmore; Glen Massan.

- \**Baccha obscuripennis*, Mg., - 6th July—2nd Sept. Blairmore; Troon; Baldernock; Tarbert (A. Ross).
- \**Baccha elongata*, F.—One ♀, - Blairmore, 25th July, 1901.
- Sphegina clunipes*, Fln., - - 12th July—29th Aug. Gorge of Avon; Holy Loch.
- Ascia podagrica*, F., - - - 3rd May—11th Oct. Gorge of Avon; Cadd. Wild.; Troon; Murroch Glen; Possil Marsh; Craigton Wood; Hawkhead (A. Ross).
- Ascia floralis*, Mg., - - - 10th June—24th July. Frankfield Loch; Possil Marsh.
- Volucella pellucens*, L., - - 28th June—31st Aug. Tarbert (A. Ross); Shandon; Strone; Ardentinnny; Blairmore; Mill Plantation, Cadder; Strone; Hawkhead Est.
- Eristalis intricarius*, L., - - 24th June—18th Aug. Troon; Possil Marsh; Monk. Cl.; Tarbert (A. Ross).
- Eristalis nemorum*, L., - - 13th July—2nd Sept. Gartcraig; Possil Marsh; Baldernock; Strone.
- Eristalis rupium*, F., - - 30th June—28th July. Holy Loch; Loch Eck; Blairmore; Ardentinnny; Tarbert (A. Ross).
- Myiatropa florea*, L., - - 28th June—11th Aug. Ardentinnny; Monk. Cl.; Blairmore; Holy Loch; Hawkhead Est.; Tarbert (A. Ross).
- \**Helophilus trivittatus*, F.—  
One ♀, Holy Loch, 7th July, 1903.
- Helophilus lineatus*, F.—One ♂, Frankfield Loch, 10th June, 1900.
- Xylota segnis*, L., - - - 19th May—28th July. Ardentinnny; Cadd. Wild.; Blairmore.

- \**Xylota abiens*, W.—One ♀, - Glen Finart, 29th July, 1903.  
 \**Chrysochlamys cuprea*, Scop.—  
     One ♀, Hawkhead Est., 28th June,  
     1903 (A. Ross).  
*Sericomyia borealis*, Fln., - - 30th June—7th Sept. Lang-  
     bank; Strachur; Holy Loch;  
     Stepps; Blairmore; Monk-  
     Cl.; Loch Eck; Troon; Tar-  
     bert (A. Ross).  
*Chrysotoxum arcuatum*, L., - 6th July—30th Aug. Arden-  
     tinny; Troon; Holy Loch.  
 \**Chrysotoxum festivum*, L.—  
     One ♀, Troon, 18th Aug., 1902.  
*Chrysotoxum bicinctum*, L., - 18th July—10th Aug. Gare-  
     letter Point; Tarbert (A.  
     Ross).

## Fam. CONOPIDÆ.

- \**Conops flavipes*, L., - - - 19th—22nd Aug., 1902. Troon.  
*Sicus ferrugineus*, L., - - - 19th—24th Aug., 1902. Troon.  
*Myopa buccata*, L.—One ♂, - Mill Pln., Cadder, 17th May,  
     1903.

### Meteorological Notes and Remarks upon the Weather during the Year 1903, with its General Effects upon Vegetation.

By JAMES WHITTON, Superintendent of Parks.

[Read 31st May, 1904.]

In order to preserve the continuity of the series, these notes have been compiled, as in former years, from the records kept at Queen's Park, Glasgow.

*January.*—The new year was ushered in with seasonable and pleasant atmospheric conditions, the sharp frost being a delightful change from the wet, stormy weather which prevailed

during the latter part of December. Though cold, the fine bracing day was a blessing to the thousands who were on holiday in and out of town. The pleasant change, however, was of short duration, as rain began to fall late at night, and by 9 a.m. on the 2nd the amount registered was 0.82 inch. Changeable, cold, wet weather was experienced until the 8th, when, with a N.-E. wind, there was a sharp touch of frost. On the 9th there was a fall of snow to the depth of fully 4 inches, which, followed by slushy rain, made the condition of the streets extremely unpleasant for pedestrians. Frost set in again on the 11th, and continued with some severity for ten days. During the prevalence of the frost the fog fiend was in evidence, particularly on the 12th and 13th, when its density in the City was very pronounced. A change set in on 21st, after which, until the end of the month, stormy, wet, unsettled weather predominated.

The atmospheric pressure was erratic and wide in range. From 29.30 inches on the 1st it fell to 28.90 inches on the 3rd, rising again to 29.45 inches on the 5th, then falling to 28.70 inches on the 7th, then up to 29.40 inches on the 8th. With a slight fall on the 9th, when the snowstorm occurred, there was a steady rise afterwards, until on the 14th it was up to 30.40 inches. Thereafter, with moderate variations, it fell, and at the end of the month it was at 29.40 inches, with a tendency downwards.

As indicated, the frosts were somewhat severe, and as on seven days the thermometer did not rise above freezing point (32° Fahr.), the average temperatures for the month are low, the maximum being 39° and the minimum 31°, against 43° and 33° respectively for the corresponding month of 1902.

Frost was registered on 13 days to the amount of 115°, the lowest reading being on the 13th, when 20° of frost were recorded.

The rainfall was heavy, 7.04 inches being registered, part of which was melted snow. The greatest amount for one day was 0.92 on the 3rd. There were 13 dry days.

Consequent on the cold, ungenial conditions, vegetation made no apparent movement. The grass lands, indeed, looked extremely dismal.

*February.*—The weather during this month was of a very changeable, stormy nature. After a few days of uncertainty, the elements held high carnival, and storms of wind and rain on the 6th, 7th, and 8th caused a considerable amount of damage throughout the district, as all low-lying lands were deeply flooded. From the 9th to the 18th the conditions were somewhat pleasanter, but from the 19th to the end of the month the weather was again stormy and wet.

The character of the weather is well shown by the erratic and varied range of the atmospheric pressure, as shown by the barometer. From the low point, 28·80, on the 1st, there was a sharp rise to 29·90 on the 3rd; another sharp change downward predicted the gales of 6th to 8th. Between the 9th and 18th the pressure varied between 29·50 and 30·20, without any very notable step. Then afterwards, with sharp, erratic steps, it fell, and on the 27th was down to 28·50, rising again sharply to 29·25 inches on the 28th.

Frost was only registered on two days to the extent of 4°—a very low amount for this month, and in sharp contrast to that of February, 1902, when frost totalling 149°, occurring on 14 days, was registered. The average maximum temperature was 46°, and the average minimum 39°, whereas in the corresponding month of the preceding year the figures were 39° and 29° respectively.

The exceptional nature of the weather is also well illustrated by the rainfall, which amounted to 7·11 inches, an abnormal quantity for February. Of that amount 1·71 inches was registered on the morning of the 8th and 2·02 inches on the 9th—two very exceptional readings for the respective preceding twenty-four hours. There were only seven dry days.

Consequent on the absence of hard frosts, and dry retarding winds, vegetation showed signs of activity early during the month, and, assisted by the comparative mildness of the season, Snowdrops, Crocuses, Winter Aconites, Narcissi, and similar bulbous plants soon made headway, and were in bloom or bud by the middle of the month, while *Daphne Mezereum*, L., *Rhododendron præcox*, and *R. nobleanum* began to open their flowers about the 10th, and were in full bloom by the third week, and deciduous plants, such as Lilacs and Hawthorns, were bursting their buds.

*March.*—The changeable, stormy weather which prevailed so much in February continued to an even greater degree throughout this month. Hardly a day passed without rain. The winds, unfortunately, were not of a drying nature, as rain almost invariably accompanied or followed them. The result was that, owing to the saturated condition of the ground, farmers had a trying time in getting their land in a fit state for seeding.

Though the barometric readings show the atmospheric pressure as being nearly as irregular as in the two preceding months, the range is not quite so wide. From 29.00 inches on the 1st there was a slight fall on the 2nd; then followed a gradual rise, and the pressure was fairly even, excepting one sharp change on the 8th, followed by heavy rain, till on the 14th it reached 29.90 inches. A sharp fall to 29.10 inches on the 17th was the precursor of the heavy rains which occurred between the 16th and 23rd. Towards the end of the month the readings were of a varied and erratic nature.

The amount of frost registered was trifling, only 8° in all, and that occurring on four mornings. Despite the absence of hard frost, the temperature was low, and the average maximum (45°) and the average minimum (36°) were lower by 4° and 1° respectively than those for March, 1902. This can be accounted for by the adverse influence of the heavy rains and high winds.

The quantity of rain which fell pretty clearly indicates the nature of the weather experienced. Even though there were only two dry days, the rainfall was abnormally heavy, as 8.31 inches were registered. The greatest fall for twenty-four hours was 0.87 inch, registered at 9 a.m. on the 23rd. That amount was closely approached on other two mornings, with 0.80 inch on 22nd and 0.81 inch on the 13th, while on 11 other days over a quarter-inch (0.25) was recorded.

The open weather had an inciting influence on vegetation, and deciduous trees and shrubs showed much activity in growth, Hawthorns, Poplars, Willows, and Sycamores leafing freely, while *Ribes grandiflora* and that precocious rhododendron, "Eugenie," were in full bloom towards the end of the month.

*April.*—After the first week, which was mild and variable in character, the weather got drier and colder. Sharp frosts

were experienced during the second and third weeks, while showers of hail and snow were too frequent. A very unseasonable fall of snow, fully 2 inches in depth, occurred between the 14th and 15th. During the latter half of the month many days were bright and clear, but cold, owing to the predominance of easterly winds. The last day, however, was mild, when a thunderstorm, with lightning and heavy rain, was experienced.

After the first ten days, when the barometric readings were somewhat erratic, the pressure got steadier, with an upward tendency, until the 17th, when it reached 30·25 inches. From that point it gradually fell to 29·30 inches on the 27th, and continued steady thereat for a few days.

Though frost was only registered on 10 occasions, the thermometer was at or below freezing point (32°) on thirteen mornings. The total amount of frost was 62°, the lowest reading was 22°, or 10° of frost, on the morning of the 15th. Consequent on the amount of frost and prevalence of cold, easterly winds, the average temperatures are lower than usual, the maximum being 48° and the minimum 34°, as compared with 53° and 41° respectively in April, 1902.

The rainfall (1·42 inches) was low for this month, and proved to be the lowest of any month of the year. There were 19 dry days.

Vegetation, which had been naturally advanced by the open weather of the preceding month, got a severe check by the frosts and cold winds which prevailed during the latter half of the month. Most shrubs, trees, and herbaceous plants, which were in a forward state of growth, were severely crippled. In many places the crop for the season on bush fruits, Plums, Cherries, Pears, &c., was completely ruined, while the loss in plant nurseries of seedlings and young stock was incalculable. The display of bulbous plants in beds and borders was completely spoiled, even the hardy Narcissi having a crippled appearance.

*May.* — Excepting a few dry days in the second week, the weather during the first half of the month was generally dull and showery. The latter half of the month was drier and more pleasant, with some warm days.

Though they were slightly irregular in course, the daily barometric readings were fairly high. The lowest reading was 29·10 inches on the 5th, thereafter rising, and with slightly erratic variations, the pressure was between 29·50 and 29·90 inches until the 23rd, when there was a sharp rise to 30·20, then more steadily to 30·30 inches on the 26th and 27th. The pressure thereafter lessened, till on the 31st it was at 29·70 inches.

As we rarely escape the dreaded late frosts in May, their absence is notable, as only on one occasion was any frost registered, viz., on the 11th, when there were 2°. The average maximum temperature was 53°, and the average minimum 42°—the former the same and the latter 3° higher than those of the same month of 1902.

The rainfall amounted to 2·74 inches, of which 0·91 inch fell on the night of the 13th and morning of the 14th, the day of the Royal visit. There were fourteen dry days.

Vegetation, which at the beginning of the month was in a backward state owing to the checks sustained in April, made rapid headway during the warm weather of the latter part of the month, and the development of leaf and flower was more satisfactory than appearances at first warranted. The oak began to leaf on the 17th and the ash on the 27th, much about the average time, but the development was slower than usual. There was also a paucity of bloom on some subjects. Amongst evergreens, Rhododendrons were particularly barren of bloom as a whole. Deciduous plants, though not as a rule overburdened, made a satisfactory, if not specially brilliant, display. There was also a marked improvement in the appearance of grass lands by the end of the month.

*June.*—The weather of the first part of this month was practically a continuation of the pleasant conditions which characterised the latter half of May; in fact, the longest spell of "summer weather" of the year was that experienced during the first three weeks. The last week was variable and showery.

With easterly winds preponderating, the barometric readings were somewhat high and within moderate range. During the first week the pressure indicated was for several days—from

3rd to 8th—steady at 30·30 inches. The lowest reading was 29·60 inches on the 16th.

Although there was a considerable amount of sunshine, the maximum temperature in the shade did not reach any notable point, 70° being the highest registered—a very much lower figure than usual for June. The average maximum temperature was 60°, and the average minimum 47°. In June, 1902, these figures were 58° and 47° respectively.

The rainfall was also low, only 1·53 inches being registered. The heaviest fall for 24 hours was 0·73 inch, noted on the 28th. There were 20 dry days.

Notwithstanding the amount of bright sunshine, the counter-acting effect of the easterly winds proved a serious check to the tender growth of plants, consequently the development of leaf and shoot was slower than usually is the case at this period of the year. Arboreal vegetation, however, made fair headway, and made a good average in size of leaf and shoot.

*July.*—During the first week the weather was mild and somewhat showery. The second week was drier, with some fine bright days. A change of a disagreeable nature set in on the 15th, and the heavy rainfall of the following days was a source of fear and disappointment to the many who were looking forward to a period of fine weather for the annual holidays at Glasgow Fair. The exceptionally heavy rain and chilly easterly winds made the atmospheric conditions extremely unpleasant. The week following was, on the whole, fine and dry. It was more showery afterwards, and a heavy thunderstorm occurred on the 27th.

The barometric readings show that the atmospheric pressure was somewhat irregular, though not of a wide range. The highest readings were 30·14 inches on the 9th and 30·10 inches on the 10th and 11th; the lowest, 29·40 inches on the 17th and 29·45 inches on the 29th.

The temperature was again low for this month. Only on one day (the 12th) was the maximum in shade at 70°. The average maximum temperature was 62° and the average minimum 50°, against 61° and 47° for July, 1902, in which year the maximum thermometer was only above 60° on fourteen occasions, against twenty-two times for month and year under notice.

The rainfall amounted to 3·89 inches. The greatest fall for 24 hours was 1·34 inches, registered on the 17th. The two preceding days had 0·55 and 0·58 inch respectively. There were fourteen dry days.

Owing to the heavy rainfall and the absence of a continuance of days of bright sunshine, vegetation was somewhat sluggish in growth, and the semi-tender plants used in garden decoration were much behind their usual standard. Trees and shrubs and moisture-loving plants, however, made clean, sturdy growth, much superior to what they did in the previous year.

*August.*—The weather of this month proved most disappointing and very unseasonable. Many days were of a dull, miserable character. During the early hours of the 15th there was a severe thunderstorm, with heavy rain. Another thunderstorm occurred on the afternoon of the 18th.

The variable nature of the weather is well shown by the barometric readings, which were irregular in character and wide in range for this month of the year. From 29·75 inches on the 1st the pressure fell to 29·40 inches on the 4th. On the 8th it was up to 29·98 inches. With a sudden fall to 29·30 inches on the 9th, we had a storm of wind and rain. On the 11th it was at 29·70 inches, and remained thereat for three days. Prior to the thunderstorm on the 15th it dropped quickly to 28·80 inches, then, rising to 29·60 inches on the 17th, the pressure eased off slightly till the 21st, afterwards steadily rising to 29·70 inches on the 25th and 26th. With a fall to 29·50 inches on the 28th, it was up again on the 30th to 29·90 inches; next day it was two points lower.

With only 8 dry days in the month, the rainfall is abnormal, 6·28 inches having fallen. The heaviest fall for 24 hours was 1·25 inches on the 31st. On other two occasions the fall was heavy, as 0·73 inch was noted on the 18th and 0·72 inch on the 28th.

Consequent on the wet, sunless weather, the temperature was low for the season. Only on twelve days was the maximum thermometer in shade over 60°, and the radiating thermometer on the surface of the grass indicated frost on ten mornings to the total of 33°. The average maximum temperature was 61° and

the average minimum  $48^{\circ}$ , compared respectively with  $60^{\circ}$  and  $51^{\circ}$  in 1902 and  $65^{\circ}$  and  $51^{\circ}$  in 1901.

The heavy rains and low temperature had the effect of paralysing the active growth of many plants, and summer bedding plants generally were deficient in bloom. The defoliation of lime trees began freely after the 8th, while towards the end of the month it was very evident on elms, sycamores, and chestnuts. There was no evidence of any harvesting operations in the district, excepting here and there a struggle with a belated hay crop.

*September.*—The weather during the first ten days was showery and unsettled. Afterwards it became drier and warmer, and for three weeks the atmospheric conditions were of a very pleasant nature.

During the showery weather of the first week the atmospheric pressure was irregular, between 29.10 and 29.30 inches, the latter occurring on the 11th. Thereafter the rise was steady, though somewhat quickly, to 30.40 inches on the 15th. It remained above 30.00 inches until the 26th, then gradually declined to 29.55 inches on the 30th.

Although frost was not actually registered on the minimum thermometer in shade, the temperature got low at times, so much so that the radiating thermometer on the grass indicated frost on twelve occasions. The average maximum temperature was  $59^{\circ}$  and the average minimum  $46^{\circ}$ ; in September, 1902, the figures were  $59^{\circ}$  and  $48^{\circ}$ .

The rainfall amounted to 3.63 inches, and there were fifteen dry days. These figures almost correspond with those of the previous September, which were 3.56 inches rain and 14 dry days.

The effect of the warm, sunny days on vegetation after so much rain was very striking. Flowering plants rapidly became gay with bloom, and many species of herbaceous plants were brighter and more vigorous than early appearances promised. Rhododendrons and other shrubs set flower buds. Autumn tints deepened on deciduous plants, and the early ripening larger trees defoliated rapidly. Cereals ripened quickly, and harvesting operations were general by the middle of the month.

*October.* — Through the month the weather was mild and changeable, with too much rain. Frequently the conditions were extremely disagreeable, owing to the frequency of high winds accompanied by heavy showers.

The conditions are well illustrated by the barometric chart, which shows the erratic course of the atmospheric pressure. From 29.55 inches on the 1st it fell to 29.05 inches on the 5th. On the 7th it was up to 29.60 inches. Falling off the following day, it again rose on the 10th to 29.70 inches. Then followed a sudden drop to 28.80 inches on the 12th; with a short, sharp rise and fall between, the pressure rapidly rose to 29.90 inches on the 18th, which was the highest point touched for the month. The decline was more regular, and on the 26th and 28th was below 29.00 inches. There was a sharp rise to 29.60 inches on the 31st.

As no frost was registered, the temperatures show high averages, the maximum being 53° and the minimum 43°—the former 2° and the latter 3° higher respectively than the figures for October, 1902.

Again the rainfall was abnormally high, as 7.10 inches were registered. There were only three dry days.

The changeable nature of the weather caused vegetation to have a most bedraggled appearance, deciduous trees and shrubs being only partly defoliated. Evergreen shrubs and grass were the only things that appeared benefited by the rain washings, while the disastrous effects on the grain crops were too apparent, as these could neither be cut nor ingathered, and the sodden condition of the ground prevented the raising of root crops.

*November.* — Though not so pronounced, the weather conditions were as changeable as those experienced during the preceding month. With the waning season the weather got colder, and there were occasional touches of frost, though none of any severity till the end of the month. Snow, followed by rain, fell on the 27th.

The upward tendency of the atmospheric pressure noted on the closing days of October continued until, on the 5th and 6th, it indicated 30.40 inches. The changes thereafter throughout the month were of a marked sharp type. On the 9th the

pressure had fallen to 29·60 inches, rising again to 30·10 inches on the 11th, then falling to 29·40 inches on the 14th and 15th. With another sharp rise to 30·05 inches on the 18th, there was an equally quick drop to 29·40 inches on the 21st. By the 24th it was up to 29·90 inches, from which point there was a sharp decline to 29·00 inches on the 28th, which was a dirty, wet day. With the frost which marked the closing days of the month the pressure again increased.

The minimum thermometer in shade was at freezing point on nine occasions, but only on four mornings was frost registered, amounting in all to 22°. Of that amount 6° were noted on the 18th and 13° on the 30th. The average maximum temperature was 47° and the average minimum 37°, compared with 47° and 39° respectively for November, 1902.

Though there were only eight dry days, the amount of rain which fell was only moderate in quantity, the total being 3·07 inches. On no occasion was a fall of half-an-inch registered for the twenty-four hours.

The showery weather had the effect of further prolonging the belated harvesting of crops. In many places the crops were practically ruined and the condition of the ground deplorable.

*December.* — Wintry weather characterised the early days of the month, and the conditions throughout were changeable and generally disagreeable. The fogs in Christmas week were especially dense and noxious.

The range of barometric readings was wide, but, excepting the sharp fall at the beginning of the month, fairly steady, with an upward tendency most of the month. During the frost on 2nd the pressure was at 29·80 inches. There was a sharp fall to 29·00 inches on the 5th, and to 28·75 inches on the 8th. After keeping about that point for a few days, it gradually rose until it reached 30·10 inches on the 28th, slightly falling at the close of the year.

Frost was registered on fourteen mornings to the extent of 73°. The lowest reading was 18° Fahr., or 14° of frost, on the 30th. The average maximum temperature was 40°, and the average minimum 32°. In the preceding December the respective figures were 42° and 35°.

The amount of rain registered was 3·20 inches, and on no occasion was half-an-inch registered for one day. There were fourteen dry days.

Comparing the records with those of previous years, the most outstanding feature of 1903 is the heavy rainfall registered, the amount (55·52 inches) being greatly in excess of the average of the past twelve years. The first three months were abnormally wet. March proved the wettest month of the year, having only two dry days and a rainfall of 8·31 inches. The other months with excessive rainfall were—January, with 7·04 inches; February, with 7·11 inches; August, with 6·28 inches; and October, with 7·10 inches. The heaviest fall for 24 hours was 2·02 inches, registered on the morning of 9th February. The other occasions when over an inch was recorded were—10th January, with 1·30 inches; 8th February, with 1·71 inches; and 31st August, with 1·25 inches.

April again belied its reputation for showers, as it was the driest month of the year, having only 1·42 inches of rain. April, 1902, however, had only 0·83 inch.

The number of days on which no rain was registered was 138, compared with 185 dry days in 1902.

The following table of rainfall recorded in the various Public Parks of the City is interesting as showing the variations in the different parts of the City. Due allowance must always, of course, be made for local conditions, as the exposure, altitude, and surroundings are different in each case.

(See next page for Table.)

Regarding the temperature, in comparing the records with those of the preceding year, it is found that the monthly averages are again low, and it is remarkable that the averages for the year are practically the same as those of 1902.

The thermometer in shade was at or below freezing point (32° Fahr.) on 67 days, and on 48 occasions frost, amounting in all to 286°, was registered, as compared with 392° on 50 occasions, with the freezing point reached 65 times, in 1902. The lowest reading of the thermometer was on 13th January, when it registered 20° of frost. The lowest reading in the preceding year was 10°, or 22° of frost, on 14th February. On

## RAINFALL DURING 1903 IN THE PUBLIC PARKS.

	QUEEN'S.	MAXWELL.	KELVIN-GROVE.	SPRING-BURN.	ALEX-ANDRA.	GLASGOW-GREEN.	BELLA-HOUSTON.	TOLL-CROSS.	RUCHILL.	BOTANIC GARDENS.	GEORGE SQUARE.
Height of Gauge above Sea-level.	145 ft.	69 ft.	48 ft.	361 ft.	141 ft.	34 ft.	160 ft.	85 ft.	220 ft.	110 ft.	40 ft.
	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
January, -	7.04	5.97	7.08	4.86	6.42	7.91	6.35	6.98	6.77	6.58	6.94
February, -	7.11	6.98	6.25	4.90	5.72	6.85	5.87	7.43	6.28	5.93	5.79
March, -	8.31	7.68	7.05	5.74	6.46	7.31	6.04	8.07	6.77	7.26	6.12
April, -	1.42	0.75	1.24	0.82	1.42	1.25	1.25	1.29	1.06	0.94	1.11
May, -	2.74	2.48	2.70	1.74	2.30	2.66	2.48	2.82	2.81	2.93	2.56
June, -	1.73	1.60	1.94	2.35	1.81	1.40	1.53	2.11	2.10	2.01	1.48
July, -	3.89	3.17	2.96	3.71	3.71	3.46	3.33	3.66	3.08	2.53	3.20
August, -	6.28	6.08	5.91	5.66	5.69	5.82	5.58	5.25	5.93	5.67	6.09
September, -	3.63	3.67	3.76	3.78	4.11	3.53	4.18	4.52	3.97	3.98	3.38
October, -	7.10	7.30	7.48	7.22	7.46	7.23	7.50	7.47	7.65	7.21	7.26
November, -	3.07	2.89	2.96	2.63	2.88	2.86	2.75	3.08	2.91	2.39	2.37
December, -	3.20	3.45	2.77	2.44	2.41	2.73	2.75	2.59	2.85	2.02	2.13
Totals, -	55.52	52.02	52.10	45.85	50.39	53.01	49.61	55.27	52.18	49.45	48.52

8 days during the year the temperature did not rise above freezing point; the same happened in 1902. January was the coldest month, with frost on 13 days, totalling  $113^{\circ}$ . In 1902 January had  $134^{\circ}$  on 12 days, and February  $149^{\circ}$  on 14 days, the latter being thus the coldest month of that year.

The warmest month was July, with an average maximum temperature of  $62^{\circ}$  and an average minimum of  $50^{\circ}$ . The absence of heat is noteworthy, as the thermometer in shade was only at  $70^{\circ}$  on three occasions during the year, while in 1902 it was at or above  $70^{\circ}$  six times, and in 1901 twenty-four times.

Throughout the year the winds were extremely variable, and frequently of a boisterous nature. South-west winds, as usual, predominated, and easterly winds were less in evidence than in the two preceding years, the western group prevailing 283 days and the eastern 82 days, against 255 days for the western and 108 days for the eastern in 1902, direct north and south winds being excluded.

While not so wide in range as in 1902, the barometric charts show that the atmospheric pressure was more erratic in course and varied in character throughout the year. The highest reading was 30.40 inches, which was noted on three occasions, viz. :—14th January, 15th September, and 5th November. The lowest reading was 28.50 inches on 27th February. The pressure was 71 times at or above 30.00 inches and 20 times at or below 29.00 inches. The figures for the previous year were 90 and 11 times respectively.

In regard to the temperature, it is somewhat striking, on comparing the records, to find that the mean temperature for the year is practically the same as that of the previous year, which was one characterised by a want of sunshine, a low rainfall, with an unwonted prevalence of easterly winds. In the year under notice we have the mean temperature similarly low, though the operating causes appear almost diametrically opposite. Even though the winds were more westerly, and consequently milder, the abnormally heavy rainfall, conjoined with the comparative absence of sunshine, had as great cooling effect on the atmosphere.

Consequent on the natural rest of the season, intensified by the

frosts in January, vegetation was easily excited; therefore, with the open, mild, moist weather of February and March, trees and shrubs began to expand their buds, and growth was fairly well advanced on many plants when the disastrous frosts occurred during the middle days of April. These frosts completely ruined the fruit crop on all trees and bushes which happened to be in bloom at the time, and seriously crippled the growth of many species of trees and shrubs. Rarely has so much damage been experienced in orchards and nursery gardens as that caused by the frosts alluded to. On account of the saturated state of the ground, great difficulty was experienced in getting crops planted in a satisfactory condition. Seeds germinated slowly, and, owing to the want of atmospheric warmth, growth throughout was indifferent and slow, especially on heavy soils. Crops ripened slowly, and harvesting operations, owing to the wet, changeable weather, were performed under most unwonted difficulties, with extremely unsatisfactory results. Apart from the damage done to those subjects which naturally start early into growth, and which were crippled for the season, established trees and shrubs, which were later in starting, made a fairly good growth, and flower buds are more in evidence on these than they were at the end of the previous year. Recently transplanted trees and shrubs, however, made a less satisfactory growth, and the loss of young plants in nursery lines was considerably above the average.

While there is no gainsaying the fact that a season in which bright sunshine predominates is conducive to much pleasure and enjoyment of life, as well as of great benefit to vegetation, it is interesting to note that the health of the community, judging from the comparative immunity from zymotic diseases and the low death-rate, was not affected adversely by the atmospheric conditions. The heavy rains doubtless carried down many noxious impurities from the murky pall which too frequently overhangs our busy manufacturing city, and also washed away impurities of a different nature, which in a hot season would have bred many undesirable evils to health.

Subjoined is the abstract of the meteorological record for the past three years, as kept at Queen's Park, and the averages for the past twelve years.

COPY OF METEOROLOGICAL RECORD KEPT AT QUEEN'S PARK, GLASGOW.  
RAIN GAUGE 145 FEET ABOVE SEA LEVEL.

MONTHS.	1901.				1902.				1903.				AVERAGES FOR THE LAST 12 YEARS.												
	Rainfall.		THERMO-METER.		Rainfall.		THERMO-METER.		Rainfall.		THERMO-METER.		Years.		Rainfall.		Mean Tem- perature.		Dry Days.		Number of Days on which 1° or more of frost was registered.		Degrees of Frost registered.		
	Inches.		Max.	Min.	Inches.		Max.	Min.	Inches.		Max.	Min.	Average.	Dry Days.	Inches.		Average.	Dry Days.	Average.	Dry Days.	Number of Days on which 1° or more of frost was registered.	Dry Days.	Mean Tem- perature.	Dry Days.	Number of Days on which 1° or more of frost was registered.
January,	2.68		42	34	3.54		43	33	17	7.04		39	31	14	1892	33.84	45	194	101	798					
February,	1.40		42	30	1.49		39	29	20	7.11		46	39	7	1893	33.05	47	186	56	306					
March, ...	2.06		45	34	2.52		49	37	8	8.31		45	36	2	1894	41.48	46	169	55	256					
April, ...	3.30		54	37	0.82		53	41	18	1.42		48	34	19	1895	27.57	45	202	99	823					
May, ...	1.91		62	42	2.15		53	39	13	2.74		53	42	14	1896	33.90	47	209	63	331					
June, ...	2.81		63	47	2.06		58	47	17	1.73		60	47	20	1897	40.22	46	205	61	347					
July, ...	2.39		69	55	2.62		61	47	17	3.89		62	50	14	1898	38.44	48	212	42	190					
August, ...	3.59		65	51	2.67		60	47	19	6.28		61	48	8	1899	41.67	47	193	64	415					
September,	2.85		61	49	3.56		59	48	14	3.63		59	46	15	1900	46.46	47	164	57	326					
October,	3.96		53	41	2.34		51	40	17	7.10		53	43	3	1901	34.65	47	201	70	327					
November,	3.20		46	36	2.21		47	39	10	3.07		47	37	8	1902	30.82	45	185	53	392					
December,	4.50		40	33	4.84		42	35	15	3.20		40	32	14	1903	55.52	45	138	48	286					
	34.65				30.82				185	55.52				138	Aver- ages,	38.13	46°	188	64	400°					

## The Land Mammals of the Clyde Faunal Area.

By HUGH BOYD WATT.

[Read 28th June, 1904.]

\* Indicates an extinct species in the area.

†    „            introduced    „    „

THE following notes, along with my account of the Clyde Marine Mammals (*Trans. of the Nat. Hist. Socy. of Glas.*, VI. (N.S.), 1902, pp. 191-8), complete our information for the area to the present date.

A chronological method has been followed, and details are given of the history of species, with the object of showing their past and present status and distribution. It seemed to me that such details might supplement the very valuable and important work done by the late Mr. Edward R. Alston in this field. (See the entries under his name at the end of this paper.)

To obviate burdening the pages, references are not generally given in the text, but the list of authorities appended contains the names of the most important works consulted. I take the opportunity of expressing my thanks to all who have supplied me with information, and thus assisted in a measure of completeness being attained in this faunistic survey of the extensive and varied district dealt with.

### ORDER CHIROPTERA.

Out of the twelve species of Bats recorded for the British Isles, five only are included in the Clyde List. While it may be that not much attention has been given to the group, it also seems clear that the Bat fauna of the district, although poor, is not any poorer than that of other Scottish areas.

#### *Family Rhinolophidae.*

1. [RHINOLOPHUS HIPPOSIDERUS (*Bechst.*)—Lesser Horse-Shoe Bat. Crookston Castle is named in the new *Statistical Account*

of Scotland (1845) as a locality for this species; but, failing further information, the square brackets, which indicate that confirmation of a record is awaiting, must remain.]

*Family Vespertilionidæ.*

2. *PLECOTUS AURITUS* (L.)—Long-eared Bat. Probably more common than is generally supposed. There are records and authentic reports from Paisley (1845 and the present date); Glanderston, Barrhead (1857); Kelvingrove; Thornliebank; Hawkhead; Garscadden; Antermomy; Luss and Arran — all recent.

3. *VESPERUGO PIPISTRELLUS* (Schreber)—Common Bat or Pipistrelle. Our most abundant Bat recorded from all over the area. My experience, however, is that in the vicinity of Glasgow Bats are far from numerous. It is in places away from the zone of the city, such as Luss and Arran, that they may be seen without fail on summer evenings. I have seen this species on the wing in bright sunshine on an August afternoon at Wemyss Bay. It has also occasionally been observed in winter. Mr. D. A. Boyd saw one at Portincross on 13th January, 1890, and I have noted it at Thornliebank on 15th November, 1896, and at Row on 3rd November, 1901. The earliest of my dates is 22nd March, 1894. The Rev. J. D. W. Gibson informs me that it is abundant at Carmichael (altitude above sea-level about 750 feet).

4. *VESPERTILIO DAUBENTONI*, Leisl. — Daubenton's Bat. Our area is on the northern limits of the range of this species. I can only repeat the already known records, viz. :—Glasgow Green (1864); Kelvingrove (1879); and Craigenfeoch, Renfrewshire, where some numbers were obtained by Mr. J. M. B. Taylor in January, 1885, hibernating. I am not aware of any more recent occurrences.

5. *V. NATTERERI*, Kuhl—Reddish-grey Bat. A specimen in the British Museum, labelled "Inveraray, 1858," is the only known occurrence of this species in Scotland. The Bat is preserved in spirit, and was received in the flesh and registered in the year named. It is said to have been presented by the late Duke of Argyll. (Dobson's *Catalogue of the Chiroptera in the British Museum*, 1878, pp. 307-8.)

## ORDER INSECTIVORA.

*Family Erinaceidæ.*

6. ERINACEUS EUROPOEUS, L. — Hedgehog. This species is named in both the old and new *Statistical Accounts of Scotland* (1791-7 and 1845) from many of the Clyde parishes. They need not be recapitulated. It is, however, noteworthy that none, except Luss, is in the Highland portion of the area. In view of this, it may be said that Mr. James Lumsden reports the Hedgehog as common on Loch Lomondside, and that I know of its recent occurrence at Arrochar, Glen Massan, and Imellan. The late John Colquhoun gave it as common in Bute, and Mr. John Robertson recently saw it in that island. There are no Arran records. It is found near our large towns; for instance, at Castlemilk, Rutherglen, it is abundant.

*Family Talpidæ.*

7. TALPA EUROPOEA, L. — Mole. This is another species named in both *Statistical Accounts* from many parishes, Highland and Lowland. It is probably more abundant now than then. It is reported to have "commenced ravages" about 1824 in Saddell and Skipness, but is said to have spread to Campbeltown only recently, and not yet to be known in Southend. Pennant (1777) writes of it as "among the isles only in Bute; a praise to its soil." I do not know that it occurs there now or in any of the other Clyde islands. Its remains have been found on Ailsa Craig, but the animals were probably carried from the mainland by birds. Mole hills and castings may be seen on many of our grass-moorlands and lower hills up to about 2,000 feet. I have seen them in Coire an Tee (Loch Eck), at 1,200 feet, in early spring, when the snow-line was about 1,000 feet.

*Family Soricidæ.*

8. SOREX VULGARIS, L. — Common Shrew. Occurs all over the area, from the Glasgow Parks to the uplands of Lanarkshire (Carmichael) and the remote Ayrshire coast (Lendalfoot), and also in the islands. There is a want of information from the Highland parts, but I have recent records from Arran and Bute. A

"screw-mouse" is known on Ailsa Craig, which is either this or the next species. It has been heard calling in mid-winter (2nd January, 1899) by Mr. John Robertson at Thornliebank.

9. *S. MINUTUS*, L.—Lesser Shrew. If this species is specifically recognised and known, the distribution, as shown by the information in hand, is curious. It is not mentioned in either of the *Statistical Accounts*, and Mr. C. Berry does not know it at Lendalfoot. This is sufficient to assure us that it does not occur there. Alston gave it as "not rare in the Upper Ward of Lanarkshire;" specimens have been taken near Paisley; and in 1898 I received one in the flesh from Sanda (reported to be not common there), and another from the Great Cumbræ. These island records point to the probability of the Ailsa Craig Shrew being this species. This completes the story for the area, so far as I know it.

10. *CROSSOPUS FODIENS* (Pall.)—Water-Shrew. A local interest attaches to this species, as its claim to be included in the Scottish Fauna rested for some time on specimens obtained near Glasgow by Dr. J. Scoular, a former President of this Society. Mr. Wm. Evans has, however, traced prior records back to 1808, and points out that "what Scoular really did was to recognise the variety *remifer* for the first time as Scottish." By the date of the publication of the new *Statistical Account* (1845) the species had become well known, and at the present time it may be found throughout the area in places suited to its requirements. I have recent records from every county except Argyll, and it is found in Arran. Possil Marsh, Glasgow, amidst its wealth of aquatic life, does not lack the Water-Shrew.

## ORDER CARNIVORA.

### *Family Felidæ.*

11. *FELIS CATUS*, L.—Wild Cat. Recent research indicates that this is not a native species. (*The Wild Cat of Scotland*, by Edward Hamilton, M.D., in the *Annals of Scot. Nat. Hist.*, 1897, pp. 65-78.) If this is correct it is unnecessary to consider whether specimens obtained are true Wild Cats or only cats run wild. The doubt may not, however, take

from the interest of a brief recapitulation of our chronological records, as the form is practically extinct in "Clyde." Bones of Cats were found by Mr. John Smith in both the surface and middle deposits in Cleaves Cove, Dalry, and also in the Ardrossan Shell-mound; Sir Walter Scott, writing of the fourteenth century, says in *Castle Dangerous* that the "Wild Cat was frequently surprised in the dark ravines or swampy thickets" of Douglas Dale; in 1791 it is reported from Ballantrae as amongst the "animals common to the West of Scotland;" in the old *Statistical Account* (1791-7) it is mentioned from other parishes; in the new *Account* (1845) it is given from many parishes, usually with a remark on the decrease in its numbers, but in Inveraray (where one was trapped about 1828) it was said to be common; John Colquhoun, when a boy, hunted them in Dumbartonshire (specimens are in Rosdhu House, Luss, but none killed since 1857); the Hunterian Museum, Glasgow, has specimens from the Buchanan side of Loch Lomond, presented by a former Duke of Montrose (they are undated, but probably are about 1840); one was killed in Daltote Wood, Kintyre, about 1870; and there is one in Paisley Museum, taken at Gleniffer on 26th January, 1895. Pennant stated that it was a native of Arran, and it is still reported as there in 1845 (*Statistical Account*). In 1900 feral Cats had a stronghold in the rocks at Slochd an Calaman, near Loch Ranza, and dogs could not dislodge them.

#### *Family Canidæ.*

12. \*CANIS LUPUS, L. — Wolf. History and tradition throw some light on the occurrence in our area of this extinct Scottish species. Co-related place-names are not uncommon. In the Ardrossan Shell-mound bones which are either this species' or the dog's were found. In Jocelin's *Life of St. Kentigern* (Chap. XX.) there is the story of an episode which took place on the banks of the Mollindinour (Glasgow) before the end of the sixth century, which shows that the wolf was known then and there. The saint, being in necessity, had, by the power of prayer, called deer to his aid in ploughing. One of them was killed and devoured by an hungry wolf, which rushed upon them from the wood. Kentigern called on the wolf to

make reparation. It came to his call, and was yoked along with a stag in place of the one devoured, and nine acres were ploughed by this curious team. Sir Walter Scott (*Castle Dangerous*, Chap. I.) depicts wolves as still maintaining their ground in Douglas Dale in the fourteenth century. In the old *Statistical Account* (1793) the woods of Cathcart are stated to have proved a defence to the Deer, the Boar, and the Wolf, "now no more to be found in this country." The story of the last Wolf seen in our area comes from Inveraray (see new *Statistical Account*, 1845, VII., p. 680). Unlike stories from other Scottish localities, no claim is made that the animal killed was the last British Wolf. The story seems, indeed, to justify the inference that the period of the contemporaneous history of the species had not yet passed away, and this may permit the date of this last "Clyde" Wolf to be approximately fixed as the sixteenth century.

13. *CANIS VULPES*, L.—Fox. This is still a common species, particularly in Highland localities. Outside the hunting country, now confined to East Renfrewshire and Cunninghame and Kyle, a note of some recent records shows how general the distribution is—Cadzow (many; in 1898 a vixen, with ten young, was killed); Carmichael (abundant; are trapped and despatched to hunting districts); Milton Lockhart; Gartcosh (only occasional now); Eaglesham; Craiggallion (rarely occur); Loch Lomondside (few); Carrick Castle; Benmore and Glen Massan (149 killed between 1891-7); and Paltalloch—over "Clyde" borders—(212 killed in the three years, 1894-5-6). No mammal is more frequently mentioned in both the *Statistical Accounts*, sometimes with interesting details. Such is the Campsie story (1795) of the three different kinds found there, and their primitive hunting on the Fells. Two packs of Foxhounds are at present established in "Clyde"—the Earl of Eglinton's and the Lanarkshire and Renfrewshire. The first-named hunt a large portion of North Ayrshire hard, and yet in 1861, when the Hunt was formed, foxes were so scarce that good sport could not be obtained. A rapid increase must have taken place, as in the season 1867-8, 77½ brace were killed. This number was not exceeded till 1890-1, when 81 brace were accounted for, and in 1895-6 the number rose to 82 brace. In the limited portion of East Renfrewshire to which

the Lanarkshire and Renfrewshire Hunt is now confined, 16 brace were killed in 1898-9, and 13 foxes were accounted for in ten days' cub-hunting in 1900. Coverts come within five miles of the Royal Exchange, Glasgow, and some years ago a fox was chased through Kelvingrove Park and killed in Partick. The species has been extirpated in Arran and in Bute. In the last-named island it became a general pest, so that in 1731 a fox-hunter was engaged, and cleared them out in two years.

*Family Mustelidæ.*

14. *MUSTELA MARTES, L.*—Pine-Marten. Both *Statistical Accounts* give this species as occurring in many parishes. At Hamilton it was "very common" (1841), but this was not generally the case. It is now so rare that a note of all recent records in their sequence may be briefly given. Loch Lomondside was a stronghold; John Colquhoun (who lived at Rosdhu in his boyhood, *circa* 1820) says they were often trapped at the poultry yard there, but in his *Feræ Naturæ* (1873) he speaks of the "last Martens," and the only later Loch Lomond record known is of one killed near Tarbet in 1882. Further recent dates are—Culzean (1874); Maybole (1876); Minnock Water (1878-9); Arrochar (1882); Kilmory, Lochgilphead (1896); and Poltalloch—"Argyll"—(1896, and another one in the decade from 1890-1900). There is an undated example of the so-called Beech Marten from Garelochhead in Glasgow Museum.

15. *M. PUTORIUS, L.*—Polecat. From the *Statistical Accounts* this was a much more abundant species than the Pine-Marten, but it is now practically extinct in "Clyde." South Ayrshire seems to have been a stronghold. In 1839 Wm. Thompson (author of the *Natural History of Ireland*) saw several taken at Ballantrae; the nest has been known at Knockdolian; two were trapped on the Lendal about 1860; an occasional one was said to be caught by the keepers at Culzean in 1880; and there is a report of one at Pinmore about 1892. The late Mr. Henry Grieve recollected seeing Polecats, which were preying on Rabbits, trapped every winter at Braidwood, Lanarkshire, immediately subsequent to 1850. The keeper at Bishop Loch, Gartcosh, told me that his predecessor had, in the course of one year, about 1850, trapped seven Polecats amongst roots of

trees near the sluice. A specimen was presented to Glasgow Museum by Mr. A. Veitch in 1898, but the animal was captured at Picketlaw, Carmunnock, so far back as 1837. One is recorded from Linwood by the late Mr. M. Young, Paisley, in 1858, and in the Museum of that town there is a specimen from High Craig Rock, Craigenfeoch, dating from about 1868. Since then the Polecat is lost to Clyde natural history. There is a report that one was obtained in the island of Bute in 1890, but, if so, it was not native. John Blain (1761-1820) says definitely that it is not in Bute.

16. *M. ERMINEA*, *L.*—Stoat. A common species, and apparently more abundant in those derelict, half-deserted places, destroyed as natural country, and yet not completely assimilated as manufacturing and industrial centres, than in wilder places. For example, the keeper at Bishop Loch, Gartcosh, told me (1900) that he had killed 400 to 500 Stoats there since he came. It has been long known in Bute, and Mr. John Robertson saw one in that island recently, but it is not in Arran or the other "Clyde" islands.

17. *M. VULGARIS*, *Erxl.*—Weasel. Common, and in the islands has the same status as the Stoat. Both species seem to have been nearly exterminated in Upper Lanarkshire, with the result that when, in natural course, a vole plague occurs, an importation of Weasels and Stoats is desired. Some had been taken for export to Australia to assist in checking the rabbit-plague there (*Report on the Plague of Field-Voles in Scotland*, 1893, pp. 29 and 35).

18. *M. TAXUS* (*L.*)—Badger. Some details of the occurrence of this species may be given, as it is now so little known. Remains were found by Mr. John Smith in the Ardrossan Shell-mound. It is included in both *Statistical Accounts* in many of the parish lists, sometimes with interesting remarks. For instance, in Campsie, in 1795, two species were found—"one somewhat resembling a sow, the other a dog." The references in the 1845 *Account* make it clear that the species had then become less abundant than formerly. Some Lowland haunts are named as still occupied, *e.g.*, Montfode (Ardrossan) and Ardneil (West Kilbride). John Colquhoun knew it well on the hills between Luss and Arrochar and in Glenfalloch. In the

Hunterian Museum, Glasgow University, there is a specimen from Loch Lomondside, dated 1869, and in Paisley Museum one from Finlaystone, Langbank, the same year—1869. Mr. J. A. Harvie-Brown records one from the Campsie Fells (1867); two from the Strathblane Hills (about 1873); one from Woodburn, Campsie (1874); and one each from Aucheneck and Ballikinram, Killearn (1875). More recent records are—one adult female from Dolphinton (1890), noted as “the third Badger got there within the last two or three years” (*Scottish Naturalist*, V. (N.S.), p. 36); two specimens in Paisley Museum from Renfrewshire (1893 and 1896); on Poltalloch (just beyond the “Clyde” area) three were killed in 1894, four in 1895, and five in 1896; one shot at Gilbank, Carluke, and one female netted at Jock’s Gill, Lanarkshire (1896); one male at Milton Lockhart (1897); one female at Murrich Glen, Dumbartonshire (1899)—this was the only Badger the keeper had seen in fourteen years’ experience in Stirlingshire, Ayrshire, and Dumbartonshire—and another female trapped alive in the same place on 18th April, 1904; one female, in young, near Glengarnock (April, 1901); one male at Kilkerran, Ayrshire (March, 1902)—this is the only Badger taken there for over 30 years; one female at Ardlamont, Argyllshire (2nd June, 1902)—the only capture of the kind remembered; and one at Rowardennan, Loch Lomond (1903). Some of the above records are not free from suspicion that the animals were “escapes.” On Benmore (Cowal) the Badger may be found at present, and also in Glen Sannox, Arran, where it was introduced previous to 1895. Badgers to the number of five were brought from Peeblesshire and put on Ailsa Craig about 1876. The introduction was so far successful that young ones were subsequently seen, but none at all has been observed for several years now.

19. *LUTRA VULGARIS*, *Eral.* — Otter. This species occurs throughout the area from the tidal waters of the island of Sanda and the South Ayrshire Coast to the upper reaches of the Clyde at Carmichael. A young one was captured in the river at Glasgow Green on 3rd September, 1899. The tale of deaths accounts for a considerable number of individuals each year, but the habits of the species and the sentiment of the sportsman may tend to prevent any serious diminution in its

numbers. The Rivers Doon and Ayr are annually visited by the Dumfriesshire Otter Hunt, and Mr. Carnaby Foster's Hounds have hunted in Arran occasionally. From this island there is evidence that the species is an old-established inhabitant, as Dr. E. Duncan obtained the skull of a Badger in excavating a long barrow at Lagg in August, 1896. A specimen shown at the Andersonian Naturalists' Society, Glasgow, in January, 1893, from the River Kelvin at Summerston, is stated to have been, when in the flesh,  $49\frac{1}{2}$  inches long and 26 lbs. in weight.

### *Family Ursidae.*

20. \**URSUS ARCTOS*, L.—Brown Bear. Long extinct, although apparently known in Scotland at the time of the Roman occupation. The record marked on Inch Murren in the Mammals Map in the *Royal Scottish Geographical Society's Atlas* (Plate VII.) is probably due to the statement made by Colonel Thornton (*Sporting Tour through Northern England and the Highlands*, 1804), that Lord Graham had turned out a few wild bears on this Loch Lomond island.

## ORDER RODENTIA.

### *Family Sciuridae.*

21. *SCIURUS VULGARIS*, L.—Squirrel. Interesting and full details of the spread and progress of this species in the Clyde area are given in Mr. J. A. Harvie-Brown's *History of the Squirrel in Great Britain* (1881). The species continues common in the woodlands, notwithstanding a long list of misdeeds charged against it—*e.g.*, damaging young trees; ruining silver firs; stripping the bark off Wellingtonias; plucking horse-chestnut buds; digging up crocus bulbs; and, worst of all, scaring young pheasants from their roosting trees to the ground, where they fall a prey to foxes. I do not know of its occurrence in the islands, although at one time it was in Bute. It approaches the vicinity of our towns, and on two different dates in 1896 I saw a squirrel in the Queen's Park, Glasgow. I have observed it occasionally out in the depth of winter—*e.g.*, at Benmore on 30th December, 1900, and at Eglinton on 1st January, 1903.

*Family Castoridae.*

22. \*CASTOR FIBER, *L.*—Beaver. Remains were found by Mr. John Smith in the Ardrossan Shell-mound and in Cleaves Cove, Dalry, but written history tells nothing of this species in our area. In 1874 a small colony was established at Mount Stuart, Bute, by the then Marquess of Bute, but by 1890 the animals had died out. One found dead, and shown at the Zoological Society of Glasgow in 1890 was supposed to be the last. Mr. J. Stuart Black has given some particulars of this experiment in a pamphlet entitled "*A Short Account of how the Marquis of Bute's Beavers have succeeded in the Isle of Bute, Scotland*" (Cupar-Fife, 1887).

*Family Muridae.*

23. MUS MINUTUS, *Pall.*—Harvest-Mouse. A nest of this species from Kilbarchan (1895) is in the Paisley Museum, and Mr. J. M. B. Taylor has seen the nest in the Abbey Parish. The nest is also reported from Lendalfoot, but in every case the animal is wanting. In the Hunterian Museum there is a specimen marked "Andersonian Collection," but no further data is given. It is probably not a local example.

24. M. SYLVATICUS, *L.*—Wood or Long-tailed Field-Mouse. Common, and said also to occur in the islands, but I have no information from them later than the date of Alston's general statement that it is "in most if not all of the inner islands." He knew it as common in Arran. In many mainland localities it is so abundant as to be a pest.

25. M. MUSCULUS, *L.*—House-Mouse. This "companion of man" is probably our most abundant species.

26. †M. RATTUS, *L.*—Black Rat. There is no evidence that this species was ever common. Recent records from Glasgow, Greenock, and Paisley are almost certainly due to introductions. Between March and December, 1887, Mr. W. Hannan Watson received eighteen specimens from a rat-catcher, all taken in the neighbourhood of Glasgow Harbour. Amongst this number was a young female, which gave birth to seven young, four being regular brown rats.

27. †M. DECUMANUS, *Pall.*—Brown Rat. This species seems to have made its appearance in the early years of last century.

John Colquhoun recollected, as a child, "the rueful face of a farm-man who informed my father of the first rat that had ever been known" at Rosdhu, Luss. On Ailsa Craig the Brown Rat obtained a footing in 1889, and, probably owing to abundant food, had increased so enormously that, in 1890, 1,000 are said to have been killed. In 1900 its numbers were still such that it could clear off the bodies of the innumerable dead birds which accumulate at the base of the cliffs. It flourishes on a shore diet, and is found on the smaller islands, such as Sanda, Sheep Island and Glunimore (Kintyre), Sgat Mhor (Loch Fyne), and Inch Moan (Loch Lomond).

28. *MICROTUS AGRESTIS* (L.)—Common Field-Vole. A common species throughout the area. Its depredations are not confined to grass lands, for it has been known to damage growing trees. At Cameron (Dumbartonshire) in 1825 the oak coppices were attacked, and at Nether Pollok in 1898 Mr. John Boyd, forester, was struck by the sickly appearance of a small plantation, and, on examination, found that the trees were barked all round to the height of about one foot from the ground, both hard-woods and conifers being attacked. The great vole plague of 1888-1893, which infested the pasture lands of the South of Scotland, had its northern limits in the "Clyde" parishes of Crawford and Dalmellington (*Report on the Plague of Field-Voles in Scotland, 1893*).

29. *M. GLAREOLUS* (Schreber.)—Bank-Vole. This is a little known species, but such may be due to its being overlooked by observers or to a want of specific determination. As my information stands at present, the already-known records can only be repeated, viz.:—Lesmahagow (1866); Paisley (1891); and Luss (previous to 1895).

30. *M. AMPHIBIUS* (L.)—Water-Vole. Common and of general distribution in mainland waters. It occurs on some of the Loch Lomond islands, but I have no knowledge of it on the islands of the Firth. The black variety is not infrequent; Mr. W. Hannan Watson (*in lit.*, 19th October, 1898) reports numbers at Hairlaw Dam, Renfrewshire; and one from Tighnabruaich was shown at a meeting of this Society on 27th March, 1900. The variety was first recognised as occurring in "Clyde" from examples taken at Ballantrae in August, 1842; but by

John Colquhoun's time it had become extinct there, although formerly common in the River Stinchar.

*Family Leporidae.*

31. *LEPUS EUROPOEUS*, *Pall.*—Common Hare. From the new *Statistical Account* (1845) it is clear that this species was much more numerous then than now, the reports from many parishes showing that it was very plentiful, in some places to the extent of being a nuisance to farmers. It is still a common species, and is a familiar sight in some places quite near Glasgow, such as Cathcart and Carmunnock. The great stone wall encircling the Hundred Acre Hill at Cathcart is said to have been built by a former laird of Aikenhead to preserve the space for coursing. The Eaglesham district, about 1845, was the meeting-place of the Clydesdale Coursing Club. Coursing is an old-established and flourishing sport in Upper Lanarkshire, and at the well-known Carmichael Meetings hares of a very robust type and of extraordinary speed occur. Packs of Harriers and Beagles have in recent years hunted the Hamilton and Strathaven districts. In the islands the species has been introduced into Arran since Pennant's time; it was in Bute then and is there now; in the Great Cumbrae it once existed, but had disappeared by 1845, and a few are now again on this island. It has been known to stray within the bounds of Glasgow, and I saw one, thoroughly wild and scared, in the Queen's Park on 28th February, 1901. A Hybrid between this species and the Mountain Hare from Dumbarton Muir was shown to this Society by Mr. James Lumsden on 9th January, 1877.

32. *L. TIMIDUS*, *L.*—Mountain-Hare. This species is named in the old *Statistical Account* (1791) from the parish of Luss alone, and in the new *Statistical Account* (1845) from Buchanan, Arrochar, Kilmun, Dunoon, Inverchaolain, and Inveraray. In the last-named parish it is said to have appeared about 1839. John Colquhoun writes that one observed by him in 1822 near the top of Ben Voirla (? Voirlich) was the first he had seen in the Loch Lomond district, but by 1873 they were numerous. In 1861 the species was introduced at Glenbuck (Ayrshire); by 1867 it was plentiful near Muirkirk, and rapidly increasing on the Lanarkshire and Ayrshire borderland. Mountain-Hares are

now tenants of the uplands of every county in our area. On 23rd January, 1861, a pure white specimen from Carnwath was shown by Dr. J. A. Smith at a meeting of the Royal Physical Society, Edinburgh. It may be worth noting that the species has in recent years been observed by me on the Gleniffer Braes, Ellrig Muir, Cairntable, Campsie Fells, Strathblane Hills, Arrochar Hills, Glenfalloch Hills, Ben More, and the Bishop's Seat (Cowal), and there are authentic records from many other high-lying localities. On the Misty Law Hills (Renfrewshire) 300 are reported to have been killed in one season. On 4th May, 1896, one seen on the Campsie Fells showed partially white fur.

33. †*L. CUNICULUS*, *L.*—Rabbit. This species was apparently never more abundant and generally distributed in our area than at the present time. It is mentioned in the old *Statistical Account* (1791) from only a very few parishes—in the case of Lanark with the remark, “now entirely rooted out.” It may be interesting to note the dates of the first appearance of the Rabbit in certain places, viz.:—Arran, previous to 1772; Stevenston, 1777; Luss, about 1820; Caldarvan (Dumbartonshire), 1828 or 1829; Cathcart and Sorn, previous to 1845; Dalziel, previous to 1845 (a reappearance); Saddell and Skipness, turned out unsuccessfully, previous to 1845; and Minard (Loch Fyne), 1849. None of our Clyde mammals takes so kindly to island life; I have seen Rabbits on Arran, Bute, the Cumbraes, Lady Island (Troon), Eilean Aoidh and Liath Eilean (Loch Fyne), Ailsa Craig, Sheep Island (Kintyre), and Inch Moan and Inch Tavannach (Loch Lomond). It is known to have been on the Little Cumbrae by A.D. 1453, and on the Great Cumbrae and Ailsa Craig previous to 1612. I have observed the black variety on Arran and the Gleniffer Braes, and at Kennox, Eglinton, and Inveraray, but only in small numbers.

#### ORDER UNGULATA.

##### *Family Bovidæ.*

34. †? *Bos TAURUS*, *L.*—White or Park-Cattle. This semi-domesticated species has been kept in the following places in our area, viz., Auchincruive, Cadzow, Cumbernauld, Ardrossan

(and Eglinton Castle?), Kilmalcolm, and Kilmory (Lochgilthead). The sole surviving herd is at Cadzow, the numbers of which, as the undernoted figures show, are well maintained:—

Date.	Total Number of Animals.	Authority.
1835, ...	80 (about)	New <i>Statistical Account</i> — Lanarkshire, p. 278.
18th July, 1877, ...	56	A. H. Cocks. <i>Zoologist</i> , 1878, pp. 282-3.
1880, ...	40 (over)	Alston's <i>Mammalia</i> (p. 25), <i>auct.</i> Storer's <i>Wild White Cattle</i> (1879).
22nd Aug., 1887, ...	60	Report of Committee of the British Association. <i>Zoologist</i> , 1887, p. 403.
1888 to 1890, ...	48	W. Hannan Watt.
7th May, 1898, ...	42	H. B. Watt.
7th Oct., 1899, ...	44	H. B. Watt.
1900, ...	49	<i>Scots Pictorial</i> , 15th Oct., 1900, p. 301.
11th Apr., 1902, ...	53	H. B. Watt.
3rd Oct., 1903, ...	71	H. B. Watt.

In 1886 fresh blood was introduced from Chillingham, and in 1898 one Bull and four Cows were brought in from Vaynol Park, Carmarthenshire, for cross-breeding. The original stock at Vaynol was from Kilmory, and consisted of 22 animals transferred previous to 1897. The Kilmory herd was raised, previous to 1845, from a White Bull (which was understood to have come from that portion of the Blair Atholl stock which had gone to the Earl of Breadalbane in 1834), and from white or dun Highland Cows. The last of the Kilmory beasts were disposed of in 1903. I can add nothing to the account given by Mr. J. E. Harting (*British Animals extinct within Historic Times*, 1880) of the Auchincruive and Ardrossan herds. The animals, which were at Kilmalcolm previous to 1845, were brought from Eglinton, and were probably the same stock as the Ardrossan ones. The historic "quhit bullis" of Cumbernauld mentioned by Boece (A.D. 1527), Bishop Leslie (1578), and Monipennie (1597), if not entirely destroyed by the Earl of Lennox in 1570, may have some connection with the Cadzow herd, the origin of which is not known.

35. \*B. LONGIFRONS, *Owen*—Celtic Shorthorn. Remains of this species have, within recent years, been found in superficial

surface deposits in the heart of the city of Glasgow (High Street), and at Gorbals, Pollokshaws, Dumbuck (Dumbartonshire), Ardrossan Shell-mound, Lochlee Crannog, and Kirkoswald (Ayrshire). — See *Transactions of the Geological Society of Glasgow*, II., 1867, pp. 152-3, and VI., 1882, p. 283, and Mr. John Smith's *Pre-historic Man in Ayrshire*, 1895, pp. 26, 67, and 148. "Bones of the ox" have been obtained from Tor Castle (John M'Arthur's *Antiquities of Arran*, 1861, p. 81), and from cairns excavated by Drs. E. Duncan and T. H. Bryce at Torlin and Clachaig, Arran, since 1896, but the species is not determined.

#### *Family Cervidae.*

36. CERVUS ELAPHUS, L. — Red Deer. Remains have been found in surface deposits which belong to what seems to have been a large form of this species—such are the antlers with about twenty points from a moss at West Kilbride, now in the Hunterian Museum, Glasgow University. From our Lowland district the Red Deer has long since disappeared, and also from the hill country of Lanarkshire and Ayrshire, although "a stray animal of this species was said to have been seen upon the hills of Lamingtoun about fifteen years ago" (new *Statistical Account*, 1845). Not much more than this can now be said even of our Highland area, with the exception of its northern fringes and of Arran. The Arrochar shootings include Red Deer limited to six stags each season, and there are reports that a certain secluded area in Dumbartonshire is being converted into a deer forest. The portion of Argyllshire in "Clyde" does not contain any forest, although it doubtless harbours many Red Deer. The southern limit of the species in Scotland is the island of Arran, whose hills and glens afford favourable quarters and yield heavy stags. One scaling 20 $\frac{3}{4}$  stones and another 19 stones were killed in 1898. It is an old inhabitant of the island, as bones were found in excavating the mound at Tor Castle, and in 1578 Bishop Leslie spoke of the Arran deer as a "mervellous multitude." Martin (*circa* 1697) gave the number as about 400; Pennant (1772) found the "stags reduced to about a dozen;" previous to 1845 the Deer were down to a few dozens (new *Statistical Account*); in 1859 there was an importation of fresh blood from the mainland

and in 1872 the numbers had risen to 500 head (Alston in Bryce's *Arran*, 4th ed., 1872).

37. †*CERVUS DAMA*, *L.*—Fallow Deer. In some places this species runs wild and thrives, but in others it is more than semi-domesticated. Amongst the places possessing herds are Culzean, Eglinton, Douglas Castle, Stonebyres House, Pollok House, Rossdhu, Inchlonaig, Inch Murren, and Brodick Castle. Difficulties are experienced in maintaining the stock, and some herds have died out. One such was at Cadzow, where the last animals were killed off in 1898. There was a good stock previous to 1792. The Little Cumbrae was a deer forest in A.D. 1453, "well stocked with deer and rabbits" (Paterson's *History of the Counties of Ayr and Wigtown*, 1866, III., p. 338); Monro (1549) calls it "Cumbray of the Dais, because there is many Dais intil it;" and Monipennie (1597) is quite specific, and speaks of "Little Cumbra, fertill of Fallow deere." I have no information when they disappeared from this island, but they are not mentioned as being there in either of the *Statistical Accounts*.

38. *CAPREOLUS CAPREA*, *Gray*—Roe Deer. From the reports in the new *Statistical Account* (1845) none of our mammals seems to have been then better known than this species, and at the present date I have records of it from so many places, extending from Dalquharran to Carmichael, and also in our Highlands, that they need not be named. At some places, such as Culzean and Eglinton, there has been a great diminution in numbers; at Culzean they are reported to be nearly exterminated; and in the country hunted by the Eglinton Foxhounds, where in 1861 the coverts were full of Roe Deer, they have been thinned out as spoil-sports. The wooded and secluded peninsula of Rosneath has been a centre of distribution; animals from it have been seen swimming across Loch Long to Cowal. In Arran the Roe Deer was extinct long previous to 1845, but it occurs at the present time in the island of Bute (Mr. John Robertson, *in lit.*, 12th June, 1901).

39. \**RANGIFER TARANDUS* (*L.*)—Reindeer. Remains of this species (whose occurrence in Scotland within the historic period is doubtful) have been found in Glasgow (Greendyke Street) and at Partick, Raesgill (Carluke), Croftamie (Drymen), Woodhill

Kilmaurs), and the Lochlee Crannog.—See *Proc. Nat. Hist. Socy. of Glasgow*, 1852, pp. 13-4; *Trans. Geological Socy. of Glasgow*, III., pp. 311-4, and V. (1877), pp. 15-6; Harting's *British Animals extinct within Historic Times*, 1880, pp. 68-9; and John Smith's *Pre-historic Man in Ayrshire*, 1895, p. 148.

#### *Family Suidæ.*

40. \**SUS SCROFA*, L.—Wild Boar. Sir Walter Scott seems to have considered it not misleading to suggest that this species was hunted in Douglas Dale in the fourteenth century (*Castle Dangerous*, Chap. VII). Actual evidence of its occurrence in the Clyde area is slight, and I have no definite information, beyond that remains were found in the mound at Tor Castle, Arran, and at the Dumbuck "Crannog," on the Clyde.

#### PRE-HISTORIC SPECIES.

It must be sufficient here to mention only the names of species and the localities where traces of them have been found, and to give references to authorities for details and particulars of the discoveries.

1. *BOS PRIMIGENIUS*, *Bojanus*—Fossil Ox or Urus. Remains found in Glasgow (Greendyke Street), and at Partick, Jordanhill, Carluke, Paisley (two places), Crofthead (Neilston), Rothesay Bay, Ardeer, and Maybole.—See the new *Statistical Account* (1845) for Maybole and Stevenston; *Proc. Nat. Hist. Socy. of Glasgow*, 1852, pp. 13-4; Sir A. Geikie's *Phenomena of the Glacial Drift of Scotland*, 1863, p. 186; *Trans. Geol. Socy. of Glasgow*, II., pp. 153-4 and 171; IV., pp. 70-1; IX., pp. 143 and 213-5; and XI., p. 297.

2. *ELEPHAS PRIMIGENIUS*, *Blumenbach*—Fossil Elephant or Mammoth. Bishopbriggs, Airdrie, Cliftonhall, Mainhill (Baillieston), Woodhill (Kilmaurs), and Drummuir (Dreghorn).—See *Proc. Nat. Hist. Socy. of Glasgow*, I., p. 82, and II., p. 263; *Proc. Royal Physical Socy. of Edin.*, 1885, VIII., pp. 451-9; *Trans. Geol. Socy. of Glasgow*, II., pp. 167 and 311-4; III., p. 415; VI., p. 291; and VIII., pp. 208-9 and 213-23; Sir A. Geikie *op cit.* above; and Mr. John Smith's *Pre-historic Man in Ayrshire*, 1895, p. 95.

3. *EQUUS CABALLUS*, L.—Fossil Horse. Bowling (dredged from the Clyde), Heatherhouse (Irvine), Crofthead (Neilston),

Hunterston Rock-shelter (West Kilbride), Ardrossan Shell-mound, and the Cothouse (Paisley), but the species is not in every case unquestioned. See *Proc. Nat. Hist. Socy. of Glasgow*, II., p. 215; and *Trans. Geol. Socy. of Glasgow*, IV., pp. 18 and 70-2; VIII. p. 34; and IX., pp. 213-25 and 364.

4. CERVUS GIGANTEUS, *Blumenbach* — Gigantic Irish Elk or Deer. Paisley (two places), Crofthead (Neilston), and Maybole. See the new *Statistical Account*, 1845, V. (Maybole), and *Trans. Geol. Socy. of Glasgow*, IV., pp. 70-1, and IX., p. 143 and pp. 213-25.

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#### Report on Excursions.

CADZOW, 3rd October, 1903.—Mr. R. B. Johnstone, conductor. Measurements of trees made by Messrs. John Renwick and Richard McKay:—Great Maple (*Acer Pseudo-platanus*, L.), at Barncluith Gate, bole, 9 ft.; girth, 15 ft. 9½ ins. at 4 ft. 8 ins.; increase 2·50 ins. in 6 years = ·42 in. per annum. Another great Maple at Gate, west of Chatelherault, bole, 8 ft.; girth, 13 ft. 10 ins. at 4 ft. 9 ins.; increase 1·50 ins. in 3 years = ·50 in. per annum. Ash (*Fraxinus excelsior*, L.), in Low Park, near gatehouse, bole, 13 ft.; girth, 14 ft. 6 ins. at 5 ft. Radius of spread, 64 ft. to South. Oak (*Quercus Robur*, L.), near gate in division between High Parks, bole, 7 ft.; girth, 21 ft. 2 in. at 3 ft. 6 ins. Tree decaying. Oak, at Sheds, bole, 14 ft.; girth, 15 ft. 6 ins. at 4 ft.

6 ins. Evergreen Oak, *Quercus Ilex*, L., bole, 4 ft.; girth, 3 ft. 5½ ins. at 3 ft. 8 in.; increase 2·50 ins. in 3 years = ·83 in. per annum.

The most interesting fungi observed at this "Foray" were:—*Arcyria incarnata*, Pers., *Hypoxylon coccineum*, Bull., *Typhula erythropus*, Fr., *Pistillaria quisquilaris*, Fr., *Stereum sanguinolentum*, Fr., *Solenia anomala*, Fr., *Grandinia granulosa*, Fr., *Trametes mollis*, Fr., *Polyporus intybaceus*, Fr., *P. destructor*, Fr., *Fistulina hepatica*, Fr., *Hebeloma glutinosum*, Lindgr., *Pholiota spectabilis*, Fr., *Hygrophorus ceraceus*, Wulf, *H. pratense*, Fr., *Clitocybe nebularis*, Batsch, *Lactarius subdulcis*, Fr., *Russula integra*, Fr.

NORTH QUEENSFERRY, 4th April, 1904.—Joint-excursion with the Geological Society of Glasgow. Mr. Goodchild, F.G.S., Edinburgh, conductor. Rev. A. S. Wilson, M.A., B.Sc., sent an interesting account of the Antiquities and Geology of the District, which was read at the meeting on 26th April.

WEST KILBRIDE TO FAIRLIE, 23rd April, 1904. Mr. D. A. Boyd, conductor.—This excursion was a joint one with the West Kilbride Ramblers' Club.

In the course of the walk to Kilrusken and Bigleés, vegetation was found to be in a very backward state, and none but the most common plants were observed in flower. Several well-grown specimens of the Jew's-ear (*Hirneola auricula-judæ*, Berk.) grew on the trunk of an Elder-tree, near Bushglen. Several common species of parasitic fungi were also observed, including *Uromyces poe*, Rabh., in its cluster-cup state, on leaves of *Ranunculus Ficaria*; *Puccinia hieracii*, Schum., in its uredospore state, on leaves of *Hypochaeris radicata*; *P. bunii*, DC., on leaves of *Conopodium denudatum*, and a few others in an imperfectly developed condition.

SCALPSIE BAY and LOCH QUIEN, BUTE, 23rd May, 1904. Conductor, Mr. J. Ballantyne.—This excursion took place conjointly with the Microscopical Society of Glasgow. The weather, unfortunately, was wet and stormy, which no doubt prevented many of the members from taking part in the excursion, and

consequently there was a very small attendance. Rothesay was reached shortly after mid-day, and the party proceeded by brake to Ambrismore Farm, thence to Scalpsie Bay. After proceeding along part of the bay and noting its plants, the party returned by Dun-Scalpsie fort, one of the oval kind of which there are many examples scattered over the island.

Thereafter the party proceeded to Loch Quien, a sheet of water which appears to be little known outside of Bute, and in which are apparently the remains of two crannogs. The district round Loch Quien is rich in plant life, and several comparatively rare species may be obtained by the botanist.

In Loch Quien *Callitriche autumnalis*, L., *Lobelia Dortmanna*, L., and the small variety of white water lily, *Castalia speciosa*, Salisb., b. *minor* DC., also *Utricularia minor*, L., are to be found. And here too *Anthemis nobilis*, L., has been able, for many years, to establish itself, its strong perfume being quite noticeable before the plant is observed.

Among others, the following plants may be noted as observed by the party:—

*Cerastium tetrandrum*, Curtis.

*Pinguicula lusitanica*, L.

*Neckeria claviculata*, N. E. Br.

*Phegopteris Dryopteris*, Fée.

Mr. D. A. Boyd supplied the following list of plants which he observed during the course of the day:—

Mosses—

*Tortula ruraliformis*, Besch.

*Brachythecium albicans*, B. & S.

*Pterogonium gracile*, Sw.

The two former on sandy ground, Scalpsie Bay, and the last on shady rocks near the shore.

Fine specimens of the Jew's-ear Fungus (*Hirneola auricula-Juda*, Berk.) were found on dead branches of Elder.

The micro-fungi noted included *Peronospora ficariae*, Tul., *Entyloma ranunculi*, Bon. (in its conidial state as *Cylindrosporium*), and *Uromyces pœv*, Rab. (as *Æcidium ficariae*, Pers.), all on leaves of *Ranunculus Ficaria*; *Puccinia primulae*, DC. (as *Æcidium* on

*Primula vulgaris*); *Puccinia suaveolens*, Pers. (as fragrant spermogonia on *Cnicus arvensis*); *P. oblongata*, Link. (uredospores on *Luzula maxima*); *P. bunii*, DC. (on *Conopodium denudatum*); *P. glomerata*, Grev. (on *Senecio Jacobææ*); *P. valantiæ*, Pers. (on *Galium saxatile*); *Triphragmium ulmaria*, Schuns. (primary uredospores on *Spiræa Ulmaria*); *Cystopus candidus*, Pers. (on *Capsella Bursa-pastoris*); *Rhopoglyphus filicinus*, Fr. (on dead stems of *Pteris aquilina*).

INVERKIP AND THE CLOCH, 11th June, 1904. Conductor, Mr. John R. Lee.—The route followed was along the shore road from Inverkip, past the Cloch Lighthouse, to Ashton. As the interest of the members of the party was mainly botanical, the observations made were exclusively confined to the flora of the locality. A search was made for plants of interest, first amongst the shrubbery and woods by the roadside from Inverkip village to the point where the road emerges upon the shore, then along the shore itself for a short distance, afterwards returning to the woods and roadside for the remainder of the journey.

In the woods near Inverkip a number of plants of the great pendulous sedge (*Carex pendula*, Huds.) were found. Amongst other plants noted in the woods, those of more especial interest were *Carex remota*, L., and *Aspidium angulare*, Willd. Amongst mosses, the most noteworthy was *Weisia verticillata*, Brid., found in clefts of the sandstone rocks at the back of the woods, fruiting freely—a somewhat unusual occurrence. There falls to be recorded also from these woods the hepatic *Saccogyna viticulosa*, Mich., which does not appear as a Renfrewshire species in the recently published "Census of Scottish Hepaticæ," by Mr. S. M. M'Vicar. It would appear, therefore, that this is the first record for the county of this common liverwort. On the shore the most interesting plant observed was *Cerastium tetrandrum*, Curtis. The moss, *Orthotrichum affine*, Schrad., was found abundant on a low stone wall near the shore, in fine fruit.

The most interesting find of the day, however, was *Wahlenbergia hederacea*, Reich., of which there is an old record for this locality, although it does not seem to have been noted of late years. The plant does not flower until July, and only the leaves were visible at the time of our visit; but a specimen

was sent to Mr. Arthur Bennett, F.L.S., who confirms the identity of the species.

Numerous Microfungi were observed, of which the most notable were *Peronospora nivea*, Unger, on *Egopodium Podagraria*; *P. arenaria*, Berk., on *Arenaria peploides*; *Synchytrium mercurialis*, Lib., on *Mercurialis perennis*; *Ustilago violacea*, Pers., in anthers of *Lychnis dioica*; *Uromyces ficariae*, Schum., on *Ranunculus Ficaria*; *Puccinia caricis*, Schum. (as *Ecidium urticae*, DC.), on *Urtica dioica*; *P. epilobii*, DC., on *Epilobium palustre*; *P. chrysosplenii*, Grev., on *Chrysosplenium oppositifolium*; and *Ovularia primulana*, Thüm., on *Primula vulgaris*.

CASTLEMILK, RUTHERGLEN, 21st June, 1904.—Among the plants observed were *Ranunculus bulbosus*, L., *Sanicula europaea*, L., *Polygonum Bistorta*, L., all growing plentifully. Patrick, in his "Indigenous Plants of Lanarkshire," 1831, records the last of these, the Snakeweed, "in a glen at Castlemilk in great abundance." Ferns were not very common. *Athyrium Filix-femina*, Roth., *Lastrea filix-mas*, Presl., *L. dilatata*, Presl., were observed.

In the rockery *Polypodium Dryopteris*, L., *Cryptogramme crispa*, Br., were growing.

The following trees were measured:—Holly (*Ilex Aquifolium*, L.), to south of house, 8 ft. 6½ ins. at 5 ft. on N.; bole, 10 ft. The tree is decaying, the stem has been filled up with cement; the girth is exactly the same as it was 11 years ago. Great Maple, (*Acer Pseudo-platanus*, L.), to south of garden, 11 ft. 7 ins. at 3 ft. 3 ins. on East; bole, 5 ft.; increase in 11 years, 9 ins. = .80 per annum, the greatest increase yet noticed in this species, but the stem of this tree is very short, and the rate of growth is probably affected by the swell of the branches, and perhaps of the root. Horse Chestnut (*Esculus Hippocastanum*, L.), to S.-W. of house, 12 ft. at 3 ft. 4 ins. on W. N. W.; bole, 5 ft., increase 9 ins. in 11.2 years = .80 per annum, which seems to be a fair average rate. Hawthorn, *Crataegus Oxyacantha*, L., to S.-W. of house, 5 ft. 2¼ ins. at 3 ft.; bole, 5 ft. Report supplied by Mr. John Renwick.

HEADS OF AYR, 25th June, 1904. Mr. James Stark, conductor.—Leaving Ayr Station, the party took the tramcar to Burns's Cottage, then proceeded on foot by the road along the right

bank of the Doon, crossing that river near its mouth, and thence along the sands towards the Heads of Ayr. At low water, along this stretch of shore, the cement-stone division of the calciferous sandstones, which form the lowest story of the carboniferous formation, may be seen cropping out from under the sands, and dipping gently towards the north-east, so that lower and lower members of the series, to a thickness of many hundred feet, are crossed as we approach the "Heads." The first object of particular interest is the ruined fortalice of Greenan, perched on the edge of a tall escarpment of volcanic tuff, which in places appears to traverse, and in places to be interstratified with, the cement stones. Embedded in the tuff are numerous fragments, both of volcanic and of sedimentary rocks, which were ejected as bombs from the crater of some adjacent contemporary volcano, belonging to the same period of volcanic activity as that to which the bedded traps of the Campsie, Kilpatrick, and Renfrewshire hills are due. A short distance beyond Greenan a dolerite dyke, 25 to 30 feet thick, and probably of Tertiary age, crosses the shore. This dyke has brought up and enclosed within itself a mass of fine-grained shale, which is probably composed, like the famed Water of Ayr stones, of finely comminuted volcanic ash. The metamorphic action of the dyke has induced a beautiful spherulitic structure, in many parts of the shale of which some good specimens were obtained.

A mile beyond the dyke we come to the most northerly of the "Heads" of Ayr, a great mass of volcanic agglomerate, which has been scarped into tall sea cliffs and weathered into fantastic forms by the combined action of marine and aerial denudation, thus exposing the core of what must have been a great volcano, and probably that to which the tuffs of Greenan are due. On the shore in front of the cliffs the cement stones are found to be greatly disturbed and indurated by volcanic intrusions, while all round the "Head" the cement stones are seen to dip inward towards the agglomerate—a characteristic feature of stratified rocks in contact with a volcanic rent, which appears to be due to the contraction of the core in cooling, drawing the truncated edges of the strata downwards towards itself.

Beyond the "Head" is another stretch of sandy shore, in

which are embedded numerous travelled boulders, including many specimens of Highland schists and Galloway granite, indicating that in this neighbourhood the glaciers from the northern Highlands and the southern uplands met and strove for the mastery. Just beyond this point a stretch of upper old red sandstone forms a lofty range of sea cliffs, pierced by several fine caves at various levels, which were hollowed out by the sea, at various periods, previous to the later rises of the land in this part of Scotland.

But by this time the weather showed signs of breaking, and most of the party had had enough for the day, and so, leaving the shore, they climbed the Bracken Brae to the Girvan Road, along which they proceeded to Ayr.

AUCHENMADE, KILWINNING, 20th August, 1904. Mr. D. A. Boyd, conductor.—The property known as Auchenmade, now divided into about half-a-dozen separate holdings, is situated near the north-eastern boundary of Kilwinning, about four miles from the town. It extends to nearly 900 acres, of which about a third part is under moss. With reference to the probable derivation of the name, the late Mr. James Dobie, of Crummock, has suggested *Achadh-na-maid*, the field of sticks or timber, or perhaps *madadh*, a dog, wolf, or fox—either of which would be sufficiently descriptive of the locality. For there are indications here, as in many other parts of the country, that the ground was once covered with natural woods, which are now commemorated solely by the huge trunks of black oak occasionally exhumed from the depth of peat-mosses; and the dark recesses of these forests must doubtless have afforded a safe retreat to wild animals, such as wolves and foxes.\* The ancient woods, with their hordes of predaceous inhabitants, have long since disappeared, but the peat-mosses which have succeeded them still remain in sufficient number and extent to form one of the striking features of the district.

From an economic point of view these peat-bogs are interesting, as illustrating the process of evolution of fertile fields from

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\* *Cuninghame Topographized*, by Timothy Pont, A.M., 1604-1608, with Continuations and Illustrative Notices by the late James Dobie of Crummock, F.S.A.Scot.; edited by his son, John Shedden Dobie (1876), p. 50.

barren wastes. Along the margin of the moss the peat is cut, dried, and stacked for use as fuel in the adjoining farms. When the surface deposit has thus been removed, the soil beneath is gradually drained until it yields good meadow hay, after which it is suitably manured, ploughed, and sowed or planted with grass, corn, potatoes, or other crops. Where this process of reclamation is in progress, the peat-moss usually terminates abruptly in a cutting from four to seven feet in depth, while on the lower level close by, from which the peat has been removed, there is a sudden transition to conditions of fertility.

Some time was devoted by the party to an examination of the peat-mosses. Among the plants observed in the former locality were *Drosera rotundifolia*, L., remarkable for its abundance and large size; *Carex curta*, Good.; *Dicranella cerviculata*, Schp., with capsules; *Omphalia umbellifera*, L.; *Puccinia hydrocotyles*, Link., apparently unrecorded for Scotland, &c.

The most notable plants observed in the moss were *Rhynchospora alba*, Vahl., which occurred in unusual abundance, and *Vaccinium Oxycoccus*, L., which grew among *Sphagnum* in boggy places. On the roadside, near Auchintiber Moss, were found, *Sagina nodosa*, Fenzl., *Gentiana campestris*, L., and *Plantago maritima*, L., the last-named species occurring here at a height of about 300 feet above sea-level, and distance of about six miles from the sea-shore.

A short detour was made so as to enable the party to visit the remains of the ruined castle of Clonbeith, formerly the residence of a branch of the Cuninghame family, who are stated by Nisbet to have been descended from the noble house of Glencairn through the Cuninghames of Aiket.

From the roadside near Clonbeith a beautiful view was obtained, stretching over a wide expanse of fertile country, and extending to the bold headlands of the Carrick coast and distant mountains of Galloway. The party had tea at Kilwinning before returning to Glasgow.

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Excursions were also made during the session to Aikenhead, Ardgowan, Queen's Park, Botanic Gardens, Ben Lui, and the Marine Station, Millport, but nothing falls to be recorded regarding them.

## Proceedings of the Society.

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SESSION 1903-1904.

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29TH SEPTEMBER, 1903.

Mr. Peter Ewing, F.L.S., President, in the chair.

A report of the Society's excursion to Portincross, on 12th September, by Mr. D. A. Boyd, was read by Mr. John Renwick (see Vol. VII. (N.S.), Part I., p. 89).

Miss Wanda Zamorska exhibited *Genista anglica*, L., the Petty Whin, from Glen Clova, Forfarshire, and read notes on its discovery. Though not officially recorded for this district, it has been found on a previous occasion in Forfarshire. It was found only in one spot on the east side of Glen Clova.

Miss Zamorska also exhibited *Centaurea Calcitrapa*, L., the Star Thistle, and contributed descriptive notes. The plant is found occasionally in the south-east of England, in waste places and on roadsides, but most abundantly by the sea-shore. Its more northern limits are Norfolk, Cambridge, and South Wales, so that in Scotland it is evidently a stranger. The plant, however, was found on waste ground at Ruchill, apparently growing luxuriantly, but closer examination showed that, owing to our colder climate, the inflorescence was rudimentary and undeveloped.

On behalf of Dr. W. W. Fullarton, Mr. Alex. Sommerville, B.Sc., F.L.S., showed specimens of the Scaly Spleenwort, *Ceterach officinarum*, Willd. (= *Asplenium Ceterach*, L.), found by Mr. R. M'Whirter up the valley of the Tig, in the Parish of Ballantrae, at an elevation of 600 feet. The discovery re-establishes this fern as an Ayrshire plant.

Mrs. Peter Ewing exhibited *Saxifraga aizoides*, L., and contributed the following notes:—

“Synonymy—

*Saxifraga aizoides*, Linn.

*Saxifraga autumnalis*, Linn.

*Saxifraga atrorubens*, Bertoloni.

*Saxifraga crocea*, Haworth.

*Leptasea aizoides*, Haworth.

*Leptasea aizoides, crocea*, Haworth.

“The European Saxifrages are divided into no fewer than forty-two genera and one hundred and eighty species, besides which there are recognised by various authorities a multitude of sub-species and varieties. In view of the characteristics of their habitat, therefore, it is a little surprising, on inquiring more closely into the particulars of their distribution in three of the regions perhaps best known to botanists in Europe—namely, the Alps, Scandinavia, and our own country—to find that, out of these, only eighteen species, to which are added four varieties, should be found in Britain.

“*Saxifraga aizoides* is one which is common to all three regions, and is without doubt a true denizen of the mountains, its range being from beyond the North Cape to the Alps. It was first recorded for Britain in Ray’s *Catalogue* in 1753 as being found on the sides of Ingleborough Hill, Yorkshire, and also in Westmoreland. The plant is well known to all frequenters of our own hill districts, and my reason for exhibiting it is to show the three forms which it assumes in northern Scandinavia, as a sort of commentary on its synonymy. These three forms, which are to be seen everywhere—on the roadsides, on the rocks, on the river banks, and on the high mountains of the Dovrefjeld—are by Professor Blytt described as *Saxifraga aizoides typica, aurantia, and purpurea*. *Typica*, with corolla, anthers, and styles yellow, the petals having dusky spots; *aurantia*, dusky yellow with bright yellow spots, anthers and styles orange red; and *purpurea* with dark purple corolla. Blytt does not mention it, but many of the specimens of *purpurea* I have examined have also purple stamens. These were sometimes to be seen growing in separate clumps or cushions; sometimes *typica* and *aurantia* were to be found together as if in one clump; occasionally, but more seldom, *typica* and *purpurea*; not infrequently *aurantia* and *typica* were associated in the same way, and in some places the whole three were to be seen together. Now it is quite evident that a plant having three distinctly-

marked forms such as these, whose distribution extends over all the Arctic, Alpine, and sub-Alpine regions of Europe, and having at the same time so short a synonymy, must be a plant of very decided characteristics, and very distinct from the other members of its genus. It seems, indeed, as if we had here a distinct and pure species. The stem, leaves, and general mode of growth of the plant are to all appearance identical, but the differences between the three forms, though slight, are distinct and constant. The typical form with corolla, stamens, and styles golden yellow, and dusky dots on the petals—the form with which we are so familiar on our own hills—was named *aizoides* by Linnæus (*Species Plantarum*, 1st Edition, page 403); the second form Linnæus apparently did not notice, but it is so named in the *Flora Danica*, Table 72, and also in Fries' *Herbarium*, normal fascicula 14, n. 46. The third form was named by Linnæus *S. autumnalis*. Bertoloni gave to this form the name of *atrorubens*, under which name it appears in Bennett's *Flora of the Alps*, and Haworth gave to the second form the name of *crocea*. A curious point in the case is that Lightfoot describes the typical form under the name of *autumnalis*, though he must have been aware that the form described by Linnæus under that name was distinguished by having dark purple petals. I do not know whether this accounts for the note after Dr. Buchanan White's record of the plant in his *Flora of Perthshire* that 'most of our dried specimens are *S. autumnalis*,' but possibly it may be the origin of it."

Mr. R. S. Wishart, M.A., exhibited germinating spores of *Ustilago carbo*, Tul., *U. hypodytes*, Fr., on *Agropyron junceum*, Beauv., and plants infested by *Tubercinia trientalis*, B. and Br.

He also exhibited the mycelium of a fungus which appears to attack living *Lobelia* plants and to destroy them. The specimen was forwarded to Mr. Wishart from his brother, Mr. James Wishart, Nunhead, London. The main feature of interest in this exhibit was the fact that the mycelium of a fungus developed on a rotting piece of wood appears to have the power and the tendency to attack a living plant, even though the plant be at a considerable distance, and to effect its destruction.

Mr. Shearer exhibited the following plants:—*Genista anglica*, L.; *Vaccinium uliginosum*, L.; *Pyrola rotundifolia*, L., all from

Ballater; and *Genista tinctoria*, L., and *Ophioglossum vulgatum*, L., from Lepton, Yorkshire. A general discussion followed with reference to the finding of *Genista anglica* and *Ceterach officinarum* in fair quantities in localities hitherto officially unrecognised.

Mr. A. Somerville, B.Sc., F.L.S., handed over to the Librarian a number of pamphlets written by Dr. Ferguson of Kinnundy, which the author had kindly sent. These were chiefly from the *Transactions of the Buchan Field Club*.

Mr. William Rennie, 76 North Woodside Road, was elected an Ordinary Member.

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#### 27TH OCTOBER, 1903.

Mr. Peter Ewing, F.L.S., President, in the chair.

This was the Fifty-second Annual General Meeting of the Society. The Hon. Secretary read the

#### REPORT OF THE COUNCIL (1902-1903).

*Meetings.*—Eleven Ordinary Meetings were held during the Session, and one special lecture was delivered. The attendance at these meetings was very good, a decided improvement on what has been customary for several previous Sessions.

*Excursions.*—A programme of nine was carried out, the attendance at which was variable.

*British Association.*—The Society continues to be enrolled among the corresponding societies of the Association.

*Membership.*—The membership of the Society is as follows:—

Honorary Members, - - - - -	19
Corresponding Members, - - - - -	40
Life Members, - - - - -	24
Ordinary Members, - - - - -	249
	273
	332

During the Session five Members died (one of them a Corresponding Member), and ten Ordinary Members resigned. There were added in the usual way eighteen Ordinary Members.

*Associates.*—The number of Associates is thirteen.

*Finance.*—The Hon. Treasurer (Mr. John Renwick) submitted his Annual Statement of Accounts, duly audited. This was found to show a balance at the credit of the Ordinary Fund of £118 6s. 11d., and of the Life Members' Fund of £157 10s. (see page 211).

*Transactions.*—The Hon. Editor (Rev. G. A. F. Knight, M.A., F.R.S.E.) reported that Part III. of Volume VI. (New Series) of the *Transactions and Proceedings* of the Society was now entirely in the printer's hands, and would be issued at an early date to the Members.

*Library.*—The Hon. Librarian (Mr. James Mitchell) reported that the Members continued their interest in the Library. "For the past Session 230 volumes," he said, "have been issued, this number, however, being rather under the average of previous years. The numbers quoted do not include the monthly and quarterly Journals and Magazines which are circulated among the Members—a much valued privilege. The usual number of exchanges have been received during the Session, and in this connection an important addition to our list falls to be recorded, viz., the Scottish Arboricultural Society, who have favoured us with nearly a full set of their *Transactions*. Ten volumes have been presented to the Library by Members and friends, to whom our best thanks are due. Eleven volumes have been added by purchase. The foreign and Colonial publications received during the Session have been placed in the Mitchell Library as usual. Members are reminded that the publications housed there can be consulted or *borrowed* during the hours when the Library is open. The books in the Library of the Society are all in good condition. The *Transactions* and Magazines are all bound up to date."

The Reports were all unanimously approved of and adopted, and cordial thanks accorded to all the officials who during the year had carried on their special work in the interests of the Society.

The various vacancies on the Council were then filled up as follows:—

As Vice-President, Professor Malcolm Laurie, D.Sc., F.L.S., F.R.S.E.

As Members of Council, Messrs. J. Ballantyne, Robert Buchanan, Robert M'Lean, M.A., and Robert Garry.

As Joint-Secretary, Mr. Alex. Ross, 2 Kennyhill Gardens, Dennistoun.

On the motion of the President, the thanks of the Society were accorded to Mr. J. J. Robertson, on his retirement from the position of Joint-Secretary, which he had occupied for several years.

The previous Auditors were re-appointed, viz., Messrs. James Jack and Joseph Sommerville.

The following were elected Ordinary Members of the Society:—Mr. James H. Parker, 89 West Regent Street, and Mr. Angus Macleod, 2 Tantallon Terrace, Ibrox.

The President read a Report of his visit as the Delegate of the Society to the Meetings of the British Association, held at Southport this year. The Report was extremely interesting, and Mr. Ewing was cordially thanked for the way in which he had discharged his duties as the representative of the Society.

Mr. Alex. Somerville, B.Sc., F.L.S., exhibited *Festuca procumbens*, Kunth (*Schlerochloa*, Beauv., *Glyceria*, R. Br.), the Procumbent Fescue-grass from Gourdon, Kincardineshire coast. Its occurrence in this locality extends the range of the plant northwards.

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#### 17TH NOVEMBER, 1903.

The Third Meeting of the Session was held in the Botanical Institute at the University, by special invitation of Professor F. O. Bower, F.R.S. Mr. Peter Ewing, F.L.S., President, in the chair.

The Members and friends were kindly entertained to tea and coffee, and thereafter the various departments of the Institute were inspected under the guidance of Professor Bower, the different class-rooms, with their varied appliances and their interesting collections of specimens, exciting warm commendation for their completeness and convenience.

The Meeting proper took place in the Herbarium Room, which was filled with a large gathering.

Professor Bower exhibited the unique specimen of *Ophioglossum*

*simplex*, Ridley, a new species, which has no assimilating leaf subtending the spike. The plant came from Sumatra, and was found growing on the ground in dark wet forests.

Dr. Lang showed a prothallus of *Scolopendrium vulgare*, Symons, raised by the late Mr. E. J. Lowe, F.R.S., which had been sown 16 years before, and had produced numerous aposporous plants, which he at the same time exhibited. He also showed *Anthoceros punctatus* and *Pellia calycina*, from a potato-field near Bearsden, and from Castlebar, County Mayo, *Aneura incurvata*, Lindl.

Mr. D. T. Gwynne-Vaughan, M.A.(Cantab.), exhibited 20 species of Mycetozoa from this district, four of which were not reported in the British Association List. These were *Ceratiomyxa mucida*, Schr., from Strathblane; *Fuligo ochracea*, Peck, from Strathblane; *Hemitrichia rufiformis*, Lister, from Strathblane; and *Brefeldia maxima*, Rost., from Campsie Glen.

Professor Bower then gave an account, gathered from the University records, of Botanical enterprise in the College in the 18th century (see page 121).

Dr. Bower was most heartily thanked for his lecture, and for the hospitality extended to the Society by the University.

Mr. Peter Macnair, Art Galleries, Kelvingrove, was elected an Ordinary Member.

The following additions to the Library of the Society were announced:—*The Journal of the Linnean Society—Botany*, 17 vols., from Mr. A. Somerville, B.Sc., F.L.S.; *The Forester—a Practical Treatise on Trees*, by James Brown, from Mr. John Fleming; *The Study of Animal Life*, by J. Arthur Thomson, from Mr. James Mitchell; *Monograph of the Land and Fresh-water Mollusca of the British Isles*, by J. N. Taylor, Part 9; *Classification of the Animal Kingdom*, by H. A. Nicholson; *Invertebrate Zoology*, by H. S. Pratt; *The Sagacity and Morality of Plants*, by J. E. Taylor, by purchase.

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22ND DECEMBER, 1903.

Mr. Peter Ewing, F.L.S., President, in the chair.

On behalf of Mr. McCulloch, Mr. John Paterson exhibited a Grey Hen, assuming the plumage of the Blackcock (*Tetrao tetrix*,

Linnaeus), from Islay; also a Gadwall (*Anas strepera*, Linnaeus) from Eaglesham, the third occurrence in the "Clyde" area. Mr. Paterson also exhibited, on behalf of Mr. Charles Kirk, a Rough-legged Buzzard (*Buteo lagopus* (Gmelin)), and a female Hen-harrier (*Circus cyaneus* (Linnaeus)), both from the Tarff, Kirkcudbrightshire; a Great Snipe (*Gallinago major* (Gmelin)) from near Otter, Lochfyne; and a Dotterel (*Eudromius morinellus* (Linnaeus)) from Buckie. Mr. Paterson then showed a Ruby-crowned Wren (*Regulus calendula*), which came on board the Anchor Line s.s. Furnessia, on the 30th October last, in lat. 53·24 N., long. 30·15 W. Although in an exhausted state it survived until the following day. There is no properly authenticated instance of this American species having occurred in Britain, but the specimen exhibited had reached within five and six hundred miles of these shores before it succumbed.

Mr. Peter Macnair exhibited a specimen of Scorpion skin got from the lower coals and ironstones of Kelvingrove Park, showing spores and stigmata. In explanation of the specimen, he pointed out that the evidence of the existence of ancient land-surfaces in the carboniferous rocks round Glasgow is exceedingly common.

On behalf of Mr. James W. White, F.L.S., there was read by Mr. A. Somerville, B.Sc., F.L.S., a paper descriptive of the botany of the Balearic Isles—the result of a visit in April.

Messrs. Ed. H. Parker, 11 Strathmore Gardens, Hillhead, and D. A. Archie, 212 Argyle Street, were elected as Ordinary Members.

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#### 11TH JANUARY, 1904.

Mr. Peter Ewing, F.L.S., President, in the chair.

Mr. Goodchild, F.G.S., F.Z.S., delivered a lecture on "Scottish Rivers and River Gorges," illustrated by photographic slides.

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#### 26TH JANUARY, 1904.

Mr. Peter Ewing, F.L.S., President, in the chair.

Mr. Robert Buchanan exhibited eggs of the common Linicolæ.

Mr. John Paterson, on behalf of Mr. Chas. Kirk, exhibited a

Waxwing (*Ampelis garrulus*, Linnaeus), recently procured in Ayrshire.

Prof. Malcolm Laurie, B.A., D.Sc., Vice-President, delivered a lecture on "Scorpions, past and present."

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19TH FEBRUARY, 1904.

Mr. John Paterson, Vice-President, in the chair.

Mr. Robert Service read a paper on "The Sylviidae of Solway" (p. 137), which was followed by an animated discussion.

On behalf of the Rev. G. A. Frank Knight, M.A., F.R.S.E., Hon. Editor of *Transactions*, Mr. John Renwick laid on the table a copy of Part III. of Vol. VI. (New Series) of the *Transactions* of the Society.

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29TH MARCH, 1904.

Mr. John Paterson, Vice-President, in the chair.

Mr. Robert Dunlop exhibited a variety of objects, chiefly insects from New Zealand.

Mr. R. S. Wishart, M.A., exhibited many plants from the Island of Jersey.

Professor George Bell Todd, M.B., C.M., read some notes on Ankylostomiasis, or Miner's Worm Disease, and showed a series of lantern slides to illustrate his remarks. The disease is caused by a small round worm (*Ankylostoma duodenale*), which infests the small intestine and bores its way into the mucous membrane. The parasite gains access to the alimentary canal in drinking water, and there attains maturity in from five to six weeks. The disease has been spreading greatly on the Continent of Europe, especially in Germany, Belgium, and latterly in France, while an outbreak which has occurred in this country at the Dolcoath Mine, in Cornwall, has been the subject of an investigation by the Home Office, who have issued a report.

Mr. John Paterson exhibited, for Mr. M'Culloch, taxidermist, a rough-legged Buzzard (*Buteo lagopus* (Gmelin)) from Port of Monteith, a hen Pheasant (*Phasianus colchicus*, Linnaeus) from Campbeltown, assuming male plumage, and a Polecat (*Mustela putorius*, L.) from Ullapool, all recently received by Mr. M'Culloch for preservation.

26TH APRIL, 1904.

Mr. Peter Ewing, F.L.S., President, in the chair.

On behalf of the Rev. A. S. Wilson, M.A., B.Sc., Mr. John Renwick read a report on an excursion to Rosyth (p. 190).

Mr. Alex. Ross exhibited specimens of *Geranomyia unicolor*, Hal., and explained that this fly owes its position as a Scottish record to a single specimen taken at Holy Loch in 1897 by Mr. Robert Henderson. Mr. Ross found this tipulid to be very common at the Isle of Whithorn, Wigtownshire, in the summer of 1902.

The President (Mr. Ewing) exhibited *Sarracenia purpurea*, Linn., and described its anatomy and physiology.

Mr. R. S. Wishart, M.A., exhibited plants from Jersey.

Mr. R. Garry, B.Sc., gave details of methods for preparing microscopic slides of Spirogyra and other fresh-water Algæ, and illustrated his remarks by an exhibition of specimens. His methods were as follows:—Fresh material is fixed in a solution of Chromic Acid in water containing about .5% Chromic Acid, a few drops of Acetic Acid being added. After removal from the solution the material is washed in several changes of water, then stained and slowly dehydrated as follows:—The stained material is placed at the bottom of a narrow test tube, alcohol is carefully poured on the surface of the water, slow diffusion takes place, and in the course of twenty-four hours the material may be removed from the tube and treated with absolute alcohol without fear of distortion. The material is then cleared in oil of cloves, precautions being used to prevent violent diffusion currents. A small quantity of the clearing medium may then be placed in a test-tube, a little absolute alcohol poured on the surface of the cloves, and the material placed in alcohol. In a few hours the material will be found in the oil of cloves at the bottom of the tube in a suitable condition for mounting in balsam—a weak solution of balsam in xylol being used. Slides prepared in this way may be considered as permanent, and although the green colour is lost, suitable staining re-agents will demonstrate the various protoplasmic structures, such as nucleus, chloroplastid, pyrenoids, &c.

31ST MAY, 1904.

Mr. Peter Ewing, F.L.S., President, in the chair.

Mr. William Wordie, M.A., 42 Montgomerie Drive, Kelvin-side, was elected as an Ordinary Member.

Mr. D. A. Boyd reported on an excursion to West Kilbride (p. 190), also verbally on an excursion to Scalpsie Bay, from which locality he showed the Jew's-Ear Fungus (*Hirneola auricula-judæ*), peculiar leaves of *Senecio Jacobæa*, and a specimen of *Tortula ruraliformis*.

Mr. John Paterson exhibited for Mr. David Bruce a Pink-footed Goose (*Anser brachyrhynchus*, Baillon) from Halkirk parish, Caithness. Mr. Paterson also exhibited for Mr. Charles Kirk an albino Mole (♂) (*Talpa europæa*, L.) from Langbank (11th March, 1904), and a smoke-coloured example of the same species from Dumbartonshire (April, 1904).

Mr. Somerville, B.Sc., F.L.S., exhibited fresh specimens of *Saxifraga tridactylites*, L., sent by Dr. Gilmour from the Machrie Sands, Islay, where it is reported to be growing plentifully at present. This is said to be the second known record in the West of Scotland. Mr. Ewing showed, for comparison, *S. adscendens*, and at same time *P. grandiflora* and a variety of *Saxifraga umbrosa*, L., sent by Mr. West, F.L.S.

Mr. Laurence Watt read a paper on "The Heaths of Connemara, and Plants from County Galway," and exhibited many specimens collected on a visit in July, 1903, in illustration of his remarks. Speaking of the heaths he said, "Here then at Craggymore we are gathering *Erica Mackaii*, Hook., and while doing so were very much struck with the appearance of *E. Tetralix*, Linn., between which and our own form there is a very considerable difference, principally in the long projecting style and the absence of the white hairs on the calyx and upper part of the stem. There is also a slight difference in the leaves. On some of the flowers of our form of *E. Tetralix*, Linn., the styles project, but not so uniformly as in the Connemara plant. The difference is more apparent when seen growing than in the dried state. If it is not *E. Stewartii*, Mr. Bennet says it is a near approach to it. *E. cinerea*, Linn., has also got the rose-coloured flowers of *E. Mackaii*, Hook., and has very glossy leaves and stems—it differs but little

from our own. In the smaller sheets of water called "Lakes," and thus distinguished from the Loughs or larger sheets, we saw *Cladium Jamaicense*, Crantz., and on the road, just after leaving the Fishery, patches of *Boretta Cantabrica*, O. Kuntze. St. Dabeoc's Heath (*Dabeocia polifolia*, Don) is well known to the natives but thought little about; however, to one who had never seen its long spikes of large and beautiful flowers projecting far above the sheltering whin, the sight came as a delightful surprise. *E. Mackaii*, Hook., is confined to a few yards, but *Dabeocia polifolia* covers as many miles, not in breadth, but in length. *E. mediterranea*, Linn., grows on the hill behind Roundstone, but it flowers in May, and so far as the country is concerned I would advise no one to go there. . . . There are lakes all around Clifden, but on the hills there are deep pools in which fine plants of *Eriocaulon septangulare*, With., are got, the deeper the water the larger the plant. . . . On the rocks south of Clifden we get *Saxifraga umbrosa*, Linn., and on the walls *Ceterach officinarum*, Willd., while on the old Galway road *Osmunda regalis*, Linn., is the common roadside fern. In a salt marsh at Galway I could not think where a strong pungent smell came from till I came on a large patch of *Coronopus didymus*, Sm. I have gathered it in "Clyde" as a rubbish-heap plant, where it had little or no smell, but here it is in its native soil, and you feel it in all its vigour. *C. Ruellii*, All., is also common. Proceeding up the River Corrib, I came across *Galium palustre*, Linn., a plant we don't often meet in "Clyde," as it is the var. *Witheringii* we mostly see. *Blackstonia perfoliata*, Huds., is common on the banks. The long spikes of *Scrophularia aquatica*, Linn., had a great appearance. There was a curious form of *Carex hirta*, Linn., and *C. filiformis*, Linn., was everywhere. I came across a curious umbellifer, which turned out to be *Apium nodiflorum*, Reichb. It was over three feet in height, and compared with our small plants which creep over the marshy bank these are giants. For the number and variety of plants a visit to Galway and Connemara is well repaid."

Mr. Robert Henderson read a paper on "Additions to the Records of Clyde Diptera" (see page 148).

Mr. James Whitton, Superintendent of Parks, Glasgow, submitted his "Meteorological Notes and Remarks upon the Weather during the year 1903, with its general effects upon Vegetation" (see page 154).

28TH JUNE, 1904.

Mr. Peter Ewing, F.L.S., President, in the chair.

Reports of excursions as follows were read:—(1) to Scalpsie Bay, Bute, by Mr. J. Ballantyne; (2) to Inverkip, &c., by Mr. John R. Lee; (3) to Castlemilk, by Mr. John Renwick (see page 193).

Mr. Alex. Ross exhibited two species of fly—*Sericomyia lappona*, L., from South Bar, Renfrew, and *S. borealis*, Fallen, the first not very common in our district.

Mr. John Renwick exhibited *Hyoscyamus niger*, L., from Greenan, Ayrshire.

Mr. Charles Kirk sent for exhibition a cream-coloured variety of the common snipe (*Gallinago caelestis* (Frenzel)) from Kilfinan, Loch Fyne.

Mr. P. Ewing, F.L.S., exhibited *Azalea procumbens*, Desv., and *Arabis petraea*, Lamk., from Ben Doirrean.

Mr. Alex. Ross, on behalf of Mr. Hugh Boyd Watt, read a paper on "The Land Mammals of the Clyde Faunal Area" (see page 170).

Mr. John Renwick intimated that Mrs. Paxton, Richardland, Kilmarnock, had presented to the Society, as a memorial of her husband, a set of lantern slides prepared by him, and illustrating Ayrshire Trees. Mr. Paxton, who joined this Society in 1895, died recently at Bournemouth. As a member of various philosophical, photographic, and natural history societies his expertness as a photographer brought him into prominence, and the excellence of his work in the illustration of trees, either as whole subjects or in such details as sprays, bark, is well known. A number of his pictures of the remarkable trees of Ayrshire has been reproduced in our *Transactions* and those of kindred societies. On the motion of the President (Mr. Ewing), it was agreed to send an expression of the sympathy of the Society in the great loss Mrs. Paxton had sustained in the death of her gifted husband, and to convey the thanks of the Society for her kind gift.

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30TH AUGUST, 1904.

Mr. Peter Ewing, F.L.S., President, in the chair.

Reports of excursions to the Heads of Ayr, Auchemnade, and

Ardgowan were submitted by Messrs. Jas. Stark, D. A. Boyd, and John Cairns, Jun. (see pp. 192-196). In connection with the report of the Auchentibber excursion, Mr. Boyd exhibited *Rhynchospira alba*, Vahl., collected in the moss at Auchentibber, where it was seen in unusual abundance.

Mr. John Robertson exhibited eggs of the Cuckoo, Thrushes, Chats, Warblers, and Doves of the Clyde area. Special notice was taken of the eggs of the three species of dove—*Columba palumbus*, Linnæus, *C. ænas*, Linnæus, and *C. livia*, Gmelin—as this was the first occasion on which the eggs of these species taken in the Clyde area had been seen together.

Miss Wanda Zamorska showed the popular Jumping Bean, *Carpocapsa saltitans*, and read a description of the fruit and larva contained therein.

Mr. John R. Lee exhibited *Webera Ludwigii*, Schp., from Ben Vane.

Mr. Robert Dunlop exhibited two Bats from New Zealand, the Long-tailed Bat (*Chalinolobus morio*) and the Short-tailed Bat (*Mystacops tuberculatus*). He gave a detailed account of both species, and pointed out that the former is still fairly plentiful, but is decreasing in number as the brush is cut down. The latter is very rare, and till the present has been found only at a few places on the coast of New Zealand.

Mr. Alex. Ross showed specimens of two species of Coleoptera *Strangalia quadrifasciata*, L., and *Cetonia floricola*, Herbst., taken by him at Tarbert, Loch Fyne, on 12th August, and both known to be very rare in "Clyde."

Mr. John Renwick then took the chair, and the President (Mr. Ewing) presented his report as Delegate to the British Association at Cambridge.

Volumes I. and II. of "*Katalog der Paläarktischen Dipteren*," and the Report of the British Association for 1903, were laid on the table.

ABSTRACT STATEMENT OF ACCOUNTS—SESSION 1902-1903.

1903—Aug. 31.			
By Rent and Attendance, . . . . .			£11 7 0
Postage, Stationery, &c., . . . . .			15 18 0
Printing Circulars, . . . . .			11 19 9
Lecture Expenses, . . . . .			0 18 8
Library—New Books, . . . . .	£8	1 5	
Insurance, . . . . .		0 12 0	
Postage, Stationery, &c., . . . . .		0 15 2	
Binding, 1901-2, £4 2s. 6d.;			
1902-3, £1 12s. 2d., . . . . .		5 14 8	
Locks and Keys for Cases, . . . . .		0 14 0	
			15 17 3
Donation to Marine Biological Association, . . . . .			1 1 0
Balance—Life Members' Fund,			
2½ per cent. Debentures of the			
Modern Permanent Building			
and Investment Society, Mel-			
bourne, . . . . .	£87	10 0	
Do., on loan at 4 per cent., *£70 0 0			157 10 0
Balance, Ordinary Fund,			
on loan at 4 %,*£17 0 0			
Balance, Ordinary Fund,			
in National Security			
Savings Bank, and			
in Treasurer's hand, 101 6 11		118 6 11	
			275 16 11
			£332 18 7

1902—Sept. 1.			
To Balance—Life Members' Fund, 2½ per cent.			
Debentures, . . . . .	£100	0 0	
Do., on loan at 4 per			
cent., . . . . .	47	0 0	
	£147	0 0	
Ordinary Fund,			
on loan, £40 0 0			
Do., in Bank,			
and in			
Treasurer's			
hand, . . . . .	96	12 6	
			£243 12 6
1903—Aug. 31.			
To 2 Life Members' Subscriptions, at £5 5s.,			10 10 0
158 Members' Annual Subscriptions, at 7s. 6d.,			59 5 0
22 Members' Arrears, . . . . .			9 0 0
8 Associates' Subscriptions, at 5s., . . . . .			2 0 0
Interest, . . . . .			7 8 7
Transactions sold, and Reprints, . . . . .			1 0 0
Donation to Illustration Fund, . . . . .			0 2 6
			£332 18 7

From Balance of £118 6s. 11d. fall to be deducted cost of Transactions for 1900-1901, for 1901-1902, and for 1902-1903.

\* On Security of Guaranteed Railway Stock.

GLASGOW, 21st October, 1903.—We have audited the above Accounts, compared same with relative Vouchers and Securities, and find them correct.

(Signed) JAMES JACK, }  
 JOSEPH SOMMERVILLE, } Auditors.

## Natural History Society of Glasgow.

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SESSION LIII.—1903-1904.

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### OFFICE-BEARERS:

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*President.*

PETER EWING, F.L.S., The Frond, Uddingston.

*Vice-Presidents.*

JOHN PATERSON, 82 Cumming Drive, Mount Florida.

THOMAS BEATH HENDERSON, M.D., 155 Bath Street.

MALCOLM LAURIE, M.A., D.Sc., Edinburgh.

*Hon. Secretaries.*

ROBERT BROWN, M.D., 1 Leslie Road, Pollokshields.

ALEXANDER ROSS, 2 Kennyhill Gardens, Dennistoun.

*Hon. Treasurer.*

JOHN RENWICK, 49 Jamaica Street.

*Hon. Librarian.*

JAMES MITCHELL, 222 Darnley Street, Pollokshields.

*Hon. Editor of Transactions.*

REV. G. A. FRANK KNIGHT, M.A., F.R.S.E., 9 St.  
Leonard's Bank, Perth.

*Members of Council.*

GEORGE HERRIOT.

J. J. ROBERTSON.

WILLIAM LEIGHTON.

J. BALLANTYNE.

JOHN ROBERTSON.

ROBT. BUCHANAN.

JAMES WHITTON.

ROBT. M'LEAN.

A. B. MOTHERWELL.

ROBT. GARRY.

J. W. REOCH.

JOHN CAIRNS, JUN.

*Auditors.*

JAMES JACK and JOSEPH SOMMERVILLE.

## LIST OF MEMBERS, 1904-5.

*HONORARY.*

1880. Professor Gustav Mayr, Haupt Strasse 75, Vienna.
1881. James Murie, M.D., LL.D., F.L.S., F.G.S., F.Z.S., Canvey Cottage, Leigh, Essex.
1884. David Sharp. M.B., C.M., Hon. M.A., F.R.S., F.L.S., F.Z.S., F.E.S., Hawthorndene, Hills Road, Cambridge.
1885. Sir John Murray. K.C.B., LL.D., D.Sc., Ph.D., F.R.S., F.R.S.E., F.L.S., F.G.S., F.R.G.S., F.S.A.Scot., Challenger Lodge, Wardie, Edinburgh.
1887. William Carruthers, F.R.S., F.R.S.E., F.L.S., F.G.S., 14 Vermont Road, Norwood, London, S.E.
1887. Sir Joseph Dalton Hooker, M.D., R.N., G.C.S.I., C.B., D.C.L., LL.D., F.R.S., F.L.S., F.G.S., F.R.G.S., etc., The Camp, Sunningdale, Berks.
1888. Rev. Canon A. M. Norman. M.A., D.C.L., F.R.S., F.L.S., The Red House, Berkhamstead, Herts.
1890. M. C. Cooke, M.A., LL.D., A.L.S., 83 Castle Road, Kentish Town, London, N.W.
1895. Professor John G. McKendrick, M.D., F.R.C.P.E., LL.D., F.R.S., F.R.S.E., The University, Glasgow.
1901. Sir Samuel Chisholm, Bart., LL.D., 20 Belhaven Terrace.
1901. Professor John Cleland, M.D., D.Sc., LL.D., F.R.S., The University, Glasgow.
1901. Professor J. W. H. Trail, M.A., M.D., F.R.S., F.L.S., the University of Aberdeen.
1901. J. A. Harvie-Brown, F.R.S.E., F.Z.S., M.B.O.U., Dunipace House, Larbert.
1901. Mrs. David Robertson, Fernbank, Millport.
1901. Mrs. Robert Gray, 59 George Street, Edinburgh.
1901. Andrew Carnegie, LL.D., Skibo Castle, Sutherlandshire.

*CORRESPONDING.*

1866. The Right Hon. The Earl of Haddington, F.S.A.Scot., Tynninghame, Prestonkirk.
1868. Rev. Paton J. Gloag, D.D., 28 Regent Terrace, Edinburgh.
1869. George Stewardson Brady, M.D., LL.D., F.R.S., C.M.Z.S., Mowbray Villa, Sunderland.

1869. Col. H. W. Feilden, R.A., C.M.Z.S., West House, Wells, Norfolk.
1869. Rev. John Fergusson, LL.D., The Manse, Fern, Brechin.
1871. Peter Cameron, F.E.S., Union Road, New Mills, Derbyshire.
1879. John Smith, Monkredding, Kilwinning.
1879. Thomas Scott, LL.D., F.L.S., F.R.Ph.S.E., Naturalist to the Fishery Board for Scotland, 3 Menzies Road, Torry, Aberdeen.
1884. W. Anderson Smith.
1885. J. T. Cunningham, B.A., Lecturer on Fishery Subjects, Penzance.
1885. John Rattray, M.A., B.Sc., F.R.S.E., Dunkeld.
1885. John R. Henderson, M.B., C.M., F.L.S., Professor of Biology, The Christian College, Madras.
1885. Frederick G. Pearcey, 43 Balcarres Street, Morningside, Edinburgh.
1885. James M'Andrew, 21 Gillespie Crescent, Edinburgh.
1887. Arthur Bennett, F.L.S., 5 Edridge Road, Croydon, Surrey.
1887. D'Arcy W. Thompson, C.B., B.A., F.R.S.E., F.L.S., Professor of Natural History in University College, Dundee.
1887. Rev. David Landsborough, LL.D., Cor.Mem.S.A.Scot., Kilmarnock.
1888. William Abbott Herdman, D.Sc., F.R.S., F.R.S.E., F.L.S., Professor of Natural History in University College, Liverpool.
1888. Edgar A. Smith, F.Z.S., British Museum (Natural History), Cromwell Road, London, S.W.
1888. William Carmichael M'Intosh, M.D., LL.D., F.R.S., F.R.S.E., F.L.S., L.R.C.S.E., C.M.Z.S., Professor of Natural History in the University of St. Andrews.
1888. George R. M. Murray, F.R.S., F.R.S.E., F.L.S., Keeper of the Botanical Collection, British Museum (Natural History), Cromwell Road, London, S.W.
1888. Edward Morell Holmes, F.L.S., F.R.H.S., Ruthven, Sevenoaks, Kent.
1888. William Phillips, F.L.S., Canonbury, Shrewsbury.
1888. Sir Thomas D. Gibson-Carmichael, Bart., M.A., F.L.S., Castlecraig, Dolphinton.

1889. James Edmund Harting, F.Z.S., M.B.O.U., Librarian and Assistant Secretary of the Linnean Society, Burlington House, Piccadilly, London, W.
1891. R. J. Harvey Gibson, M.A., F.R.S.E., F.L.S., Professor of Botany in University College, Liverpool.
1895. Robert Broom, M.D., B.Sc., South Africa.
1895. John T. Marshall, M.C.S., Sevenoaks, Torquay.
1895. Frederick J. Hanbury, F.L.S., F.E.S., 37 Lombard Street, London, E.C.
1895. Edward E. Prince, B.A., F.L.S., 206 O'Connor Street, Ottawa, Canada.
1896. Robert H. Read, M.B.O.U., 7 South Parade, Bedford Park, London, W.
1900. James Groves, F.L.S., 58 Jeffreys Road, Clapham Rise, London, S.W.
1900. William P. Hiern, M.A., F.R.S., F.L.S., Castle House, Barnstaple, Devonshire.
1900. Rev. Edward F. Linton, M.A., Edmondsham, Salisbury.
1900. Rev. Edward S. Marshall, M.A., F.L.S., West Monkton Rectory.
1900. Robert Lloyd Praeger, B.A., B.E., M.R.I.A., National Library of Ireland, Dublin.
1902. William West, F.L.S., Lecturer on Botany and Materia Medica in the Technical College, Bradford.

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ORDINARY.

\* *Life Members.*

1900. \*Allan, Claud A., 121 St. Vincent Street.
1903. Archie, D. A., 312 Argyle Street, Glasgow.
1880. Bain, Andrew, 17 Athole Gardens, Glasgow, and Glen Tower, Hunter's Quay.
1888. Baird, J. G. A., M.P., 168 West George Street.
1887. Balfour, D. D., Sheriff-Substitute of Lanarkshire, 6 High Windsor Terrace, Kelvinside.
1884. Ballantine, Matthew, 101 Buchanan Street.
1895. Ballantyne, J., Corporation Gasworks, Hamilton.
1882. Baxter, William R., 64 Great George Street, Hillhead.

1893. Beard, Miss M. S. M., 14 Ruthven Street, Hillhead.
1893. \*Bell, Sir James, Bart., of Montgreenan, by Kilmarnock.
1902. Bell, Philip Jerome, 11 Carnarvon Street.
1869. Bennett, Robert J., 50 Gordon Street.
1883. Bishop, Thomas G., Dalmore, Helensburgh.
1879. Black, Malcolm, M.B., C.M., 5 Canning Place.
1900. Blackie, Walter W., B.Sc., The Hill House, Helensburgh.
1902. Bles, Edward J., B.A., B.Sc., The University, Glasgow.
1885. Bower, Frederick O., M.A., D.Sc., F.R.S., F.R.S.E.,  
F.L.S., Regius Professor of Botany in the University of  
Glasgow, 1 St. John's Terrace, Hillhead.
1896. Bowie, William, 188 Comelypark Street.
1882. Boyd, D. A., Seamill, West Kilbride.
1879. Boyle, Thomas, care of J. C. Jackson, Inverach, Dryburgh  
Avenue, Rutherglen.
1895. Brown, Hugh, 9 Clairmont Gardens.
1894. Brown, Robert, M.D., 1 Leslie Road, Pollokshields, JOINT-  
HON. SECRETARY.
1900. \*Bruce, David, 18 Carrington Street.
1899. Bryce, Thos. H., M.A., M.B., C.M., F.R.S.E., Queen  
Margaret College, University of Glasgow.
1901. Buchanan, Keith, Fairholm, Giffnock.
1901. Buchanan, Robt. M., Fairholm, Giffnock.
1902. Buchanan, Walter, Dunclutha, Tollcross.
1895. Burnett, George, 65 Camperdown Road, Scotstoun.
1897. Cadell, George Allan, C.A., 116 St. Vincent Street.
1887. Cairns, John, jun., 151 Renfrew Street, VICE-PRESIDENT.
1870. Campbell, J. M., F.Z.S., F.R.S.G.S., 6 Franklin Terrace.
1893. Campbell, William, 1 Seafield Cottages, Jordanhill.
1902. \*Coates, Henry, F.R.S.E., Pitcullen House, Perth.
1887. Colquhoun, Sir James, of Luss and Colquhoun, Bart.,  
Dunclutha, Ore, Hastings.
1888. \*Craig, William, M.D., F.R.C.S.E., F.R.S.E., 71 Bruntsfield  
Place, Edinburgh.
1888. Crichton, Mrs. George, 8 Montgomerie Crescent, Kelvinside.
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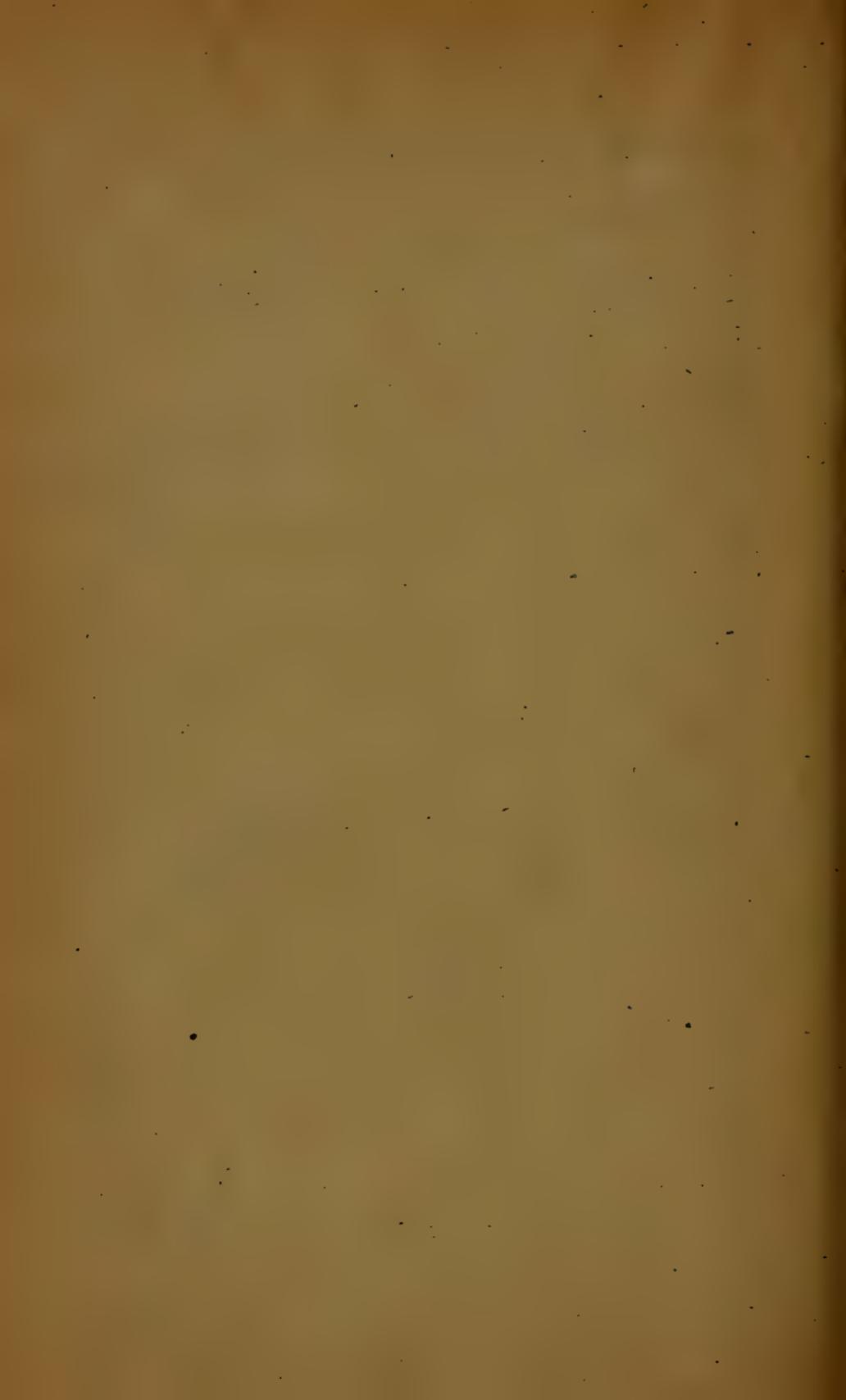
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TRANSACTIONS  
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Natural History Society of Glasgow.

**An Ecological Problem.**

By PETER EWING, F.L.S.

[Read 27th September, 1904.]

As something is expected from the President at the opening of the session, I wish to ask your attention for a short time to one of those ecological problems which are now exciting the curiosity of botanists, namely, the relation between alpine plants and the rocks on which we find them.

We talk of plants being found on the mountain limestone, on the trap rocks, on the granite, and on the schists. The question we wish to discuss is this, "Are any of the plants we term alpine confined to any one of these formations?" That involves our first agreeing as to what *are* alpine plants. For the present we will include what may be termed arctic species along with the alpine species, only remarking that we have a fairly large number of so-called arctic species in Scotland.

LIST OF THE SPECIES.

EXTREMELY RARE ARCTIC AND ALPINE PLANTS.

	Arctic.	Alpine.	Lavers.	
<i>Arabis alpina</i> , - -	x	x	—	Skye.
<i>Saxifraga cernua</i> , -	x	x	x	Ben Lavers.
<i>Bryanthus taxifolius</i> ,	x	—	—	Sow of Atholl.
<i>Carex ustulata</i> , -	x	—	—	Beinn Heasgarnich.

## VERY RARE ARCTIC AND ALPINE PLANTS

	Arctic.	Alpine.	Lawers.	Vice Cos.		Arctic.	Alpine.	Lawers.	Vice Cos.	
<i>Draba rupestris</i> , - -	x	—	x	5	<i>Myosotis alpestris</i> , - -	—	x	x	3	
<i>Cochlearia groenlandica</i> ,	x	—	x	6	<i>Pinguicula alpina</i> ,	—	x	—	3	
<i>Lychnis alpina</i> , - -	x	x	—	3	<i>Salix lanata</i> , - -	x	—	—	3	
<i>Arenaria sulcata</i> , - -	x	—	x	4	<i>Juncus alpinus</i> , - -	x	x	—	6	
<i>Arenaria norvegica</i> ,	-	x	—	2	<i>Salix reticulata</i> , - -	—	x	x	5	
<i>Sagina nivalis</i> , - -	—	x	x	2	<i>Juncus biglumis</i> , - -	x	—	x	3	
<i>Astragalus alpinus</i> ,	-	x	—	3	<i>Eriophorum alpinum</i> ,	-	x	—	3	
<i>Oxytropis campestris</i> ,	-	x	x	—	2	<i>Kobresia caricina</i> ,	—	x	x	4
<i>Lathyrus niger</i> , - -	x	x	—	2	<i>Carex rupestris</i> , - -	x	x	—	5	
<i>Saxifraga rivularis</i> ,	-	x	—	x	5	<i>Carex approximata</i> ,	—	x	—	4
<i>Saxifraga caespitosa</i> ,	-	x	—	x	4	<i>Carex alpina</i> , - -	x	—	—	3
<i>Erigeron alpinum</i> ,	-	x	x	x	3	<i>Carex rariflora</i> , - -	x	—	—	5
<i>Gnaphalium norvegicum</i> ,	x	—	—	2	<i>Luzula arcuata</i> , - -	x	—	—	6	
<i>Lactuca alpina</i> , - -	x	—	—	2	In all thirty-two plants, of which six are					
<i>Gentiana nivalis</i> , - -	—	x	x	2	Arctic-Alpine, - -	21	16	13		

It is a common belief that alpine plants will grow where montane or littoral plants could not exist for the cold, and general appearances favour this idea. For instance, when we explore an extensive tract of country in the north of Europe, or very high mountains in any part of the world, we find, as we ascend, that the temperature falls and the aspect of the vegetation changes, so that those plants found near the perpetual snow in India have a close resemblance to those found near the perpetual snows in the arctic regions, and this is so markedly seen with certain trees and shrubs that they form what are termed belts, such as the "Pine Belt," the "Birch Belt," and the "Willow Belt," and lend a very characteristic feature to the landscape when viewed from a distance. We have this now only in a very limited degree in Scotland, so limited, in fact, that it is almost

impossible to define it, although the tree remains in our bogs show conclusively that at one period of our country's history it was as distinctly marked as it is at the present time in Scandinavia. In Norway we find appearances of the same change, for at the base of its mountains, whose tops are covered with perpetual snow, *Taraxacum Dens-leonis* and *Mulgedium alpinum* grow side by side, showing that even there it is possible for what we may consider littoral plants to grow and reproduce their species at high altitudes while we never find the converse. There is no doubt that some plants are washed down the mountains with the torrents and appear to flourish, as on the shores of Loch Tay, but they never seem to survive an open winter. In early spring these plants start into life, but as soon as they are confronted by the cold winds of March and April, they quickly become exhausted, and, having already spent most of their available energy, are unable to continue their precarious existence; yet we see in some halophytic plants that very little protection is required. The salt-laden atmosphere in the case of the sea-pink or scurvy grass can be compensated under the zerophytic conditions of an alpine situation by the presence of the snow, or even shelter from the easterly winds in our gardens. In the case of the arctic plants, for protection the flowers expand as the stem rises above the leaves, and seems to go on rising until the seed is ripe or growth stopped. The plant may even flower one year and ripen its seed the next. In all plants the same thing is seen, but not to such a marked extent with us. This peculiarity may be observed in the Coltsfoot (*Tussilago Farfara*), its early flowering causing it to act during the arctic weather exactly as if it were an arctic plant, which I have no doubt it really is.

Suppose we take Ben Lawers as a basis for the observation of these arctic-alpine plants. We find that of the above list thirteen are found on its sides. If we refer to the geological map we discover that the rocks, on which the majority of these plants are found, are termed phyllite schists, and, if we run our eye along this formation as shaded on the map, we find that on many of the mountains in Glen Lochay and Glen Dochart up to Beinn Laoigh, this is the rock which forms the substratum for these plants whenever they occur in the district, in fact, so much do they seem to be confined to this formation, that one would be

inclined to conclude that there was some deep-seated affinity between them. But, just as we find *Eryngium maritimum* a purely silica plant, growing, and to all appearances, thriving in heavy soil without the influence of the sea, so it is with the alpine plants, given the necessary conditions as to the situation and moisture. Let it be granted that certain plants require certain constituents for the building up of their tissues, and these they extract from the decomposing rocks. Were we to assert that the component parts for certain plants can only be got from decomposing phyllite schists, then it follows that when there are no such rocks we could not expect to find such plants, and also that where such rocks exist such plants should be found freely distributed. This, it is well known, is not the case. Alpine plants are as local as littoral plants are, consequently we have rare and common alpine plants.

Take Ben Lawers and Beinn Laoigh, the mountains forming the extreme ends of this schistose belt which we are discussing. We find that there are seven of our rare alpine plants on Ben Lawers that are not found on Beinn Laoigh, and five on Beinn Laoigh that do not occur on Ben Lawers. Again, although all the alpine region of Ben Lawers is on the phyllite schists that is not the case with Beinn Laoigh; we note some alpine plants on the mica schist that are not found on the phyllite schist.

Some parts of the phyllites are very barren owing to the lack of moisture, and some parts of the mica schists are very rich owing to abundant moisture and shelter. In the corrie of Beinn Laoigh above the phyllites we find several arctic-alpine species, and *Arabis petraea*, a typical arctic plant, is found all over the mountain, on the phyllite, mica, and black schists, and on the basaltic and dioritic outcrops, here and on the islands of Mull and Skye, and although in other nineteen Watsonian Vice Counties it has not been observed further east on the phyllite belt. Then if we go to Beinn Heasgarnich we find *Carex ustulata* on the black schist, and not on the phyllite schist. It is well known that the range of mountains under review is all more or less schistose, and all the other outcropping rocks are so limited in extent that the decomposing schists would probably annul any effects they might have on the flora. Before comparing the flora of these rock formations with that of other rock formations, let us look a little

more closely at the floras of the different mountains of the range. On the rocks overlooking Lochan a' Chait, on Ben Lawers, we have the following very rare plants:—*Cochlearia grænlandica*, *Saxifraga rivularis*, *S. caespitosa*, *Myosotis alpestris*, *Salix reticulata*, *Juncus biglumis*, *Phleum alpinum*, *Woodsia hyperborea*, and *Cystopteris montana*; on the rocks of Meall Garbh, also overlooking Lochan a' Chait, we find these plants more numerous and to all appearance growing more luxuriantly, with the exception of *Saxifraga rivularis*, which, however, it must be admitted, does not seem at home on Ben Lawers—but then we have *Erophila inflata*, *Erigeron alpinum*, *Gentiana nivalis*, and *Kobresia caricina* in addition, and here we find also that form named *Cerastium trigynum* by the older botanists, and which has a very close resemblance to that plant. Then if we take the western side of Ben Lawers, we find at the head of the ravine a marked change in the general appearance of the flora at the same elevation. Here, we see, is the habitat proper of *Myosotis alpestris* and *Gentiana nivalis*. Looking more closely, we find *Arenaria sulcata* and *Sagina nivalis*, and although we miss nearly all the plants mentioned on the eastern side, to make up for this, as it were, we have all the rare cryptogams. Now, if we ascend the southern slope towards the Ordnance Ravine, we find *Loiseleuria procumbens*, a plant not found elsewhere on the mountain now, and in the ravine we come across *Draba rupestris*, the fast dying-out *Saxifraga cernua*, and a number of the rarer cryptogams, all upon the rocks having a western exposure, while the rocks of Beinn Ghlas on the other side of the western ravine, and likewise having a western exposure, are almost barren of alpine plants, none of those we have mentioned being found on them.

Coire Liath, Meall Corranaich, and Coire Odhar, all over 3,000 feet, and of the same rock formation, we pass as almost destitute of rare species, and take up Creag-an-Lochain, where we again meet with many of our rare forms, even at much lower levels than on Ben Lawers. *Woodsia hyperborea* is still to be found growing with *Geranium lucidum* under 2,000 feet, and more luxuriantly than on Ben Lawers. Among others, *Erophila inflata*, *Cochlearia grænlandica*, *Sagina nivalis*, *Juncus biglumis*, and *Phleum alpinum* occur, and now this point is the eastern limit of *Dryas octopetala* and *Juncus castaneus*. Meal nan Tarmachan is

comparatively poor, and we have to walk on to Cam Chreag before we again come to interesting plants. Here we find for the first time in some profusion *Dryas octopetala*, that plant which has been the guiding star of all botanists who have written of immigration. It is a purely and typically arctic plant, although it is found in Ireland and England as well as with us. There is a difference worthy of mention, however. In Scotland it seems to grow and hold its place as well as in Norway, but this cannot be said of the specimens I have seen from Ireland and England. Blytt speaks of it as growing on the mica and black schists in Norway. In England and Ireland it occurs on the mountain limestone, while in Scotland it seems to occur near to, if not on the mica schists and limestone outcrops.

It does not occur on the phylites, and where we saw it in Norway it seemed to be on clay slate, though from the appearance of the rocks, soil, and associated plants, I would say that the rocks contained a very large percentage of calcareous matter. Here again, for the second and last time, we come across *Gentiana nivalis*, and *Arenaria sulcata*, together with a few plants of *Sagina nivalis*, one small patch of *Cystopteris montana*, and all along the base of the detritus *Kobresia caricina* in some abundance. In the marshy places near the summit *Equisetum alpestre* finds its eastern limit. The large Coire of Fionn Lairige, once so richly clothed with alpine forms of *Hieracia*, is now almost barren, these having been cleaned out by a few rapacious collectors. On Creag na Caillich we again meet with some of the rare species. *Erophila inflata* is here in great plenty, two very fine patches of *Dryas octopetala*, small plants of *Sagina nivalis* are now and again met with, and many of the common alpine plants grow to great perfection. Beinn a' Bhuic is poor, Meall Dhuin Croisg has nothing to make it worth mentioning unless its patch of *Alsine verna*. Meall Ghaordie is another of our comparatively barren mountains, *Loiseluria procumbens*, *Carex rupestris*, and *Cystopteris montana* being the only plants worth noting. Meall Taurnie is interesting for its marsh plants, but few rare alpine flowering plants are found upon it; Creag nam Bodach has a very promising appearance, and here the Alpine Willows grow in great profusion, but again we look in vain for the rarer alpine flowering plants. The rocks and bogs at the

head of the Truchill and around the Lochans of Achlarich give much interesting material in forms of *Carex*, but few other flowers. Then we come to Beinn Heasgarnich, where, in its finely sheltered and well watered corrie, we have every right to expect a very fine collection of alpine plants, but except for that form like *Cerastium trigynum* and *Carex ustulata*, and some interesting Carices and grasses, this mountain is very poor in rare alpine plants. Meall Tionail offers no foothold for plants, but when we come to the corries of Creag Mhor, here again we find the rarer alpiners in great profusion, none, it is true, of those classed extremely rare, but many very rare forms notwithstanding. We miss *Draba rupestris*, *Arenaria sulcata*, *Saxifraga rivularis*, *Erigeron alpinus*, *Gentiana nivalis*, and *Myosotis alpestris*, but we have many others to take their places, which may still be found on Ben Lawers, though their situation is only known to a few, whereas on this mountain you cannot fail to find them. *Bartsia alpina* occurs here for the first time on this range. *Dryas octopetala* is plentiful, *Salix* is well represented, and many new forms met with here also for the first time on this range. *Woodsia hyperborea* and *Cystopteris montana* are common plants, carex and grass forms are abundant, and, owing to its difficulty of access, the *Hieracia* are still abundant on the rocks.

Suppose we take that chain of mountains lying between Glen Lochay and Glen Dochart, from Killin Hill to Beinn Chalum. On the rocks of Meall na Saone which are well watered, sheltered, and at a good elevation, we look in vain for the very rare species for which its corrie is noted. Here *Cystopteris montana* was first found by Donald Macgibbon, a Killin mason, and shown to the late Professor Balfour, but we have not seen even a frond of it on the range for years now, and feel confident it is extinct. A remnant of *Salix lanata* is still to be seen here, and here *Bartsia alpina* has its most easterly limit. The commoner alpine plants are plentiful, but, with the exception of *Hieracium holosericeum* and *Loiseleuria procumbens*, which are common all along the ridge, none is worthy of note. The same may be said of the fine rocks of Sgiath Chrom and the whole of the ridge east to Beinn Chalum. The marshes of which this tract is composed are very interesting, but, so far, I have discovered nothing of any consequence in the way of flowering plants. Beinn Chalum,

although a tempting mountain to look at, is also practically barren of the rarer alpine plants.

Now let us turn to the south side of the river Dochart, and examine that mountain which has always been considered barren, we mean Ben More, taking with it Am Binnein, as the two are really one. Here, again, although entirely clear of the *phylite schists*, we see in its flora but little difference from that of many mountains into which these schists largely enter; in fact, it is richer than some in the commoner alpine plants, but there is a decided falling off in rare species. On the mountains westward between this and those we have spoken of, we come across patches of alpine plants, but none of the rare forms until we reach Beinn Laoigh, a mountain that is in many respects much richer than Ben Lawers, although its flowering plants are not of the very rare class. Here we miss *Draba rupestris*, *Sagina nivalis*, *Arenaria sulcata*, *Saxifraga rivularis*, *S. cernua*, *Gentiana nivalis*, *Myosotis alpestris*, while *Arabis petraea*, *Dryas octopetala*, *Bartsia alpina*, *Juncus castaneus*, *Kobresia caricina*, and *Equisetum alpestre* are frequent. Here you see an erratic distribution of flowering plants in a comparatively small area, and if we had taken the rare cryptogams into consideration, we could have shown that they too have no fixed law of distribution.

In the tables given are four plants which have only been recorded from one locality in Britain *Arabis alpina*, an arctic-alpine plant, only found on the basalt in Skye, but on the granite, gneiss, syenite, and trap in other countries. *Saxifraga cernua*, another arctic-alpine plant, found only on the phylite schist of Ben Lawers, but not reported from schistose rocks in any other country in Europe. In the Dovrefjeld in Norway it grows by the road sides, on the margins of cultivated fields, and in situations similar to those in which we find *Saxifraga granulata* in our own country.

*Carex ustulata* is another arctic plant growing, not on the phylite schist, but on the black schists, of which there is none on Ben Lawers. Nyman in his "Conspectus Europea" mentions this plant from Lawers, but I am inclined to think that this is an error caused by the common expression "Scotch mountains," of the older botanists. It is also a common wayside plant on the Dovrefjeld. *Bryanthus taxifolius*, another arctic plant, is only

found on the quartzite schists in this country, but is a common plant in Scandinavia, and seen by myself on many different rock formations. Thus we find that so far as our extremely rare plants are concerned they are not confined to any one rock formation, and if we examine the list of what I have termed the *very* rare arctic or alpine plants, thirty-two of which occur in this country, we discover that only thirteen of them occur on Ben Lawers; in short, the wider we make the range the more varied do the soils on which the plants grow become.

In view of these facts I think there is some reason for doubting that any one rock formation has much influence in determining what plants will grow on it. That plants appear to grow better on some rock formations than on others, is not to be denied. But that chemicals set free by the decomposing rock is the sole cause of this is very questionable. The pockets formed by some of these laminated and contorted schists provide a good foothold for plants, and that this is an important factor cannot be gainsaid, and also that the disintegrating rock which fills these pockets forms a suitable nidus for the plants is undeniable—the mica on the roots of all our alpine plants in Herbaria proves this; but again if this disintegrated rock were better adapted than other rocks for the propagation of alpine plants it should be shown on the detritus. Let us consider the detritus of Ben Lawers where it is composed of phyllite schist; that of Creag-na-Caillich where it is quite apparent that a fair proportion of lime is mixed with the soil; that of Ben More where we have pure black schist, and that of Beinn Laoigh where we have black and phyllite schists. In all these cases the detritus is at an elevation of from 2,000 to 3,000 feet, and we find only five plants, namely:—*Cerastium alpinum*, *Sagina Linnæi*, *Silene acaulis*, *Alchemilla alpina*, *Sibbaldia procumbens*, common to the four mountains. At first sight this looks as if the rock composition might be influencing distribution, but on looking a little closer into the matter, we see that all the plants found on the detritus of any of these mountains will be found on different parts of the different mountains with four exceptions, namely, *Sagina nivalis*, *Arenaria sulcata*, and *Myosotis alpestris* confined to Ben Lawers, and *Arabis petraea* confined to Beinn Laoigh. Now, it is quite evident that the xerophilous nature of some soils has a very great influence on

alpine plant life. The decomposing granite or the decomposing schists, especially those containing a large amount of mica, seem to resist the action of the sun's rays, as they appear to hold the moisture, and only admit of slow evaporation, consequently the temperature, although falling low, does not fall suddenly. Then another item to be considered is the fact that the moisture being so near the surface of this porous soil, when the temperature falls, dew will be formed much faster, thereby causing protection to the plants in modifying the effects of low temperatures. This is markedly seen in many plants when we compare the flora of the schists with those of the granites. Take *Saxifraga rivularis* for instance, on the schists of Lawers, or by the sides of the streams in the Dovrefjeld, in Norway, it attains only about one inch in height, while on the granite of Lochnagar it reaches the height of four or five inches. *Poa alpina* on the schists is found as a rule in single plants, while on the granites it is found in tufts, but in these cases the method of decomposition appears to have much greater influence than the chemical constituents of the rocks.

In spite of the efforts of many geologists and botanists too, to fix certain alpine plants to certain rock formations, these theories have never, in my opinion, been proved from actual alpine experience. Suppose the fine range of mountains under review had been composed of another formation, granite with limestone outcrops, for personal preference. I have no doubt that they would have been richer than they are in arctic or arctic-alpine plants. *Calluna vulgaris* grows luxuriantly on the sand by the sea shore near to fresh water, the nidus here being destitute of lime. *Sphagnum* grows to great perfection on the rocks overhanging the sea in some of our Western Islands, where again no lime is present, and the same might also be said of *Vaccinium myrtillus*, *Sarothamnus scoparius*, *Rumex acetosella*, and *Digitalis purpurea*. If traces of lime are to be found, they are very weak. Again *Helianthemum vulgare* and *Anthyllis vulneraria* will only grow where there is a strong percentage of lime, and all over the tract of country we have been speaking of, the bracken seems to grow whenever we can trace lime in the soil. No so-called limestone plants are found on the limestone in Cornwall. But this only goes to prove that the difference between a limestone flora and a silica flora is not so great as the difference between a halophytic

and a non-halophytic flora. There is no doubt that much good work could be done for œcology by a chemical analysis of the rocks. Even the number of species might possibly be reduced if we had this; for we know that certain plants having been changed to distinctly different soils, have varied so much as to be raised to specific rank. For instance, *Adiantum nigrum* on the serpentine outcrop in Glen Lochay becomes the form *Serpentini*. *Asplenium viride* also changes, possibly owing to this rock containing silicate of magnesium. Then we have also *Cochlearia micacea*, an alpine form raised to specific rank because varying when found on mica schist; also *Erophila inflata*, found on the phyllite schist, its variation possibly owing to these rocks containing a large percentage of alumina.

I have always believed that lime plays a very important part in plant life, in fact, in my opinion, it is just as important as it is in animal life, and the more œcological information I acquire, the more confirmed am I in this conviction. There are plants that grow well on pure silica, and plants that do well on pure limestone, but the fact still remains that the varied conditions as to water, heat, light, and atmospheric pressure govern the distribution.

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## On the Occurrence of Conodonts in the Arenig-Llandeilo Formations of the Southern Uplands of Scotland.

By JOHN SMITH.

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[Read 25th October, 1904.]

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AFTER the splendid work done by Prof. Lapworth and the officers of the Geological Survey, Messrs. Peach, Horne, and Macconochie, in the Southern Uplands, the very thought of adding a single new organism to the already large lists prepared by these gentlemen might seem to be presumptuous, and in the summer and autumn of 1903, when I took a look round amongst the hills, it was not with the intention of collecting

fossils nor adding a single stroke to the picture furnished to us by the geologists named. However, "instincts will out," and one day, in passing up the Cleuch (the second one on the right side of the head of the Snar Valley) that comes down from Hunt Law, I came in face of a small cliff of radiolarian chert, the bands of which had been slightly parted asunder by the frost. The thin layers of shale between the chert could be picked out by the fingers, and, as they seemed to have been prepared by Nature for microscopical examination, I took a few, and, after washing and preparing them, I found on their surfaces abundance of Conodonts. There would be about one to every square inch of surface, sometimes as many as three on that area of the shale, which could be easily split into laminæ a sixteenth of an inch thick, or even thinner. I was now in an assured position to carry out an extensive microscopical examination of the chert-shales and other deposits of the Silurian Rocks of the South of Scotland, and with this object in view I spent a considerable time in collecting material.

The shales of the Silurian formations of the Southern Uplands and the Ayrshire coast sections (other than those intercalated in the chert beds), *with four exceptions*, to be referred to in the sequel, I found to be utterly devoid of Conodonts. These shales are of various shades of grey, green, and red, and few of the larger fossils occur in them. The presence of mica in them, after it reaches a certain proportion, seems to have been inimical to life or to fossil preservation. Even in the black shales, which often contain abundance of Graptolites and hingeless Brachiopods, I found no Conodonts, and some of them are pretty fine grained.

The exceptions already referred to are, first, a bed of shale which occurs close to a chert-shale bed, and contains abundance of Conodonts, occasional Graptolites, and hingeless Brachiopods. The mica in this shale is abundant, but in minute white scales, and from what I have seen of other shales I think I may safely say that, had the particles of mica been a little larger, this bed would also have been without Conodonts.

The second is the thick bed of Indian-red Arenig Shale well seen at several places in the Southern Uplands. I first made my acquaintance with it at Morroch Bay, on the west coast of the Mull of Galloway, where a complete exposure of a thick bed

of it is kept bare by the waves. In my examination of the specimens carried off I found no Conodonts.

At Fardingmulloch, four miles south-east of Sanquhar, there is a good, although partial, exposure of red Arenig shale, and in some of the specimens I selected for microscopic examination I found abundance of Conodonts. This induced me to make a re-examination of the Morroch Bay red shale, and for this purpose I collected samples from every foot of the shales—sixty-six in all. In this large examination I only procured some five Conodonts—four of them having been got at the thirty-fourth foot from the south side of the bed. The red shales here are in a vertical position and in excellent preservation for examining microscopically, splitting easily into thin laminæ.\*

The abundance of Conodonts in parts at least of the Fardingmulloch bed, and their extreme rarity in the Morroch Bay one, raises the question, Do the exposures at these two localities belong to the same period of deposition? In such "fankled" strata as the Silurian Uplands display, this is a question that cannot with any degree of confidence be answered. The best that can be done in the circumstances is simply to say that at both places graptolite shale of undoubted Llandeilo Age occurs not far from the red beds.

The third and fourth exceptions are the thick beds of pale-green Arenig shale which occur close on each side of the red shales already mentioned. From the lower bed I obtained a few Conodonts, from the upper one I did not get any; but the comparison is not a fair one, as in nearly all the samples—twenty-eight in number—I examined, the shales of the latter were very much slickensided by crushing, very few of the layers having escaped.

These Arenig shales, both red and green, are extremely fine-grained, mica being seldom seen in them, and where present on the slickensides it has evidently been developed by earth movements.

Besides Conodonts, these shales contain hingeless Brachiopods—at least the first one—Foraminifera, Sponge remains; Radio-

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\* These Arenig shales are sometimes called "mudstones," but I don't see the propriety of this term as applied to them.

larians, occasionally showing the double test, often abundant, and sometimes with the spines attached; and particles, some of them vesicular, and probably of both volcanic and cosmical origin, the vermilion specks abounding at parts, probably oxidised globules of meteoric iron, forming an exceedingly beautiful object for the microscope, and resembling, when spotted over the surface of a pale-green shale, a refined variety of a *verd antique*.

It has been suggested that these red and green shales were deposited in very deep parts of the oceans of Arenig time, and are represented at the present day by deposits of similar colour and fineness of material taking place in the deepest parts of the present oceans.

From the examination I have made I think the red shales have been deposited in the lowest depths. This is not made out by the microscope, but by logic, there being two beds of green shale to one of red. I take this to mean that when the ocean bed (by subsidence) had reached a certain depth—not by any means a given number of fathoms from the surface—green sediment was deposited; when it reached its greatest depth, red shale was laid down; when it again rose to its first depth, green shale was again accumulated. In one locality I examined there was a beautiful set of “passage beds,” reddish and greenish bands alternating for a few feet.

**RADIOLARIAN CHERT-SHALES.**—The Radiolarian chert-shales are exceedingly fine-grained, but even in this respect they vary, some of them containing a little mica, evidently derivative, and also occasionally mica which has apparently been developed in them by dynamic metamorphism since their formation, this having been brought about by pressure or squeezing when the strata were being turned up on edge, and abundance of minute irregular flakes may often be seen on slickensided surfaces, sometimes called *shorn* or *flaser* structure. The structure called *flaser und augen* is also commonly seen under the microscope in examining those shales, and has been caused by Radiolarians or other minute hard bodies which happened to be in a zone of shearing. More rarely one comes across perfect hexagons of secondary mica, in little clusters, the individual plates or crystals being sometimes as much as  $\frac{1}{4}$  of a mm. in size. The chert-shales also contain minute particles of magnetite, often congregated

into small clusters by mutual attraction, which may be of volcanic and cosmical origin. In some of them there are also perfect rhombs of a mineral which at first I took to be scales of some kind of animal, as they often show on the surfaces of the prepared shales as minute lozenge-shaped bodies. The largest measure about  $\cdot 2$  of a mm. in their greatest length, and some are exceedingly minute. They have evidently been developed in the shales since their deposition, and are probably crystals of calcite.

The great bulk of the material making up the chert-shales is composed of exceedingly minute particles of dust, and the ocean in which the cherts and their intercalated shales were deposited was evidently never discoloured by sediment unless by particles as minute and scarce as those which give the fine "sea-green" to the purest parts of the oceans of the present day. The shales merge into the chert-bands, and the latter, besides being crowded with Radiolarians, often contain a lot of dust, rarely small cubes of pyrite, more frequently minute rhombs of calcite, and are sometimes stained by carbon, manganese, and iron salts.

I made a pretty extensive microscopical examination of the chert-bands, to see if I could find Conodonts, but was successful in obtaining only two specimens. The Conodontians evidently did not agree with the Radiolarians, and had migrated to other parts of the ocean during the intervals of time when the latter held supreme sway.

From a study of the chert Radiolarians, Dr. Jennings Hinde thinks that they lived in water as deep as those of the present day do, viz., in an ocean over 12,000 feet in depth.\*

Since Silurian times the only Radiolarian beds known to geologists are those in the Devonian Rocks of New South Wales;† the Culm Strata of Devonshire, now supposed to be the deep ocean equivalents of the Mountain Limestone of England;‡ Mullen Island, off the western coast of the Lizard, age unknown;§ Port Darwin, Australia, age unknown;|| Bar-

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\* *Annals and Mag. Nat. Hist.*, July, 1890.

† *Quar. Jour. Geol. Soc.*, February, 1899.

‡ *Quar. Jour. Geol. Soc.*, 1895.

§ *Quar. Jour. Geol. Soc.*, May, 1893.

|| *Quar. Jour. Geol. Soc.*, May, 1893.

badoes and the Nicobar Islands—the Radiolarians in the deposits of which are so fresh as to resemble recent species, and are supposed to be of Tertiary age.

Not long ago it was thought that the rocks contained no organisms which had lived in great depths of ocean, and this led to the theory of the permanence of ocean basins during all geological time; but the finding of Radiolarians in four great systems—the Silurian, Devonian, Carboniferous, and Tertiary—has exploded that theory, and shown us how pliable the earth's crust has been in times even so recent as the Tertiary period.

So far as I know, no organisms but Radiolarians have been hitherto recorded from the Arenig-Llandeilo chert-shales. Some of these shales I found to be pretty free from Radiolarians, other parts were crowded with them, and some have carious hollows which very likely represent them. In fact, this is placed beyond conjecture when we find occasional spines springing from their sides, the double test often remaining.

In the list of Radiolarians from the Southern Uplands given by the officers of the Geological Survey,\* the species from the Arenig cherts have all been found in the Llandeilo cherts, so that the Radiolarians are useless as “zonal fossils.” It appears to be different, however, with the Conodonts, as, from an examination of about sixty bands of the shale between the chert-layers of Hunt Law Cleuch, I found Conodonts *in every* band. On the other hand, in the fine section in the bed of the Wanlock Water, seventeen yards north-west of the mouth of Rea Burn, I only got one Conodont, and it is different from all the rest I found. The shale here is of a fine fresh green colour, probably caused by silicate of iron. This was the only chert-shale in which I found hingeless Brachiopods; it is bounded on the north-west side by a bed of much-crushed black shale, and on the south-east by bluish shale, coarse-looking under the microscope, with much mica, and containing no fossils.

The fine cliff-section of chert-shale at Bennane Cave, north of Ballantrae, has some shale with similar physical properties and identical appearance under the microscope to the Wanlock Water chert-shale, and from it I was equally unsuccessful in finding

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\* *Geo. Sur. Mem. Silurian-Rocks of Britain (Scot.)*, page 667.

Conodonts; it is pretty much crushed, the chert bed here having been folded on itself. However, there was a sufficient quantity of good stuff to have shown Conodonts had they been present in anything like the number they are in the Hunt Law Cleuch bed and other exposures of the chert-shales.

I mention these instances to show, as I think, that the Conodonts will be useful as marking *zonal bands* of the Radiolarian chert-beds of the South of Scotland.

I need not give a detail of all the examinations I made. I may, however, say that the absence of Conodonts in some instances may have been due to the deformation the beds have undergone from pressure, but I was constantly being astonished to find Conodonts on strongly slickensided surfaces, where one would have expected that such delicate little things would have been brushed away by the differential movement of the rocks.

The present condition of most of the chert-shales is in a great measure due to weathering or rotting, and, of course, more or less to pressure. The Wanlock Water chert-shales are evidently fresh and solid; those in Windgatefoot Cleuch are dirty white, blotched with blue; those in Raven Gill are in colour and consistency not unlike gamboge, and break up when placed in water; Bennane Head has green, reddish, and grey shales; head of Shillen Glen, Wanlockhead, dirty yellow; head of Glenkip, Leadhills, cream coloured, and sometimes blotched with a fine red manganese bloom. In the mouth of the little valley between Wellgrain Dod and Wool Law, Leadhills, the shales are soldered to the chert, so that the bed here forms cliffs which break up by weathering into blocks of several feet in size. The shale is, however, so "shorn" that, after being prepared for the microscope, it shows few fresh surfaces, the fractures being mostly rusty joints. On the Glengonar slope of Waterhead Hill, near Leadhills, an almost continuous exposure of two hundred and thirty paces across the outcrop of the chert (enclosing a black shale band with flinty ribs) can be seen, and the chert here probably measures twice that thickness—this bed, in this locality, having been often folded on itself. The shale is yellow and grey, Conodonts being abundant at parts. The specimens, however, are not well preserved, owing to the folding and crushing the strata here have been subjected to. In Normangill

Burn, near Crawford, owing to rapid denudation, the chert-shale is of a fine fresh green colour, with very few Conodonts; but here one sometimes finds Radiolarians in it with the spines attached, and occasionally showing the double cancellated test. In the Hunt Law Cleuch the chert-shales are yellowish, greyish, and bluish, and, as already remarked, there are Conodonts in every layer, the chert bed here, although "erected" at right angles to its original position, having suffered very little from crushing. In the grey chert-shales of Fardingmulloch, Conodonts are common; in the green ones, very rare. In the grey shales the Radiolarians have sometimes the spines attached.

In the dark-grey chert-shales of Morroch Bay, south of Portpatrick, north and south sides, I obtained a few from the south bed and one from the north bed. The shales here sometimes show a tinge of green, and have occasional Radiolarians, with spines attached.

I could find no specimens in the chert-shale of the Spotfore Burn, a tributary of the Crawick Water, the shale being much crushed and containing an extra quantity of mica. Similar remarks apply to those of the Kiln Burn, another tributary of the "Crawk."

All the samples I brought from the Whing Burn, a tributary of the Euchan, near Sanquhar, were totally unfit for microscopic examination.

At the base of Arbory Hill, on the left bank of the little stream called Raggen Gill, a tributary of the Clyde, near Abington, I did not see any Conodonts in the chert-shale. Further up the gill than this exposure there is an immense quantity of chert—red, green, and grey—forming a talus-slope on the side of the glen, but only small knobs of the solid beds are exposed, and, as the shale when separated from the chert is soon reduced to clay by weathering, no material could be obtained here.

As to what Conodonts are, these Arenig-Llandeilo ones, I think, throw no further light on the subject. It has been conjectured that they may have been the teeth which armed the odontophores of naked gastropods. In recent gastropods the odontophores have generally three rows of teeth, the two outer being "rights and lefts," the central row consisting

of a toothed plate of equilateral symmetry. If Conodonts belonged to odontophores, we ought to find, I think, two of the former to one of the latter; but this is just what we do not find, as amongst all the specimens collected by me from the Arenig-Llandeilo chert-shales, and from the other shales mentioned, only one or two might be referred to the central row of an odontophore. From this little bit of negative evidence I think I am justified in rejecting the odontophore theory.

On searching the chert-shales I kept a sharp look-out to see if I could find any remains of *tracks* on the shales, but saw none, so that the Conodonts in all probability belonged to animals which were pelagic, or at least did not move on the bottom of the ocean.

I am inclined to agree with Pander, of Russia, in his original suggestion that Conodonts are the teeth of primitive fishes. The animals to which they belonged—whether fishes or not—appear to have had no other hard parts. This could not be made out from the Carboniferous specimens I collected,\* owing to the fact that a large quantity of the debris of small fishes is got with them; but in the Arenig-Llandeilo rocks of the Southern Uplands of Scotland they occur with only an occasional annelid jaw, and no other fossils likely to be taken for fish. Why they should be abundant in one bed of chert-shale and be all but absent from another is hard to understand.

In the Arenig-Llandeilo strata we may expect to find a great variety of Conodonts, for the animals to which they belonged appear to have had the waters of the old oceans of those times pretty much to themselves, and must have been in great abundance when some of the beds were being deposited.

Conodonts were discovered by Pander in the Cambro-Silurian rocks of the Baltic Provinces of Russia, and figured in his *Monograph* in 1856.

In 1878 I exhibited to this Society a large number of Conodonts collected by me from the Carboniferous strata of Scotland, but at that time no Scotch naturalist knew anything about them.

In 1879 Dr. G. Jennings Hinde gave a short history of

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\* *Trans. Nat. Hist. Soc. Glas.*, Vol. V. (N.S.), 1898-99.

Conodonts, with three plates of forms from the Cambro-Silurian and Devonian strata of the United States of America.\*

In the *Transactions* of this Society for 1898-99 (Vol. V., New Series) I figured some Conodonts found by me in the Carboniferous rocks of Scotland, with descriptions by Dr. G. J. Hinde (two plates).

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### DESCRIPTIONS OF THE ARENIG-LLANDEILO CONODONTS OF THE SOUTHERN UPLANDS OF SCOTLAND.

Figs. 17, 18, 19, Plate VI., may be parts of annelid jaws, but are evidently referable to Pander's genera, *Machairodus* and *Drepanodus*.

The cross-bars on some of the teeth may have been caused by shrinkage cracks.

All the figures are enlarged 40 diameters, with the exception of Figs. 17 and 48, which are 20 diameters.

#### *Centroodus erectus*, new species.

On a simple straight or curved beam a number of teeth stand at right angles, but much wider apart than in Pander's *C. lineatus*; Plate V., Figs. 1, 2, 4, 5.

Localities.—Hunt Law Cleuch, Snar Water, near Wanlockhead, in chert-shale; Ravengill, in Glencaple, Abington, in shale next chert.

#### *Centroodus obliquus*, new species.

From a simple beam, straight teeth project at an oblique angle; Pl. V., Fig. 3.

Locality.—Hunt Law Cleuch, Snar Water, Wanlockhead; in chert-shale.

#### *Centroodus distans*, new species.

On a straight beam a few simple conical teeth stand at right angles and some distance apart; Pl. V., Fig. 7.

Locality.—Ravengill, in Glencaple, Abington; in shale next chert.

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\* *Quar. Jour. Geol. Soc.*, August, 1879.

*Polygnathus parvus*, new species.

From a curved beam six slightly curved teeth project; Pl. V., Fig. 6.

Locality.—Normangill, near Crawford; in chert-shale.

*Polygnathus minus*, new species.

From a curved beam a few curved teeth project; Pl. V., Fig. 8.

Locality.—Glencaple, near Abington; in chert.

*Polygnathus princeps*, Hinde.

On a straight or slightly curved beam a number (up to fourteen) of straight or slightly curved teeth project at a slightly oblique angle; Pl. V., Figs. 9, 10, 12, 13.

Locality.—Hunt Law Cleuch; in chert-shale. *Note.*—This species has been found in the Devonian rocks of North Evans, New York.

*Polygnathus curvatus*, new species.

From a straight beam seven curved teeth project, and are set wide apart, an extra long one being sub-central; Pl. V., Fig. 11.

Locality.—Hunt Law Cleuch, near Wanlockhead; in chert-shale.

*Polygnathus pauperatus*, new species.

From a short beam a few irregularly set teeth project; Pl. V., Fig. 14.

Locality.—Hunt Law Cleuch, near Wanlockhead; in chert-shale.

*Polygnathus dubius*, Hinde.

From a nearly straight beam thirteen teeth project at an oblique angle, the teeth being alternately large and small; Pl. V., Fig. 15.

Locality.—Hunt Law Cleuch, near Wanlockhead; in chert-shale.

*Note.*—This specimen is more than twice the size of Dr. Hinde's, but is much the same otherwise. This species has been found in the Devonian and Carboniferous rocks of North America.

*Polygnathus lanceolatus*, new species.

On a curved beam eight curved teeth project at an oblique angle, the sub-central one being large and with a sharp side; Pl. V., Fig. 16.

Locality.—Hunt Law Cleuch, near Wanlockhead; in chert-shale.

*Machairodia* \* *sulcata*, new species.

A stout curved tooth, with three furrows near the base and a sharp lateral edge; Pl. VI., Fig. 17.

Locality. — Ravengill, in Glencaple, Abington; in shale next chert.

*Machairodia rhombea*, Pander.

Strongly curved in lower part, and with a sharp edge along the greater part of the side; Pl. VI., Fig. 19.

Locality. — Ravengill, in Glencaple, Abington; in shale next chert.

*Drepanodus flexuosus*, Pander.

Strongly curved in lower part, more gently so next the point; Pl. VI., Fig. 18.

Locality.—Hunt Law Cleuch, near Wanlockhead; chert-shale.

*Note.*—The above two species have been found in the Palæozoic rocks of the Baltic Provinces of Russia.

*NEW GENUS, CORNURAMIA*, Smith.

In this genus there is a double-pointed, horn-like beam.

*Cornuramia monodonta*, new species.

From a regularly curved beam projects a single stout curved tooth, about equal in length to the beam; Pl. VI., Fig. 20.

Locality. — Ravengill, in Glencaple, Abington; in shale next chert.

*Cornuramia diplodonta*, new species.

From a double-curved beam, sharp pointed at both ends, project two sharp-pointed teeth, each about half the length of the beam; Pl. V., Fig. 25.

Locality.—Ravengill, in Glencaple, Abington; in shale next chert.

*NEW GENUS, PACHYSOMIA*, Smith.

Beam thick and curving, one extremity with a knob-like termination, other end sharp.

*Pachysomia wanlockensis*, new species.

From a strong beam twelve straight sharp teeth project; Pl. VI., Fig. 23.

Locality.—Bed of Wanlock Water, seventeen yards north-west of Rea Burn; in chert-shale.

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\* As Pander's generic name "*Machairodus*" was pre-occupied, I have slightly altered the word.

*NEW GENUS, SUBPRIONIODUS, Smith.*

This genus differs from *Prioniodus*, Pander, in that the spike at the end of the beam is sharp-pointed above the beam, but not below it.

*Subprioniodus paucidentatus*, new species.

The spike is longer and stronger than the beam, and extends only a short distance below it; the beam carries but one small tooth, distant from the spike; Pl. VI., Fig. 21.

Locality.—Hunt Law Cleuch, near Wanlockhead; in chert-shale.

*Subprioniodus furcatus*, new species.

This spike has a double curve, and extends slightly below the beam in its middle part. The beam is curved up into a long point, and carries two small teeth; Pl. VI., Fig. 22.

Locality.—Glencaple, Abington; in chert.

*Subprioniodus acutus*, new species.

From a slightly curved beam project sixteen slender, sharply pointed teeth of different sizes, getting gradually smaller towards the slender end of the beam. The spike is more than half the length of the beam; Pl. VI., Fig. 24.

Locality.—Head of Glenkip, in Leadhills, in chert-shale.

*Subprioniodus parvus*, new species.

The spike is more or less stout, and extends but a little below the beam. The beam is sharp-pointed, and carries three teeth; Pl. VII., Figs, 26, 28.

Locality.—Hunt Law Cleuch, near Wanlockhead; in chert-shale.

*Subprioniodus gibbosus*, new species.

The projection of the spike under the beam is considerably widened. The beam carries nine slightly curved and three straight, longer teeth; Pl. VII., Fig. 27.

Locality.—Hunt Law Cleuch, near Wanlockhead; in chert-shale.

*Subprioniodus lanceolatus*, new species.

This spike is carried slightly below the beam, and is slender and sharp. The beam carries three teeth placed at an oblique angle to it, and is extended at a slight angle into a long, lance-shaped point, with a sharp side; Pl. VII., Fig. 29.

Locality.—Cringcramp, near Crawford; in chert-shale.

*Subprioniodus obliquo-lanceolatus*, new species.

The much obliquely set spike projects but little below the beam. Half of the slightly curving beam next the spike carries five small curved teeth on its upper side, and one near the middle on its under side; Pl. VII., Fig. 30. The beam is projected into a long, slender point.

Locality.—Hunt Law Cleuch, near Wanlockhead; in chert-shale.

*Subprioniodus equalis*, new species.

A rather stout spike, nearly equal in length to the beam, projects under the latter for a short distance. The beam carries four obliquely set teeth. The spike has a sharp side, and so has the beam for a bit; Pl. VII., Fig. 31.

Locality. — Ravengill, in Glencaple, Abington; in shale, next chert.

*Subprioniodus peracutus*, new species.

The spike projects obliquely below the beam for about a third of its length. The beam carries fourteen teeth, the sixth one from the spike being twice as long as the rest; Pl. VII., Fig. 32.

Locality.—Hunt Law Cleuch, near Wanlockhead; in chert-shale.

*Subprioniodus acutus*, new species.

The spike projects slightly below the beam, and ends in a strong base. The beam is extra strong, and carries eight teeth, some of which are equal in length to the spike. The cross-bars shown on the teeth are probably shrinkage cracks; Pl. VII., Fig. 33.

Locality.—Head of Glenkip, Leadhills; in chert-shale.

*Subprioniodus huntlawensis*, new species.

The spike is about equal in length to the beam, and its projecting part under the beam is cleft at the end. The beam carries seven to eight straight or slightly curved teeth. Shrinkage cracks are strongly shown; Pl. VII., Figs. 34A, 34B.

Locality.—Hunt Law Cleuch, near Wanlockhead; in chert-shale.

*Subprioniodus cringcrampensis*, new species.

The spike is very short—not longer than several of the teeth. The curved beam carries thirteen curved teeth of irregular sizes; Pl. VII., Fig. 35.

Locality.—Cringcramp, near Crawford; in chert-shale.

*Prioniodus inflatus*, new species.

Spike obliquely set to the beam, and with a spur near the middle, the parts above and below the latter being of equal length. The beam carries a large number of short teeth, and at least five inflated ones are interspersed at about equal distances apart. The specimen is probably not complete; Pl. VIII., Fig. 36.

Locality.—Ravengill, in Glencaple, Abington; in shalenext chert.

*Prioniodus subcompactus*, new species.

Spike longer than the beam. Beam with four long teeth, three of them closely set together; Pl. VIII., Fig. 37.

Locality.—This minute species occurs in the shale next the chert in Ravengill, in Glencaple, Abington.

*Prioniodus equalis*, new species.

The spike is pretty obliquely set, extends as far below the beam as above it, and has two spurs at a short distance below the beam. The long, straight beam carries a large number of short teeth nearly all equal in size; Pl. VIII., Fig. 38. Fig. 39 is probably the same species, but wasted.

Locality.—Ravengill, in Glencaple, Abington; in shalenext chert.

*Prioniodus curvatus*, new species.

Spike, beam, and teeth all strongly curved; outside of the spike there is a small tooth; Pl. VIII., Fig. 40.

Locality.—Hunt Law Cleuch, near Wanlockhead; in chert-shale.

*Prioniodus Macconochii*, new species.

The spike is obliquely set, and extends as far below the beam as above it. On it there is a spur a short distance below the beam. The long, straight beam carries a large number of teeth—fifty to sixty—every third, fourth, or fifth one being much longer and stronger than the rest. On the underside of the beam, opposite the strong teeth, there are sometimes slight, rounded projections; Pl. VIII., Figs. 41, 42.

Locality.—Ravengill, in Glencaple, Abington; in shalenext chert.

I have much pleasure in dedicating this splendid species to Mr. A. Macconochie, of the Geological Survey, who, by his careful collecting of the fossils of the Southern Uplands of Scotland, has made it possible for the Surveyors to tabulate the older formations of the South of Scotland, and at the same time placed all

future geologists under a debt of gratitude by throwing so much light on a once very obscure big chapter in Scottish geology.

### PLATE IX.

#### *Subprioniodus subserratus*, new species.

The spike extends but a short way below the beam. Next it there are five saw-looking teeth. The beam is long and sharp-pointed, more than half of it being without teeth; Fig. 43.

Locality.—Fardingmulloch, near Sanquhar; in chert-shale.

#### *Subprioniodus distans*, new species.

In the beam there is a notch on the under side. The five curving teeth are placed somewhat apart, the last one being set very obliquely to the beam; Fig. 44.

Locality.—Fardingmulloch, near Sanquhar, in red Arenig shale.

#### *Subprioniodus acutus*, Smith.

Fig. 45. Compare this figure with Fig. 24, Pl. VI. Fig. 45 is from a specimen from Fardingmulloch, near Sanquhar, in chert-shale.

#### *Subprioniodus calcarus*, new species.

The spike extends a short distance below the beam, and on its under part has a small spur. The long spike carries four teeth set at a short distance apart; Fig. 46.

Locality.—Fardingmulloch, near Sanquhar; in chert-shale.

#### *Subprioniodus falcatus*, new species.

From about the middle the beam bends down a bit, and then sweeps up into the spike. It carries six small teeth in two groups of three each; Fig. 51.

Locality.—Morroch Bay; in red Arenig shale.

#### *Subprioniodus fardingensis*, new species.

The spike projects slightly below the beam. The beam is curved, and carries nine teeth—four next the spike being long, and four next the end of the beam short, there being a very long tooth close beside them; Fig. 47.

Locality.—Fardingmulloch, near Sanquhar, in red Arenig shale.

#### *Subprioniodus crassus*, new species.

A curved beam carries two stout teeth, the spike being also stout; Fig. 48.

Locality.—Fardingmulloch, near Sanquhar; in chert-shale.

*Cornaramia bicornua*, new species.

The under side of the beam has a double concave curve. The beam carries a strong tooth, which springs from its centre. Each horn of the beam has three and five small teeth respectively; Fig. 49.

Locality.—Fardingmulloch, near Sanquhar; in chert-shale.

*NEW GENUS, VALENTIA*, Smith.

From a deep, thin plate a few long, slender teeth spring.

*Valentia morrochensis*, new species.

From a deep, thin, tapering beam, five long, straight teeth spring at a slightly oblique angle; Fig. 50.

Locality.—Morroch Bay, south of Portpatrick; in green Arenig shale.

## EXPLANATION OF THE PLATES.

## PLATE V.

*Centroodus erectus*, Smith, new species, Figs. 1, 2, 4, 5, page 244. Hunt Law Cleuch and Ravengill.

*Centroodus obliquus*, Smith, new species, Fig. 3, page 244. Hunt Law Cleuch.

*Centroodus distans*, Smith, new species, Fig. 7, page 244. Ravengill.

*Polygnathus parvus*, Smith, new species, Fig. 6, page 245. Normangill.

*Polygnathus minus*, Smith, new species, Fig. 8, page 245. Glencaple.

*Polygnathus princeps*, Hinde, Figs. 9, 10, 12, 13, page 245. Hunt Law Cleuch.

*Polygnathus curvatus*, Smith, new species, Fig. 11, page 245. Hunt Law Cleuch.

*Polygnathus pauperatus*, Smith, new species, Fig. 14, page 245. Hunt Law Cleuch.

*Polygnathus dubius*, Hinde, Fig. 15, page 245. Hunt Law Cleuch.

*Polygnathus lanceolatus*, Smith, new species, Fig. 16, page 245. Hunt Law Cleuch.

## PLATE VI.

*Machairodia suicata*, Smith, new species, Fig. 17, page 246. Ravengill.

*Machairodia rhombea*, Pander, Fig. 19, page 246. Ravengill.

*Drepanodus flexuosus*, Pander, Fig. 18, page 246. Hunt Law Cleuch.

*Cornuramia monodonta*, Smith, new genus and new species, Fig. 20, page 246. Ravengill.

*Cornuramia diplodonta*, Smith, new species, Fig. 25, page 246. Ravengill.

*Pachysomia wanlockensis*, Smith, new genus and new species, Fig. 23, page 246. Wanlock Water.

*Subprioniodus paucidentatus*, Smith, new genus and new species, Fig. 21, page 247. Hunt Law Cleuch.

*Subprioniodus furcatus*, Smith, new species, Fig. 22, page 247. Glencaple.

*Subprioniodus acutus*, Smith, new species, Fig. 24, page 247. Glen Kip.

#### PLATE VII.

*Subprioniodus parvus*, Smith, new species, Figs. 26, 28, page 247. Hunt Law Cleuch.

*Subprioniodus gibbosus*, Smith, new species, Fig. 27, page 247. Hunt Law Cleuch.

*Subprioniodus lanceolatus*, Smith, new species, Fig. 29, page 247. Cringcramp.

*Subprioniodus obliquo-lanceolatus*, Smith, new species, Fig. 30, page 248. Hunt Law Cleuch.

*Subprioniodus equalis*, Smith, new species, Fig. 31, page 248. Ravengill.

*Subprioniodus peracutus*, Smith, new species, Fig. 32, page 248. Hunt Law Cleuch.

*Subprioniodus acutus*, Smith, new species, Fig. 33, page 248. Glen Kip.

*Subprioniodus huntlawensis*, Smith, new species, Figs. 34A, 34B, page 248. Hunt Law Cleuch.

*Subprioniodus cringcrampensis*, Smith, new species, Fig. 35, page 248. Cringcramp.

#### PLATE VIII.

*Prioniodus inflatus*, Smith, new species, Fig. 36, page 249. Ravengill.

*Prioniodus subcompactus*, Smith, new species, Fig. 37, page 249. Ravengill.

*Prioniodus equalis*, Smith, new species, Figs. 38, 39, page 249. Ravengill.

*Prioniodus curvatus*, Smith, new species, Fig. 40, page 249. Hunt Law Cleuch.

*Prioniodus Macconochii*, Smith, new species, Figs. 41, 42, page 249. Ravengill.

#### PLATE IX.

*Subprioniodus subserratus*, Smith, new species, Fig. 43, page 250. Fardingmulloch.

*Subprioniodus distans*, Smith, new species, Fig. 44, page 250. Fardingmulloch.

*Subprioniodus acutus*, Smith, Fig. 45, page 250. Fardingmulloch.

*Subprioniodus calcarus*, Smith, new species, Fig. 46, page 250. Fardingmulloch.

*Subprioniodus falcatus*, Smith, new species, Fig. 51, page 250. Morroch Bay.

*Subprioniodus fardingensis*, Smith, new species, Fig. 47, page 250. Fardingmulloch.

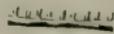
*Subprioniodus crassus*, Smith, new species, Fig. 48, page 251. Fardingmulloch.

*Cornaramia bicornua*, Smith, new species, Fig. 49, page 251. Fardingmulloch.

*Valentia morrochensis*, Smith, new species, Fig. 50, page 251. Morroch Bay.



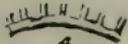
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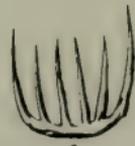
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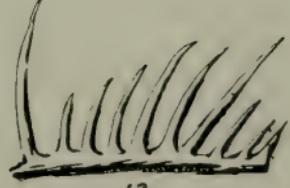
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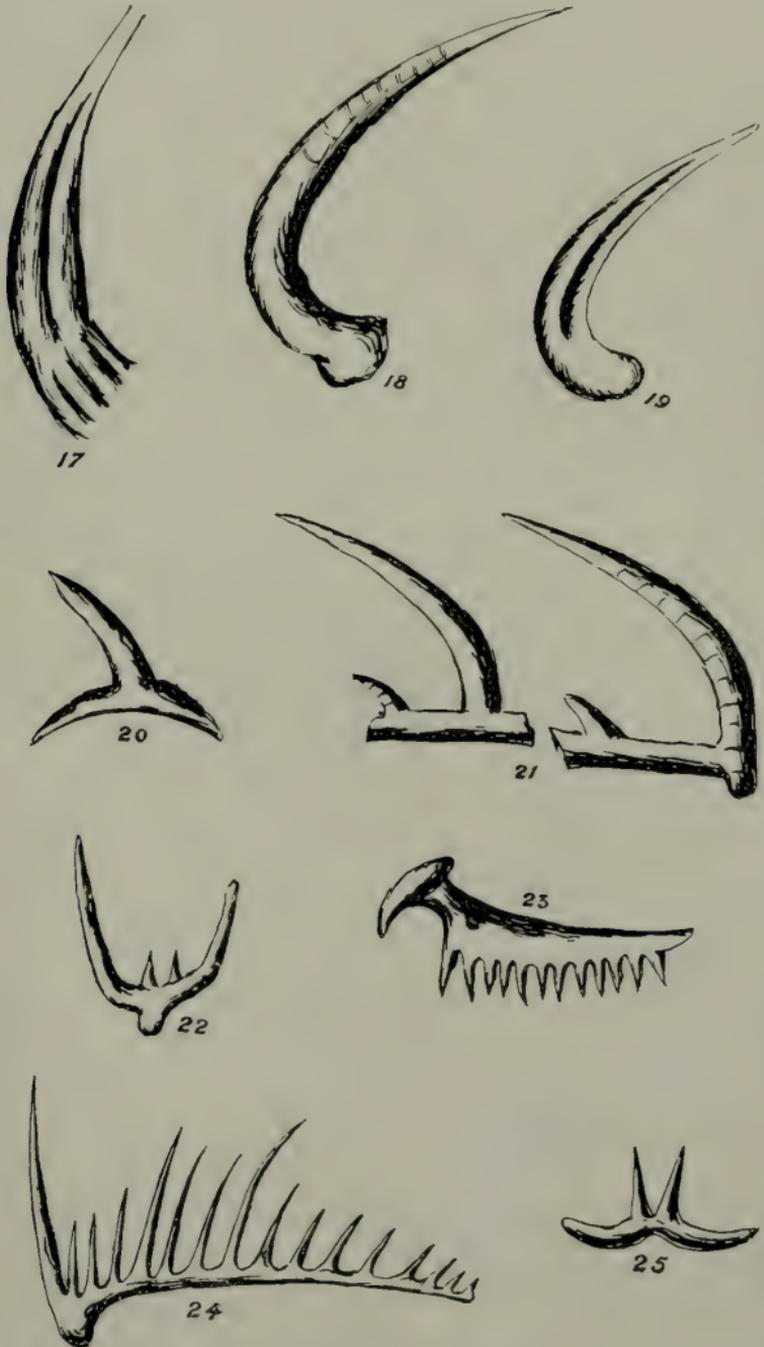
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16

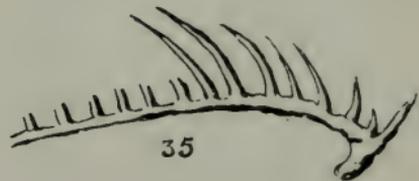
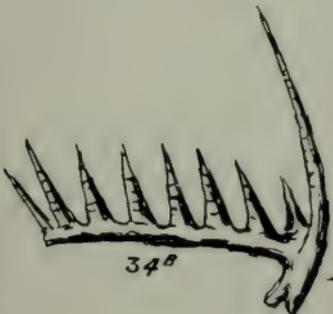
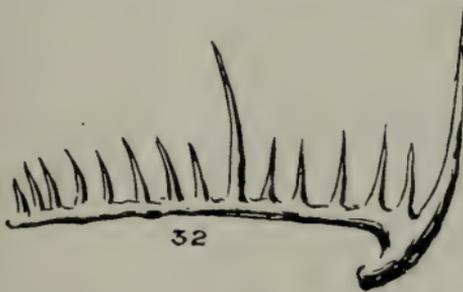
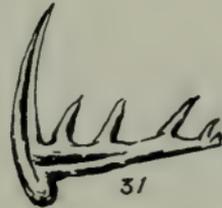
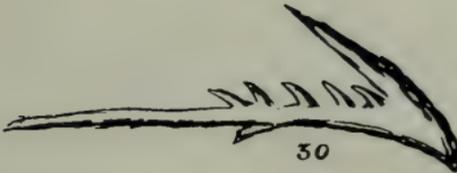
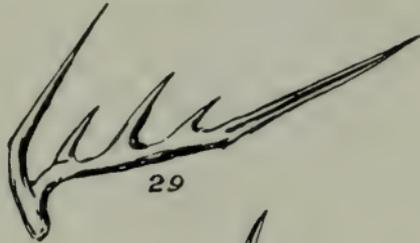
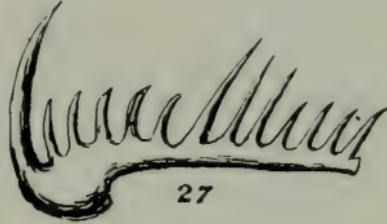
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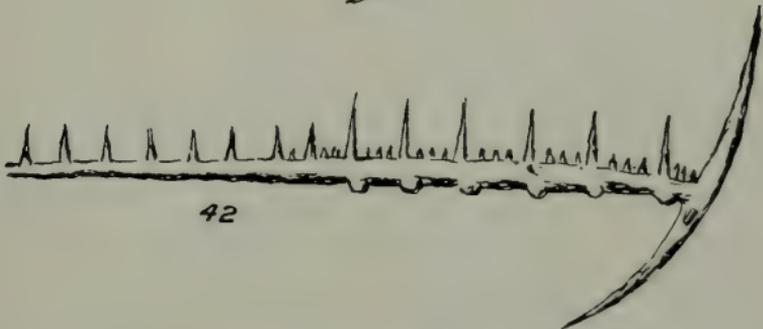
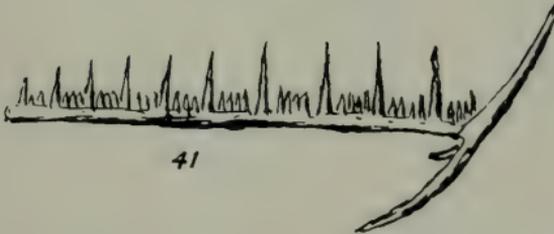
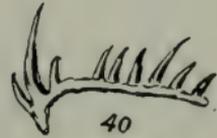
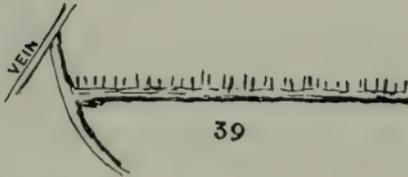
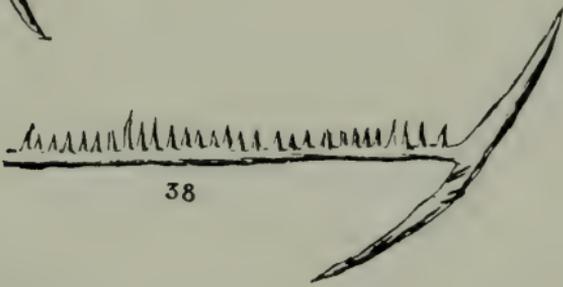
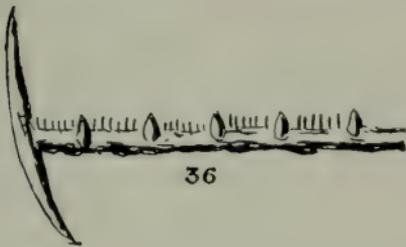
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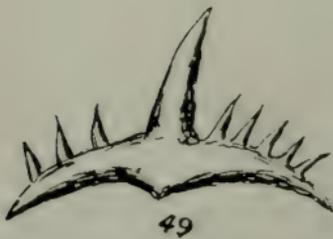
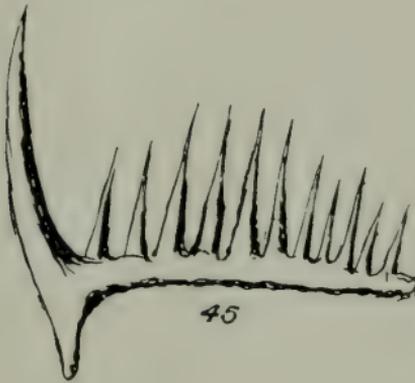
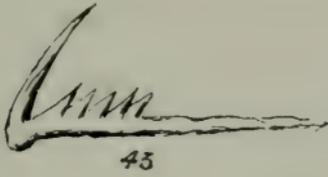
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Arenig-Llandeilo Conodonts.





Arenig-Llandeilo Conodonts.



## The Occurrence of Risso's Dolphin, *Grampus griseus*, Cuv., in the Forth.

By JAMES EGGLETON.

[Read 22nd December, 1904.]

ON 17th October last Mr. James M'Nie presented to the Kelvin-grove Museum, Glasgow, what he termed a rare "Blackfish," which I identified as the rare British species, *Grampus griseus*, or Risso's Dolphin or Grampus.

So far, the records of the occurrence of this cetacean from the British coasts are very few, and this, as far as I know, is only the second record of its occurrence along the eastern shores of Great Britain.

The first recorded British specimen was stranded near Puckaster, Isle of Wight, in 1843, the skull of which was presented to the British Museum by the Rev. C. Bury, who described the specimen in the *Zoologist* for 1845. On 28th February, 1870, a large female, 10 feet 6 inches in length, was captured in a mackerel net near Eddystone Lighthouse, the skin and skeleton of which are also preserved in the British Museum. It is figured and described by Professor Flower in the *Transactions of the Zoological Society* for 1871, and in the same paper is also figured and described a young female, 6 feet 1 inch in length, which had been sold, about a month after the one previously alluded to, in the fish market at Billingsgate. The exact locality where the last mentioned was taken could not be ascertained, but it was also probably caught in the Channel. Dr. Murie, in the *Journal of Anatomy and Physiology* (1870), has made some interesting notes on the visceral anatomy, as well as the external characters of this individual. According to Lydekker, in the *Royal Natural History*, Vol. III., other two

specimens are recorded from the English Channel. One of these was caught near Chichester in 1875, and was kept alive for a day in the Brighton Aquarium; while the other was captured in 1886, in the same manner and near the same locality as the first one already described by Professor Flower. In 1889 a shoal of some nine or ten was seen off Hillswick, Shetland, of which six—two males and four females—were captured by fishermen. The crania of four and the entire skeletons of two individuals were secured by Sir William Turner for the Anatomical Museum of the University of Edinburgh (*Proc. Roy. Phys. Soc. Edin.*, Vol. XI., pp. 192-197). In the *Annals of Scottish Natural History* for 1893, pp. 1-6, Mr. Robert Service describes two females taken from the Solway Firth. The first, 10 feet 3 inches in length, was found stranded, after the tide had ebbed, in a pool at a spot close to Battlehill, near Annan; the other, 8 feet long, was caught in the same manner at Carsethorn, about fourteen miles from Dumfries, the skeleton of which he procured for the Museum of Science and Art, Edinburgh, where it is now exhibited. In 1899 another was captured some miles to the east of the Isle of May by some fishermen, and the skull, which is also in the Edinburgh Museum of Science and Art, is described by Dr. Traquair (*Ann. Scot. Nat. His.*, 1899, pp. 1-3). Professor D'Arcy Thompson, in the *Annals and Magazine of Natural History* for June, 1901 (Vol. VII., No. 42, p. 503), in a "Note on a Dolphin showing Traces of an Encounter with a Cuttlefish," records the occurrence of a specimen which he had obtained from Galway at Christmas, 1900.

These are, so far as I have been able to learn, all the British specimens that have been recorded, and the one referred to by Professor Thompson is, as far as I know, the first record of this species from the Irish coast.

This species was first described in 1812 by Cuvier (*Ann. du Mus.*, XIX., 14), under the name of *Delphinus griseus*, from a drawing and the skeleton of a specimen taken at Brest. Since then other specimens have been recorded at different times from the French coast, the descriptions of which more or less differ in regard to the number of teeth and the colour of the animals. In 1822 Desmarest established another cetacean under the name of *Delphinus rissoanus* from a figure and description

forwarded to the Academy by M. Risso, of Nice.\* This species evidently was closely allied to Cuvier's *griseus*. Cuvier himself thought they might prove to be identical, and, more recently, M. Fischer, writing on the description of another specimen, stranded on the French coast, came to the conclusion that they were both the same†—a view which has been fully confirmed by Dr. Murie (*Jour. Anat. and Phys.*, 1870), and by Professor Flower in his paper in the *Transactions of the Zoological Society*, 1871, where he says, in reference to the descriptions and relations of these two species:—"But from the facts before us it is safer to conclude that we have here an example, very rare among mammals, of a species of variable and irregular coloration." Dr. Gray, in the *Annals and Magazine of Natural History*, 1846, changed Cuvier's specific name into *cuvieri*, on the ground that the animal was black, and not grey, but, as already stated, it will be seen that this Dolphin is one liable to a great amount of variation.

The specimen which I now describe—a female—had been observed swimming about the channel of the River Forth, off Kincardine, for over a fortnight, and on Saturday, 15th October, 1904, when the fishermen, who were using a sweep or trawl net, saw it near Inchbrake Light, they circled round it and brought it to the shore.

The following are a few of the measurements:—

	Feet.	Inches.
Total length in straight line, - - - -	9	8
Length from upper lip to blowhole, - - -	1	6½
Length from upper lip to dorsal-fin, - - -	4	4
Length from upper lip to flipper, - - - -	1	9½
From angle of mouth to eye, - - - - -	0	3
From point of upper lip to angle of mouth, -	0	11
Height of dorsal-fin, - - - - -	0	12
Length of dorsal-fin, - - - - -	1	7
Length of flippers, - - - - -	1	8
Width of flippers, - - - - -	0	6
Breadth of tail, - - - - -	1	10½

The general colour of the upper parts was dark bluish-black, becoming more or less black on the top of the head, and shading

\* Desmarest's *Mammalogie*, 1822.

† *Annales des Sciences Naturelles*, 1868, p. 363.

into a slate-grey and purplish colour on the sides of the body, but becoming darker towards the tail. The sides and fore part of the head were grey or of a dirty whitish colour, having a yellowish tinge, passing into almost pure white on the upper lip; the white of the upper lip, extending round the angle of the mouth, continued along the whole of the under-surface of the body, some parts having a creamy or yellowish tinge. The dorsal fin, flukes, and the flippers were also bluish-black, the last mentioned being whitish on the under sides. Along each side of the body, from near the eye to within about a foot from the tail, it was irregularly streaked and spotted with white, some of the streaks and spots being very indistinct. There was also a narrow white mark running up and down the right side of the dorsal fin, forming a kind of half-hoop-like shape, the left side merely having a whitish spot or dash not corresponding in shape with the other, and it had also one or two whitish spots on the upper surface of the flippers. The white spots on the sides were more or less confined to the anterior part of the body. Between the dorsal fin and the flukes the streaks were more distinct, some running in all directions, crossing each other, and forming zigzag-like markings, giving the animal rather a peculiar marked appearance. The head resembled the Carsethorn specimen, described by Mr. Service, having no ridge or hollow dividing the upper lip from the peculiar swollen-like appearance of the face. The lips were thick and fleshy, the upper one projecting about an inch over the lower one. The snout was rounded in the upper jaw, pointed in the lower jaw. It had four teeth on both sides of the lower jaw, situated near the anterior part of the mouth. There was no trace of teeth in the upper jaw. In shape this Dolphin resembled the Blackfish, *Globiocephalus melas*, but the head was less globular, and the dorsal fin was high and pointed.

The stomach was full of bones, which, on examining and comparing with other bones in the Museum, I found belonged to the Codfish, and there was also a part of the beak or mouth-piece of a species of Cuttlefish.

At the time we received this specimen at the Museum, I had no idea of bringing it before the notice of this Society, and therefore the description is not so full as it would otherwise

have been; for the same reason, I made no particular notes regarding the skeleton.

The specimen is now being preserved by Mr. Charles Kirk, and will shortly be exhibited in Kelvingrove Museum. The skeleton is still under process of maceration at the Museum, and will not be mounted until about the end of next year.

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### Some East Fife Flowers.

By R. S. WISHART, M.A.

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[Read 23rd March, 1905.]

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IN 1904, Crail was the place of our choice for a holiday in the first half of July, its chief recommendation being that we had never been there before. Situated, as it is, within two miles of the East Neuk o' Fife, Crail is a most likely centre about which to find East Fife flowers. Its general show of July blossoms is rich and varied, and in any ramble about the district a large number of summer favourites can readily be enumerated, but what will interest the Society is to be found in any particulars which show a contrast between the Crail flora and that of Clydesdale.

On walking through the quaint, old town, one of the first plants to arrest the attention is *Parietaria officinalis*, Linn., which is very abundant on the high wall to the left on emerging from the town eastwards. Other wall plants include *Linaria Cymbalaria*, Linn., *Sagina maritima*, Don, *Asplenium Ruta-muraria*, Linn., and *Linaria minor*, Desf. The last is common on the ground about the railway station and along the line. Being an annual, it depends upon its seed for each successive year's flowers, but it produces seed so abundantly that, when the habitat suits it, there is no trouble about keeping up the supply. Although rare in Clydesdale, I have observed this plant maintaining its hold on a garden walk at Stepps for the past twelve years, and, notwithstanding the fact that the walk is kept decently clean, the little

Toadflax has always managed to remain represented. It can grow on a stone with scarcely any depth of soil, and tiny plants of not more than two inches in height produce numerous seeds, and scatter them to seek the chance of more favourable conditions. It is light, sandy, or chalky soil that this plant prefers, and hence its scarcity in our heavy, clayey ground of Clydesdale.

The Umbelliferæ common at Crail include several plants which either do not occur or are rare in Clydesdale. On the grassy slopes near the sea, *Caucalis nodosa*, Scop., creeps along, and bears its knot-like sessile umbels on shortly-straggling stems, which never rise much above the surrounding herbage. *Conium maculatum*, Linn. is everywhere present all about the burgh, and it grows to giant height in large patches here and there along the shore. *Aethusa Cynapium*, Linn., is a common garden weed, and a pretty plant clothed in the rich green hue of its early growth. In any cornfield there is plenty of *Scandix Pecten-Veneris*, Linn., but it does not seem to grow so tall here as I have found it farther south. *Ligusticum scoticum*, Linn., grows profusely on the rocks out towards Fife Ness, and its green shiny leaves serve to drape many an otherwise bare patch.

One of the most pleasant walks is along the coast to "The Coves," as they are locally called. Provost Sim, of Crail, who is an accomplished and enthusiastic botanist, accompanied me in this and several other walks, and I was greatly indebted to him for furthering my interest in the local flora. The caves are large, natural cavities in the rocks some distance to the west of Crail, and they are accredited with being the abodes of Culdees. Upon the walls may be seen many of their crosses, which have been hewn out with much care.

The Provost pointed out to me where, in his opinion, the garden of the cave-dwellers was, and that right in front of the caves were still to be found patches of *Chenopodium Bonus-Henricus*, Linn. This plant had been cultivated as a vegetable by the Culdees, and it has apparently during all these years maintained a hold at this place.

Among the numerous plants found in full flower in the district of the caves may be noted—*Triglochin palustre*, Linn., and *T. maritimum*, Linn., both growing together; *Geranium sanguineum*, Linn., *Thalictrum minus*, Linn., and *Malva*

*sylvestris*, Linn. The one plant I had really tried to find unsuccessfully all along the shore on both sides of the burgh was *Pneumaria maritima*, Hill, till Provost Sim told me that it seemed to have quite disappeared from the district. I used to see this plant occasionally on the coast of Forfarshire, and I find from the *Proceedings* of the Society that I exhibited a specimen on the 28th December, 1886.

Along the shore, not far from the caves, may be seen evidences of a forest submerged. But by far the best specimen is close to the harbour, and it leaves no doubt as to its being a fossil tree stump.

A striking feature of the district is the Wild Cabbage, *Brassica oleracea*, Linn., which flourishes on the heights above the sea to the west of the burgh.

Potato field weeds seem scarcely to exist about Crail. Whether in garden or field the potato crop appears to come in for special attention in the way of keeping down rivals, and ordinary weeds fail to make a decent living among them. Corn fields, however, have samples of the common kinds, and *Sinapis arvensis*, Linn., takes its undue share of prominence there, as elsewhere. In some cases we saw this weed tackled by having it hand-pulled and laid down in heaps by the sides of the fields before its abundant crop of seeds was matured. Poppies are plentiful in many fields, but we never came upon any of the blue Corn-flower, *Centaurea Cyanus*, Linn., which is so abundant in some parts of Forfarshire. *C. Scabiosa*, Linn., is occasionally met with in East Fife; there is a good deal of it not far from the sea shore to the south of St. Andrews.

The East Coast claims the exclusive right to the genus *Astragalus*, Linn. We found beautiful specimens of *A. hypoglottis*, Linn., near Fife Ness, but it appears much less common here than at any sandy shore from Carnoustie to St. Johnstone, where *A. glycyphyllos*, Linn., also flourishes among the longer grass at occasional spots.

The only species of *Artemisia* which we can claim in the west is *A. vulgaris*, Linn., occasionally seen by roadsides. Crail is fortunate in having not only this species, but also *A. Absinthium*, Linn., and *A. maritima*, Linn., and all three are found growing near one another. The fact that *A. Absinthium* is so plentiful in

the neighbourhood of the caves and the "Hermit's Well" might suggest that it, too, was a relic of former cultivation. It is a very likely plant to have been grown by the primitive inhabitants to make a medicinal drink. It has long been used as such, and it is still cultivated in various countries for like purposes. Gustave Heuzé says: \*"*La grande absinthe* ou *absinthe amère* est très ancienne. Galien a vanté ses vertus; il la regardait comme un puissant tonique. Depuis longtemps aussi, on connaît ses propriétés vermifuges. Cette plante est indigène en France, mais elle est cultivée comme plante médicinale dans plusieurs contrées de l'Est. . . . On emploie l'absinthe en médecine comme vermifuge, tonique et fébrifuge. Elle sert aussi à préparer le vin, le sirop, la tisane et l'eau d'absinthe, le baume tranquille, la poudre vermifuge. Les brasseurs substituent parfois l'absinthe au houblon; la bière qui en résulte est très enivrante." So this plant has for long and still continues to take a place among commercial crops.

The leaves of *A. Absinthium* have not got the green upper surface that those of *A. vulgaris* have. The plant is whiter all over, and the tufts of tall stems are both striking and handsome. *A. maritima* keeps nearer the ground, and, although white in colour, its leaves otherwise very much resemble those of its relative, the Southernwood, *A. Abrotanum*, Linn. Even in fragrance it is very like the well-known garden favourite.

*Agrimonia Eupatoria*, Linn., is plentiful on many dry banks in the neighbourhood of Crail, but there seems to be only one station for *A. odorata*, Mill, in the district, and from it Provost Sim supplied a plant for the Edinburgh Botanic Gardens some years ago. Under the guidance of the Provost I had a very interesting ramble to the habitat of this plant, and we had many other specimens through hands on our way to and from the object of our search. *A. odorata*, Mill, grows by the side of an old disused gravel pit, now a deep water pool, in an out-of-the-way place, where ramblers are seldom likely to come upon it. No minute points are required to distinguished between *odorata* and *Eupatoria* if you have them both together; the whole plants look different at first sight, even if only in leaf, and the flowers of the former are larger and more closely packed on the inflorescence.

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\* "*Les Plantes Industrielles*," t. iv., chap. viii.

I had the gratification of finding two plants which the Provost had never seen about Crail before. Each was found only at one place, but in both cases there was a pretty liberal supply. The first was *Plantago lanceolata*, Linn., b. *Timbali* (Jord.), a plant which, according to Hooker's Flora, is not indigenous, and which is certainly by no means common in Scotland. In the distance, a tuft raising its long-stalked spikes above the roadside herbage looks like *P. maritima*, Linn., out of place; its leaves, however, are very like those of *P. lanceolata*, Linn., so that before coming to close quarters it appears to have the foliage of the one species and the inflorescence of the other. There were several large tufts at the place where I found it, and I brought a small bit home to plant. It took to the change at once, and went on growing although it was in flower at the time, and now, at the end of winter, it is quite fresh, and seems to be taking kindly to its garden home at Stepps.

The other stranger was one which at first approach I gleefully pronounced to be a grass which I did not know. On close inspection it was easy to see that it was a *Festuca*, and, although very different in habit, its parts came close enough to *F. elatior*, Linn., to claim kinship with this species. There was a large patch of the stranger all by itself, and growing luxuriantly, while there was plenty of the ordinary *F. elatior*, Linn., quite near. I sent a specimen to Kew, and got it identified as *Festuca elatior*, Linn., sub. sp. *arundinacea*, Schreb., var. *genuina*, sub. var. *fasciculata*, Haeck., and under this name I am exhibiting a specimen to-night.

Of other grasses which are scarce or absent from the west, *Briza media*, Linn., *Koeleria cristata*, Pers., *Hordeum murinum*, Linn., and *Trisetum flavescens*, Beauv., are plentiful. The genus *Bromus* is largely represented; but, on the other hand, we never came across either *Milium* or *Melica*. The fact that we were not much in any shady woods may, however, account for this.

Altogether Crail is a good place for a botanist's holiday. To a beginner it offers a fine general field of ordinary plants, with an occasional tit-bit of something rare or uncommon, especially to visitors from the west. Any young botanists, therefore, or old ones either, who desire to follow their hobbies over an interesting bit of ground, amidst the purest of fresh air and about a pleasant place to stay in, could not do better than take a holiday at Crail.

## Notes on Trees at Auchendrane, Ayr.

By JOHN RENWICK.

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[Read 28th March, 1905; revised November, 1905.]

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THE estate of Auchendrane is beautifully situated on the River Doon, about four miles from Ayr, and a little over a mile from the world-famous Brig o' Doon. It belongs to Miss Cathcart, a lineal descendant of the Muirs of Auchendrane, whose name occurs frequently in the history of the district. It contains a number of very fine trees, interesting, not only on account of their size and beauty, but from their historical and personal associations and from the fact that the dates of planting of several of them are known. Members of this Society have visited Auchendrane on several occasions, and have been courteously entertained by the Misses Cathcart, who take a great interest in their trees. They are perhaps prouder of a very beautiful Birch on the lawn in front of the house than of any other individual tree on the estate. It is probably the finest and most elegant Birch in the West of Scotland, or possibly in all Scotland. In September, 1902, the trunk had a girth of 10 feet  $8\frac{1}{2}$  inches at 5 feet from the original surface of the ground, or 10 feet  $3\frac{3}{4}$  inches at 5 feet above the present surface of a mound which has been raised round it. Its height at the date named was 67 feet. The bole is 13 feet, and the diameter of the spread of the branches 60 feet. From the accompanying illustration (Plate X.) it will be seen that it is a shapely, well-balanced, and graceful tree.

Miss Cathcart writes that it "was planted by our mother in 1818, at the time of her marriage to our father, then the heir of his mother, Mary Muir." It is thus 86 or 87 years old now. The average rate of increase in girth for the 84 years up till 1902 has been 1.53 inch per annum—a great growth. For seven



*Photo, by N. G. Reid.*

*Nov., 1905.*

**BIRCH AT AUCHENDRANE. AYR.**

Girth of trunk, 10 feet 4½ inches; bole, 13 feet; diameter of spread of branches, 60 feet (1905); height, 67 feet (1902),



years preceding 1902 it was 1·07 inch a year, while for nine years from 1876 to 1885 it was, according to Miss Cathcart's records, 1·11 inch yearly. It would thus appear to be past its stage of rapid increase in girth, which is stated to be reached in this species between the fortieth and the eightieth year, and it is said seldom to reach much over 100 years. Let us hope that this beautiful tree will long grace the lawn of Auchendrane.

The only Birch which I have measured that exceeded it was one at Newton Don, near Kelso, which in 1893 had a girth of 13 feet at 1 foot 7 inches; but it had a shorter bole—barely 3 feet. It had a height of 80 feet and a spread of branches of 70 feet. Another Birch at Newton Don had a girth of 10 feet 3 inches at 2 feet 3 inches.

But these trees no longer exist. Mr. C. B. Balfour, of Newton Don, in reply to our inquiry, writes—"The big Birch and its companion have, I am sorry to say, both gone. The smaller Birch went first . . . probably about 1896. The big Birch lost a limb in a gale, probably the one of Christmas, 1900. . . . It was rotten and very unsafe, and we took it down in, I think, the winter of 1901-02. The tree was very probably planted at the end of the eighteenth or early in the nineteenth century, when a good deal of planting and laying out was done." It was thus about a hundred years old.

The late Mr. George Paxton, for some time a member of our Society, presented, in 1894, to the library of the Royal Botanic Garden, Edinburgh, a book of photographs and measurements of thirty remarkable Ayrshire trees. Dr. D. Christison drew up a brief review of the general results of his labours, which appeared in the *Transactions of the Botanical Society of Edinburgh* (Vol. XX., p. 384). In it he said that, although we must admit the deficiency among some of the larger species, such as the Horse Chestnut, Sycamore, Willow, and Oak, "the county [of Ayr] can boast of some of the best Scottish examples of two of the smaller species.\* The old Auchendrane Birch is, indeed,

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\* The other species is the Holly (*Ilex Aquifolium*), the specimen of which "at Fullarton House appears also to be one of the finest Scottish examples of its kind." Dr. Christison, *loc. cit.* In July, 1903, it girthed 11 ft. 2 in. at 1 ft., 11 ft. 6 in. at 5 ft., bole 6 ft. The deficiency among

inferior in girth to the Newton Don tree in Roxburgh, with its altogether exceptional measurement of 13 feet 1 inch. But this is at the narrowest part of a very short stem, only  $2\frac{1}{2}$  feet in length, and, as far as I have been able to ascertain, the Ayrshire tree, 11 feet 4 inches in girth at the base and 9 feet 8 inches at 5 feet of a longer stem, is well entitled to the second place among Scottish Birches, particularly as Mr. Paxton's photograph shows it to be a singularly handsome, well-clothed tree, lofty and wide-spreading. . . . Nor is this the only fine Birch in the county, as Mr. Paxton has photographed a weeping one at Rosemount, Ayr, with a stem 10 feet long before it gives off a branch, and 8 feet 1 inch in girth half-way up, also a very handsome tree."

The Rev. D. Landsborough, LL.D., with whom I first visited Auchendrane, in 1896, contributed to the *Kilmarnock Standard* of 15th December, 1894, a notice of this book of photographs, in which he says, under the heading of "The Most Beautiful of Large Trees in Ayrshire:"—"The Auchendrane Large Birch.—'The Lady of the Wood,' for so the Birch is named, has the right to pre-eminence in beauty, and no Birch in Scotland—not even that of Rosemount—is so perfect as the Birch of Auchendrane. It is only about seventy years of age, yet is 9 feet 8 inches in girth 5 feet from the ground." Under the heading of "The Most Remarkable Trees of Ayrshire," he says—"This beautiful tree . . . may be expected to retain for a considerable time its supremacy, as its situation is excellent."

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the larger species is somewhat lessened by the following examples, which exceed in size those mentioned in that paper:—

Sycamore (*Acer Pseudo-platanus*)—

Glendoune, July, 1898—18 ft. 8 in. at 3 ft. 6 in.; bole,  $5\frac{1}{2}$  ft.

Auchencruive, Sept., 1905—17 ft. 5 in. at 3 ft. 3 in.; bole, 4 ft.

Oak (*Quercus Robur*)—

Bargany, April, 1900—15 ft. 2 in. at 3 ft.; bole, 7 ft.;  $101\frac{3}{4}$  ft. spread.

Doonside, Oct., 1899—14 ft.  $9\frac{3}{4}$  in. at 3 feet; bole,  $5\frac{1}{2}$  ft.; 93 ft. spread.

Willow (*Salix alba*)—

Coodham, July, 1904—17 ft. 1 in. at 4 ft. 5 in.; bole, 8 ft.

Willow (*Salix fragilis*)—

Kilmarnock, July, 1904—16 ft. 1 in. at 5 feet; bole, 22 ft.

Dr. Christison writes, in the paper already quoted—“The Auchendrane Birch is said to be only about seventy years old. This will yield an annual girth-increase of 1·65 inch. The few Birches I have observed do not grow nearly so fast as this, and it is desirable that the alleged age of the Ayrshire tree should be verified, if possible.” Instead of seventy, the age was then seventy-six years, which gives a rate of 1·52, and as Mr. Paxton’s “5 feet” was evidently taken from the top of the mound, the rate is the same as ours up to 1896. The average rate is, owing to the slower growth since then, reduced to 1·43 inch at this height, which is equal to 6½ feet above the original surface of the ground.

No other Birch that we have measured had a girth exceeding 8 feet 8½ inches, the size of one near Jedburgh in July, 1891, but in height we have—

	Date.	Height.	Girth.		At		Bole.	Spread.
			Ft.	In.	Ft.	In.	Ft.	Ft.
At Balloch Castle,	1900	75	6	2	5	0	40	...
At Killermont,	1899	72	6	0¾	4	9	35	...
At Blythswood,	1899	65	5	3¼	5	0	30	...
At Erskine,	1903	61	7	8½	5	10	10	59½

With the disappearance of the Newton Don Birch, it is probable that the Auchendrane tree takes first place among Scottish Birches.

Dr. A. Henry, F.L.S., writes—“There are some big Birches at Blair-Drummond, as: (a) girth, 13 ft. 10 in.; height, 60 ft., in 1904; (b) girth, 10 ft. 8 in.; height, 70 ft., in 1904. Large Birches are also growing in the South of England, but none so big as the Auchendrane tree.”

In the avenue is a splendid row of six Silver Firs, called the “Union Trees,” from their having been planted in 1707, in commemoration of the Union between England and Scotland. They were planted by an ancestor of the Misses Cathcart, John Muir, who was the first M.P. for the Ayr Burghs after the

Union. They were then known as "Norwegian Pines." The Silver Fir is stated to have been introduced into Britain in 1603, the year in which the two Crowns were joined. It was, therefore, quite appropriate that this tree should be selected to commemorate the Union of the two Parliaments fully a century later, and that the planter should be a member of the new (united) Parliament.

The six trees in this row are by no means of the same size as regards girth, the largest (No. 1) being at the one end of the row, 16 feet 3 inches, and the smallest at the other end, (No. 6) 11 feet  $4\frac{1}{2}$  inches, and (No. 5) 11 feet 4 inches.

A Silver Fir in the flower garden, also planted in 1707, is about the same size as the largest of the Union Trees, being, in 1902, 16 feet  $0\frac{1}{2}$  inch at 5 feet up. Another was planted in or about 1757 by Dr. Muir, the great-grandfather of the Misses Cathcart, and, in memory of him, is known as "The Doctor." It girths 15 feet at 5 feet up. There are several other good trees of this species here. The heights are—"The Doctor," 101 feet; No. 1 Union, 97 feet in 1902; one in flower garden, 110 feet in 1905.

#### RATE OF INCREASE IN GIRTH.

	For last 10 years.	For whole life.	
No. 1 Union, - -	1'00 in. a year,	- '98	198 years.
No. 2 ,, - -	'85 ,, ,,	- '85	,, ,,
No. 3 ,, - -	'70 ,, ,,	- '86	,, ,,
No. 4 ,, - -	'70 ,, ,,	- '78	,, ,,
No. 5 ,, - -	'70 ,, ,,	- '69	,, ,,
No. 6 ,, - -	'45 ,, ,,	- '69	,, ,,
Flower garden, -	'71 ,, (for 7 years),	'99	195 ,,
"The Doctor," -	'80 ,, (for 10 years),	1'22	148 ..
Tree nearest house, -	'75 ,, ,,		
Tree to N.W. of house,	'70 ,, ,,		

The rate for "The Doctor," 1'22 inch a year for 148 years, or 1'24 inch for 141 years, seems high compared with the others. But Dr. Christison, having taken up that the tree in the flower garden, which was photographed by Mr. Paxton, was planted in 1797, says in the paper mentioned that this gives an annual rate of 1'88 inch, which, though unusually high, is, he believes, not unprecedented in Scotland. Therefore, 1'24 inch in the case

of "The Doctor" may be accepted as correct. By substituting 1707 for 1797 as the date of the planting of the tree in the garden, the annual rate of growth comes out as .95 inch. The slight difference between this rate and mine is evidently caused by the fact that the tree grows on the side of a steep slope, and Mr. Paxton has measured 5 feet up at a different point from what I have done.

In comparison with these trees may be noted those at Rosneath, two of which are probably the largest in Scotland—

	Average increase.
Sept., 1903—22 ft. 4½ in. at 4 ft. 6 in.; height, 106 ft.;	8 years, .75 in.
21 ft. 11½ in. at 4 ft. 6 in.; height, 118 ft.;	,, .80 in.
15 ft. 9½ in. at 5 ft.;	,, .50 in.
14 ft. 5 in. at 5 ft.;	,, .31 in.

two others at Camstradden, Luss—

June, 1905—14 ft. at 6 ft.; height, 125 ft.;	6½ years, .70 in.
,, 17 ft. 7½ in. at 6 ft.; height, 105 ft. (in 1903);	,, .70 in.

and another at Tynninghame, East Lothian, which we saw on the occasion of the Society's visit in September, 1896, said to have been planted in 1706, and thus about the same age as the Union Trees—13 feet 3 inches at 5 feet; height, 105 feet. Average increase in girth for 190 years, .80 inch a year. The recent increase in two of the Auchendrane trees is greater than in any of the others.

The different rates of growth in girth in trees so near to each other as those in Auchendrane are rather puzzling. It can hardly be caused by the soil, but perhaps a difference in the amount of moisture in the soil and the subsoil may account for part of it, and, besides, no two trees are of exactly the same strength and vigour.

All the Silver Firs mentioned appear to be past the period of their greatest growth.

There are two fine Scots Firs here. One is supposed to have been planted in 1707. It stands on the side of the river, and, as seen from the house, forms part of a beautiful picture, the clean stem showing well against the foliage of lower trees behind,

and the finely feathered head standing clear and distinct against the sky. Underneath, in a curve of beauty, flows the river—

“ Among the bonnie winding banks  
Where Doon rins wimplin’ clear.”

The other Pine, near the Union Trees, is known as “The Wishing Tree.” Miss Cathcart writes that it “lost its ‘wishing branch’ during the severe storm about twenty-five years ago” (evidently the “Tay Bridge Storm,” 28th December, 1879) “when many fine trees were blown down here. The wishing branch was much believed in by all the people about here. It grew down from the stem of the tree about 40 feet in a circle to the ground, being hollow in the centre, where two people could easily stand.” Have we here a relic of tree-worship?

The dimensions of these Pines are—

- (a) 1707 Tree—Girth, 10 ft. 3½ in.; bole, 21 ft.; height in 1902, 87 ft.  
(b) Wishing Tree—Girth, 11 ft. 6 in.; bole, 13 ft.; height in 1902, 92 ft.

Average girth increase in ten years—(a) .55 inch; (b) .75 inch; of 1707 tree during whole life of 198 years, .62 inch per annum. It also seems to be past its period of greatest growth.

With the exception of one 96 feet high, measured this year at Benmore, Argyllshire, with Dr. A. Henry, F.L.S., these are the highest Scots Firs we have yet found, but we have very few to compare them with. Other Ayrshire specimens are—

	Date.	Height.	Girth.	At	Bole.	Spread.
		Ft.	Ft. In.	Ft.	Ft.	Ft.
At Dalquharran,	Apr., 1900,	73	9 8½	5	20	...
At Bargany,	„ „	62	11 6¼	5	24	79
At Kilkerran,	Sep., 1904,	...	11 8½	5	30	...
At Auchencruive,	„ 1905,	...	10 11	5	42	...

The Auchencruive tree is supposed to have been planted about 1700. The average increase in girth for the whole life of the tree is thus .64 inch yearly—almost the same as the Auchendrane tree of about the same age.

Mr. Paxton's list gives "The Bell Tree" at Cloncaird, 12 feet 10 inches at 2 feet up of a short stem.

All these are far short in girth of one seen at Inveraray in 1899—14 feet 2 inches at 5 feet; bole, 40 feet.

In her letter giving the information already quoted, Miss Cathcart states—"There is also a fine old Beech on the lawn near the house, and there are many rare trees that were planted by my father on the avenue, among them a good specimen of a Black Gean or Cherry."

This Beech measures 14 feet 6 inches at 5 feet; bole, 11 feet; spread, 93½ feet; girth-increase in ten years, averaging 1·05 inch a year—a good rate for a healthy Beech in full foliage. The Black Gean we did not see.

The dimensions of the Auchendrane trees already referred to and of others there are given in the accompanying table.

I have to thank Dr. A. Henry, F.L.S., for naming a number of the species and varieties.

JULY, 1906.—On a visit to the place this month, the forester pointed out a tree not previously noticed, which proved to be *Pyrus Sorbus*, Gaertn., the true Service Tree. It has a girth of 5 feet 6 inches at 5 feet, and a bole of 9 feet. There is reason to believe that this may be the largest example of *Pyrus Sorbus* in Scotland.

MEASUREMENTS OF TREES AT AUCHENDRANE, AYR.  
By JOHN RENWICK and RICHARD M'KAY.

SPECIES.	Date.	Girth.		At		Bole.	Height.	Increase in Girth.		Rate yearly, inches.
		Ft.	In.	Ft.	In.			Inches.	Years.	
<i>Liriodendron Tulipifera</i> , L.—Tulip Tree,	Sept., 1902,	5	8	5	0	8	53	3	3	1.00
	Nov., 1905,	5	11							
<i>Tilia vulgaris</i> , Hayne—Common Lime Tree,	Sept., 1902,	9	8½	5	0	13	78	3	3	.83
	Nov., 1905,	9	11							
<i>Tilia platyphyllos</i> , Scop. var. <i>asplenifolia</i> —Cut-leaved Lime Tree,	Sept., 1902,	2	11¾	5	0	9				
<i>Acer platanoides</i> , L. var. <i>laciniatum</i> —Eagle-claw Maple,	Mar., 1896,	2	9¼	5	0	7				
<i>Pyrus Sorbus</i> , Gaertn.—True Service Tree,	Sept., 1902,	3	1¼	5	0	9				
	July, 1906,	5	6							
<i>Esculus Hippocastanum</i> , L.—Horse-chestnut,	Mar., 1896,	8	7½	5	0	20				
	Nov., 1905,	9	2¼							
<i>Zelkova crenata</i> , Spach,	Sept., 1902,	5	9¼	5	0	12				
<i>Betula pubescens</i> , Ehrh.—Birch on lawn, planted in 1818,	Mar., 1896,	10	1	5	from ground					
	Sept., 1902.	10	8½							
	Mar., 1896,	9	9	5	from mound					
	Sept., 1902,	10	3¾	6¼	„ ground		67*			
<i>Betula pubescens</i> , Ehrh.—Birch, in avenue,	Aug., 1905,	10	4½	4	6	12				
<i>Quercus Robur</i> , L.,	Sept., 1902,	6	3½							
Three oaks growing together near river, with long holes.	Nov., 1905,	6	5	5	0					
	Sept., 1902,	7	5¾	5	0					
	„ „	6	8	5	0					
	„ „	6	5	5	0					

\* Spread of branches in 1905, 60 feet.

SPECIES.	Date.	Girth.		At		Bole.	Height.	Increase in Girth.		Rate yearly. Inches.
		Ft.	In.	Ft.	In.			Ft.	Inches.	
<i>Fagus sylvatica</i> , L.— Beech, N. of house, Do., W. of house,	Mar., 1896,	13	7½	5	0	11	†	6·	7	·86
	Sept., 1902,	14	1½	5	0	25				
	Mar., 1896,	10	4	5	0		67	5·5	7	·79
	Sept., 1902,	10	9½							
<i>Fagus sylvatica</i> , L., var. <i>atiro-virens</i> — Copper Beech, <i>Platanus orientalis</i> , L. — Oriental Plane,	Aug., 1905,	5	2½	5	0	25		5·5	7	·79
	Mar., 1896,	2	9½	5	0			2·25	3	·75
	Sept., 1902,	3	2¾					7·75	10	·77
	Nov., 1905,	3	5					4·75	7	·68
<i>Taxus baccata</i> , L.—Yew,	Mar., 1896,	6	7	0	6	2½				
	Sept., 1902,	6	11½							
<i>Thuia occidentalis</i> , L.—Arbor Vitae,	Mar., 1896,	6	3	5	0	12	42	5·	7	·71
	Sept., 1902,	6	8							
<i>Sequoia gigantea</i> , Torrey—Wellingtonia,	Sept., 1902,	8	1	5	0					
<i>Abies (Picea) pectinata</i> , Loudoun— Silver Firs— "Union Trees," planted 1707, six trees in a row.	Mar., 1896,	15	5	5	0		97	185·	188	·98
	Sept., 1902,	16	1					8·	7	1·14
	Aug., 1905,	16	3					·2·	3	·67
								195·	198	·98
No. 2,	Mar., 1896,	13	4½	5	0			160·5	188	·85
	Aug., 1905,	14	1					·8·5	10	·85
No. 3,	Mar., 1896,	13	8	5	0			169·	198	·85
	Aug., 1905,	14	3					164·	188	·87
No. 4,	Mar., 1896,	12	3	5	0			7·	10	·70
	Aug., 1905,	12	10					174·	198	·86
								147·	188	·78
								7·	10	·70
								154·	198	·78

† Spread of branches in 1902, 93½ feet.

## MEASUREMENTS OF TREES AT AUCHENDRANE, AYR—Continued.

SPECIES.	Date.	Girth.		At		Bole.		Height.		Increase in Girth.		
		Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Inches.	Years.	Rate yearly. Inches.
<i>Abies (Picea) pectinata</i> , Loudoun—No. 5, Silver Fir— "Union Trees," &c.	Mar., 1896,	10	9	5	0					129.	188	.69
	Oct., 1905,	11	4							7.	10	.70
No. 6,	Mar., 1896,	11	0	5	0					136.	198	.69
	Aug., 1905,	11	4½							132.	188	.70
One in flower garden, planted 1707,	Mar., 1896,	15	7½	5	0					4.5	10	.45
	Sept., 1902, Aug., 1905,	16	0½					110		136.5	198	.69
One planted 1757, "The Doc- tor,"	Mar., 1896,	14	4	5	0					192.5	195	.99
	Sept., 1902,	14	10					101		172.	138	1.24
	Nov., 1905,	15	0							6.	7	.86
One to N. W. of house,	Mar., 1896,	13	3½	5	0					2.	3	.67
	Aug., 1905,	13	10½							180.	148	1.22
Another to N. W. nearest house,	Mar., 1896,	13	3½	5	0					7.	10	.70
	Aug., 1905,	13	10½							7.5	10	.75
Another to N. W. on Old Path, <i>Abies (Pseudotsuga) Douglasii</i> , Lindley —Douglas Spruce Fir,	Mar., 1896,	13	6	5	0							
	Aug., 1905,	13	6									
<i>Picea excelsa</i> , L.—Spruce Fir, <i>Cedrus atlantica</i> , Manetti—Cedar of Mount Atlas,	Mar., 1896,	11	9	5	0							
	Sept., 1902, Nov., 1905,	5	6½	5	0							
<i>Pinus sylvestris</i> , L.—Scots Fir— In flower garden, planted 1707,	Sept., 1902, Nov., 1905,	7	4	5	0							
	Sept., 1902, Mar., 1896,	4	9½	5	3	21				118.	188	.63
Another near the "Union Trees" called "The Wishing Tree,"	Mar., 1896,	9	10	5	0					4.25	7	.61
	Sept., 1902, Nov., 1905,	10	24					87		1.25	3	.42
	Mar., 1896,	10	3½	5	0					123.50	198	.62
	Sept., 1902, Nov., 1905,	10	10½	5	0	13				5.75	7	.82
	Sept., 1902, Nov., 1905,	11	4½					92		1.75	3	.58
	Mar., 1896,	11	6							7.50	10	.75

**Bryological Notes.**

By D. A. BOYD.

[Read 30th May, 1905.]

HAVING recently had occasion to examine some memoranda relating to Mosses collected by me in the West of Scotland about twenty years ago, I have noted a few details regarding the occurrence of certain of the rarer species in localities within the Clyde Area, and also some instances of fertile specimens having been observed of species which are more commonly obtained in a barren condition. A few other notes, chiefly relating to subsequent observations or discoveries, have been added, along with some records from places outside the range of distribution indicated in Mr. Murray's List of the Mosses of the Clyde Area.\*

About the period referred to, I had the privilege of corresponding with the late Mr. Henry Boswell, F.L.S., Oxford (afterwards one of the Corresponding Members of this Society), and submitting to him many specimens collected in the western district. His kind aid—at all times readily and generously rendered—in confirming or correcting the identification of species, not only added greatly to the pleasure of bryological pursuits, but enabled certainty to be obtained regarding many doubtful points which might probably have otherwise remained undetermined. In a good many instances, specimens of mosses which had thus been submitted to Mr. Boswell were exhibited by me at former meetings of this Society, but the fact of their having been certified by him is not expressly stated in the notices regarding them in the Society's *Proceedings*. In the following list, the usual mark of authentication (!) is appended to names of localities where specimens submitted to Mr. Boswell were obtained:—

*Cynodontium polycarpum* (Ehrh.) Schp. — West Kilbride! Green Hill, parish of Dalry.

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\* *Fauna, Flora, and Geology of the Clyde Area*: Published by the Local Committee for the Meeting of the British Association at Glasgow (1901), pp. 96-105.

- Dicranella Schreberi* (Sw.) Schp., var. *elata* Schp. — Not uncommon on sides of ditches; West Kilbride! &c.
- Grimmia Hartmani* Schp.—On a dry wall near West Kilbride!
- G. Doniana* Sm.—On dry walls near Milngavie and West Kilbride.
- Pottia intermedia* (Turn.) Fűrnr.—Near Portincross!
- P. minutula* (Schleich.) Fűrnr.—Near Portincross!
- Leptodontium flexifolium* (Dicks.) Hampe.—Kaim Hill, near Fairlie, growing in considerable quantity, and fruiting freely, on places where the heather had been burned; Hauptland Moor, West Kilbride, in similar situations, but in a barren state.
- Weisia verticillata* (L.) Brid.—Gourock Burn, West Kilbride! c. fr.
- Anacætangium compactum* (Schleich.) Schwaeg. — Noddsdale, Largs, fruiting freely on moist shaded rocks.
- Orthotrichum rivulare* Turn.—Not unfrequent on stones in streams; Gourock Burn and Kilbride Burn, West Kilbride, &c.
- Splachnum ampullaceum* L.—West Kilbride, &c.; on the droppings of cattle on wet moors.
- S. sphaericum* Linn. fil.—On the droppings of sheep on a marshy moorland, Blackshaw Hill, West Kilbride, c. fr.; only once observed, but in a condition which enabled the specific characters to be well determined.
- Physcomitrium pyriforme* (L.) Brid.—On wet clayey banks, &c., West Kilbride.
- Funaria ericetorum* (Bals. and De Not.) Dixon.—Not uncommon on sides of moorland ditches on peaty soil; West Kilbride, &c.
- Breutelina arcuata* (Dicks.) Schp.—I have a fertile specimen from Shielhill Glen, par. of Inverkip, collected by the late Mr. D. Farquhar.
- Orthodontium gracile* (Wils.) Schwaeg.—On sandstone rocks; West Kilbride!
- Webera carnea* (L.) Schp.—On moist clayey banks, not uncommon in April or May; West Kilbride.
- Bryum concinnatum* Spruce.—On a rocky hillside; par. of Ardrossan!

- B. alpinum* Huds.—Fertile specimens occur not unfrequently on the higher hills around Largs, West Kilbride, &c.
- Mnium undulatum* L.—West Kilbride and Largs, c. fr.
- M. cinclidioides* (Blytt) Hübn.—Knockewart Loch!
- M. subglobosum* B. & S.—On wet moors, producing capsules in early spring; Largs, West Kilbride, Ardrossan, &c.
- Pterogonium gracile* (Dill.) Sw.—Locally frequent on shady rocks; Ardneil Bank and Carlung, par. of West Kilbride; Largs; Little Cumbrae; Bute.
- Habrodon Notarisii* Schp.—On a trunk of *Acer Pseudo-platanus*; par. of West Kilbride; identification confirmed by Dr. Braithwaite.
- Thuidium tamariscinum* (Hedw.) B. & S.—West Kilbride, c. fr.
- Climacium dendroides* (L.) W. & M.—Crosbie Meadow, par. of West Kilbride, c. fr.
- Orthothecium intricatum* (Hartm.) B. & S.—North Rotten Burn, par. of Inverkip.
- Brachythecium glareosum* (Bruch) B. & S.—Gogo Valley! par. of Largs.
- B. salebrosum* (Hoffm.) B. & S., var. *palustre* Schp. (= *B. Mildeanum* Schp.).—West Kilbride!
- B. purum* (L.) Dixon.—West Kilbride, c. fr.
- Hycomium flagellare* (Dicks.) B. & S.—Fertile specimens have occurred near Lochwinnoch and West Kilbride.
- Eurhynchium Teesdalei* (Sm.) Schp.—Largs! c. fr.; West Kilbride, c. fr.
- Plagiothecium depressum* (Bruch) Dixon.—Near Portincross!
- Amblystegium irriguum* (Hook. & Wils.) B. & S.—West Kilbride!
- A. fluviatile* (Sw.) B. & S.—West Kilbride!
- A. filicinum* (L.) De Not., var. *Vallisclausae* Brid.—In a spring-head, Kaim Hill!
- Hypnum stellatum* Schreb.—Knockewart Loch, c. fr.
- H. fluitans* L.—West Kilbride!
- H. exannulatum* Gumb.—Possil Marsh!
- H. vernicosum* Lindb.—Largs! Knockewart Loch.
- H. Cossoni* Schp.—West Kilbride!
- H. scorpioides* L.—Knockewart Loch, c. fr.; Cumbrae, c. fr.
- H. stramineum* Dicks.—Knockewart Loch, c. fr.
- H. Schreberi* Willd.—West Kilbride, c. fr.

## Meteorological Notes and Remarks upon the Weather during the Year 1904, with its General Effects upon Vegetation.

By JAMES WHITTON, Superintendent of Parks.

[Read 29th August, 1905.]

IN order to preserve the continuity of the series, these notes have been compiled, as in former years, from the records kept at Queen's Park, Glasgow.

*January.*—Accompanied by a moderate S.-E. wind and a slight touch of frost, the first three days were fine and dry. When the wind changed to the S.-W., the weather got duller and more unsettled, rain falling daily from the 6th until the 15th, with a gale on the 13th and slight snow on the 14th. The following ten days were very mild and fine for the season. The last week of the month, however, was rainy and changeable.

With the several changes of weather, the barometric readings show a varied irregular line of pressure. From 29.70 inches on the 1st, the pressure fell unevenly to 28.60 inches on the 14th. Thereafter a sharp, steady rise occurred, which on the 22nd reached 30.50 inches—the highest reading for the year—followed by an equally steady fall, as on the 28th the barometer indicated 28.90 inches.

The open weather and absence of severe frosts had a marked effect on the average temperature recorded—maximum 43° and minimum 35°. Frost only occurred on eight occasions, to the amount of 28°.

The rainfall (3.93 inches) was also less. The greatest fall for one day (0.70 inch) occurred on the 11th. There were 11 dry days.

The mild weather had a vivifying effect on vegetation, the grass being notably fresh and bright for the season, while the buds on many trees and shrubs visibly distended, and, in the case of early-flowering species of *Rhododendron*, showed colour of bloom, that precocious blooming plant, *Jasminum nudiflorum*, flowering brilliantly.

*February.*—The depression which set in during the last week of January intensified, consequently the weather during the first half of the month was very disagreeable, being dull and cold, with occasional showers of sleety rain and snow, accompanied by raw, biting winds. On the 10th, when there was a sharp touch of frost, a dense, disagreeable fog enveloped the city. High wind and heavy rain prevailed on the 12th and 13th. The latter half of the month was somewhat better but changeable and rainy.

As in January, the barometric readings were varied and irregular in course, though not quite so wide in range. From 29·10 inches on the 1st, the pressure was very erratic, falling to 28·50 inches on the 13th, thereafter rising irregularly, until, on the 28th, it was at 30·10 inches, falling therefrom on the 29th.

Frost to the amount of 48° was registered on 14 days. The average temperatures were also low—maximum 41° and minimum 32°. These low averages are doubtless due as much to the cold raw winds as to the frosts, which were not in any sense severe. The rainfall for the month was also slight, as only 2·28 inches were recorded. The greatest fall for one day was 0·54 inch, occurring on the 22nd. There were 14 dry days.

The impulse which vegetation had received from the open mild weather of January was not materially checked by the somewhat colder conditions which prevailed during this month. Snowdrops were at their best between the 10th and 22nd. Winter Aconites (*Eranthis hyemalis*) were in full bloom by the latter date, and the early blue Crocus also showed bloom. The flower-buds on deciduous trees—notably the Elms and Willows—were well advanced. That interesting shrub, *Garrya elliptica*, was in bloom on the 10th, and *Rhododendron praeox* by the 20th; the latter, however, was somewhat damaged by frost on the 29th.

*March.*—Though dry and frosty, the early part of this month was somewhat cheerless owing to the prevalence of cold easterly winds. A snowstorm occurred on the 6th, and during the continuance of the frost the fog-veil overhung the city with more or less density. On the 16th the weather freshened, and, for a week, was somewhat changeable but milder, and continued to improve during the remainder of the month.

The barometric readings were fairly high and within a moderate range until the latter days of the month, when there was a sharp fall. The notable variations were from 30·20 inches on the 2nd to 29·50 inches on the 8th; then rising to 30·20 inches on the 10th and 11th, afterwards falling to 29·40 inches on the 13th. The pressure gradually increased to 30·30 inches on the 24th; after which the sharp declension already alluded to occurred, when the pressure fell to 29·00 inches on the 30th.

Although frost was registered on 15 days, the total amount was only 61°. The cold, drying winds and the frequent frosts tended to keep the temperature low. The average maximum temperature was 44°, and the average minimum 32°.

The absence of heavy rain is very notable, as only 1·43 inches were registered. The greatest fall for one day was 0·35 inch, on the 21st. There were 19 dry days. The dryness of the month is best exemplified by comparing the figures with those of March, 1903, when there were only two dry days, a rainfall of 8·31 inches, while on 13 days the amount registered exceeded one quarter of an inch (0·25).

The frosts during the month were not of such severity as to hinder outdoor operations; consequently farmers and gardeners were enabled to work their land under satisfactory conditions. The cold dry weather, however, decidedly checked the forward tendency of vegetation, and growth, on the whole, was later than at same period of preceding year. Willows were in bloom by the 15th, followed closely by *Daphne Mezereum* and *Erica carnea*, while the Crocuses were at their best between the 10th and 20th.

*April.*—The month began with wet weather, and throughout did not belie its reputation for showers, frequently accompanied by high winds, notably on the 6th and 24th, which days were also bitterly cold. The remarkable feature of the weather was that few days were out-and-out wet. Much of the rain fell in the evenings or early mornings.

The character of the weather is fairly shown by the varied line of atmospheric pressure, as indicated by the barometric readings, which, however, do not exhibit very severe changes, as only two are in any way notable. From the 1st to the 11th the range

was between 29.20 and 29.80 inches. A steady fall occurred from the 11th to the 15th, when the lowest reading for the month, 29.20 inches, was recorded. A rapid rise followed, and on the 19th and 21st 30.10 inches pressure was noted. The sharpest fall was from the foregoing point to 29.50 inches on the 22nd. After another slight rise the range was fairly even, with a downward tendency at the end of the month.

No frost was registered, and only on the 21st, did the temperature fall to freezing point (32° Fahr.). The average temperature was 52° for the maximum and 42° for the minimum.

The rainfall amounted to 4.64 inches, the heaviest for any month of the year. There were only 6 dry days.

Consequent on the absence of frost and the abundance of atmospheric moisture, vegetation made good progress, and deciduous trees and shrubs enfoliated rapidly during the month. Poplars and Hawthorns leafed about the 15th, Elms, Beeches, Sycamores, and Pyruses, about the 20th, followed a week later by Willows, Alders, Limes, Birches, &c. Of the flowering shrubs Ribes and Forsythia were in bloom by the 8th; Rhododendron Eugenie by the 15th, and R. Cunninghami by the 30th. Narcissi on lawns began blooming during the first week, while the garden varieties were plentiful after the third week; also Scillas, Muscari, Chinodoxa, and Primroses in abundance. The grass on lawns and in fields at the middle of the month was in brighter and better condition than at any similar period during the past decade. The sudden change of atmospheric conditions, however, had a most disastrous effect on many Alpine and sub-Alpine plants which had safely withstood the trying winds of March. The damping off of many subjects, especially those with pilose foliage, was more serious than what has been experienced in gardens for many years, and the loss of stock of many species was somewhat disastrous.

*May.*—The weather during the first three weeks was very changeable—generally wet and cold, with frequent showers of hail and high winds. Occasionally the days were bright and sunny, but in the evenings the air became very chilly. Towards the end of the month the atmospheric conditions improved, and milder and more summer-like weather was experienced.

The barometric readings show a somewhat irregular line of pressure within a moderate range. Though the lowest reading was 29·20 inches on the 2nd, the range afterwards was between 29·50 inches and 30·05 inches, the latter point being recorded for the 20th and the 30th.

Although no frost was recorded, the radiating thermometer on the grass was at or below the freezing point (32° Fahr.) on nineteen occasions. The average maximum temperature in shade was 56° and the average minimum 43°.

Rain fell to the amount of 3·36 inches, of which on five occasions the fall for twenty-four hours exceeded 0·30 inch. There were 14 dry days.

Owing to the absence of frosts the progress which vegetation had made in April was not materially checked, and there was a satisfactory development of growth on most kinds of trees and shrubs. The most serious drawback was caused by the high winds, which severely damaged the soft leaves of Chestnuts and Acers. The bulk of deciduous trees and shrubs were well leafed by the end of the month. The Oak began to leaf on the 14th and the Ash on the 16th, the former three days and the latter nine days earlier than in 1903. Shrubs generally bloomed well, more particularly Rhododendrons. The display made by *Rhododendron Cunninghami* was exceptionally fine. It may be here noted that this variety of *Rhododendron* is the best we have found for planting in Glasgow, as it possesses a good constitution, is excellent in habit, and seems to have some power of resisting the dirt and smoke of a city better than any other. Amongst deciduous shrubs the Lilacs and *Azalea mollis* were particularly well bloomed. The common Hawthorn, or "May," was also fine, and for once in a decade flowered in May.

*June.*—The month opened with fine genial growing weather. From the 5th to the 13th the days were generally bright and sunny, but the air was cold owing to the prevalence of easterly winds. With a change of the wind to the S.W. there was some rain which tended to ameliorate the atmosphere. After a somewhat severe gale on the 16th, which did a considerable amount of damage, the weather became more genial and summer-like, and during the last week it was very warm and fine.

The range of atmospheric pressure was fairly even, from 29.90 inches on the 1st to 30.20 inches on 4th, 5th, and 6th, thereafter slightly declining till it suddenly dropped to 29.30 inches on the 15th and 16th during the gale which occurred on the latter dates. The rise which followed was fairly regular and continued to the end of the month, excepting one sharp depression on 25th, when there was a heavy fall of rain.

Notwithstanding that there was a fair amount of sunshine the temperature in shade was only on four occasions above 70°, the highest (74°) being recorded for the 5th. The average maximum temperature was 62° and the average minimum 48°.

The rainfall only amounted to 1.54 inches, and there were 17 dry days.

Although the cold drying winds in the early part of the month had a detrimental effect on newly-planted shrubs and the ordinary summer bedding plants, there was a marked display of bloom on established plants throughout the parks, and the value of many deciduous subjects for garden decoration in smoky cities, in comparison with many evergreen plants, was very apparent.

*July.*—Despite the fact that a considerable amount of rain fell during the month the weather on the whole was fairly satisfactory, especially to holiday-makers, as most of the rain fell in the evenings or early mornings. “Fair” Saturday, the 16th, broke fine and proved a bright, fresh, delightful day, and for several days thereafter the weather was of a pleasant description. A severe thunderstorm was experienced on the 21st, which was renewed on the 22nd, accompanied by heavy rain. For a few days the weather was dull but fine, getting warmer with the closing days of the month. Another thunderstorm was experienced on the 31st.

The barometric readings were fairly high and not very varied. The pressure on 1st was at 29.50 inches, afterwards ranging between 29.70 inches and 30.20 inches; on the 31st it was 29.80 inches.

During the month the maximum thermometer in shade was at or over 70° on four occasions, and the highest reading for the year was 75°, on the 12th. The average maximum was 64° and the average minimum 51°.

The rainfall amounted to 3·80 inches. There were 14 dry days.

The atmospheric conditions being favourable, there was a satisfactory growth throughout this district on all crops; indeed, the even and uniform growth was a feature of the season. Hay crops turned out better when harvested than anticipated.

*August.*—The conditions which characterised the weather during July continued throughout this month; and though a considerable amount of rain fell, much of it did so during the nights or early mornings, few days being wet throughout. A thunderstorm, with heavy rain, occurred on the 22nd.

The range of the barometric readings, while somewhat lower than that of the preceding month, was likewise within moderate range—from 29·85 inches on the 1st to 29·60 inches on the 31st—the highest readings occurring on the 8th, 24th, and 29th, when the pressure was at 30·05 inches. The lowest point was 29·30 inches on the 15th.

The temperature was fairly uniform throughout the month and, though the maximum in shade was only three times above 70°, the average maximum was 63° and the average minimum 52°.

The rainfall amounted to 3·49 inches, and on nine occasions over 0·20 inches fell in the twenty-four hours. There were 12 dry days.

Consequent on the favourable conditions there was a splendid display of flowers in gardens and parks. The grain in fields filled and ripened steadily and fully, while root crops made satisfactory progress. The ripening effects were also apparent on trees, as many in our parks began to cast their foliage early in the month, this being particularly noticeable with the Lime, Elm, Sycamore, and Beech.

*September.*—During the first ten days the weather was changeable, with heavy rain at times. Thereafter the days were mostly warm and sunny, and the conditions generally were of a pleasant, enjoyable character. The 26th was notably fine. The first fogs of Autumn were experienced on the 28th and 29th.

The atmospheric pressure was somewhat uneven during the early part, but, on the whole, the barometric readings were fairly high and do not show any notable feature. The lowest reading for the month was 29·60 inches on the 13th, while the highest was 30·25 inches on the 28th.

Although the radiating thermometer on the grass fell below freezing point on several occasions, the thermometer in shade did not register any frost. The average maximum temperature was 59°, and the average minimum 46°. The same in each case as in September, 1903.

The rainfall amounted to 2.73 inches, and there were 17 dry days.

The warm genial weather hastened the ripening of cereals, most of which were harvested in excellent condition. The bloom on Autumn flowering plants was particularly bright and satisfactory. Deciduous trees assumed russet tints, and many species ripened and shed their leaves during the month.

*October.*—Opening with a sharp gale and heavy rain, the weather was somewhat changeable and stormy during the first nine days, afterwards it was fine and dry until the 17th, which was rainy. During the remainder of the month it was fairly pleasant though several days were showery and windy.

The barometric readings show that the atmospheric pressure was erratic in course. From 29.50 inches on the 1st the pressure rose sharply to 30.10 inches on the 3rd. A marked depression followed, as on the 6th it was down to 29.30 inches. After a sharp rise it was fairly steady for a few days, and on the 13th stood at 30.30 inches. Another rapid fall took place, and on the 17th, when heavy rain occurred, it was down to 29.30 inches. The recovery to 30.20 inches on the 19th was too sharp, and it was followed by almost as quick a drop to 29.50 inches on the 22nd. Thereafter the pressure rose more gradually, and, with the exception of one occasion, it was over 30.00 inches to the end of the month.

Although the first sharp frost of the season occurred on the 13th there was an absence of severe frosts, consequently the average temperatures are high, the maximum was 54 degrees and the minimum 43 degrees.

Though rains occurred somewhat frequently the total amount for the month is low, as only 2.12 inches were registered. There were 11 dry days.

Though the bulk of the grain crops were secured in September, the harvesting in later districts benefited by the dry periods

which occurred, as the high winds tended to dry any wetness in the sheaves. The harvesting of root crops was very general during the month. The gales of the 1st, 5th, and 6th practically cleared the leaves off deciduous trees, while the frost on the 13th finished the display of garden flowers for the season.

*November.*—For the season of the year the weather was remarkably open and mild during the first half of the month. In the third week it began to get colder, a slight fall of snow occurring on the 20th, while on the 21st the ground was covered by snow fully an inch in depth. A severe spell of frost followed, accompanied by disagreeable fogs. On the 28th, the city was enveloped by a fog of extreme density.

The line of atmospheric pressure, as shown by the barometric readings, was wide in range and varied in character. On the 1st and 2nd it was at 30·20 inches, then it steadily fell until on the 9th it was at 29·10 inches, when a cold wet day was experienced. A steady, rapid rise followed, and on the 14th and 16th it was at 30·30 inches. From that point the pressure steadily declined to 29·40 inches on the 22nd and 23rd, after which it rose a few points, and for several days at the close of the month was steady at 29·70 inches.

Frost, amounting to 50°, was noted on 10 mornings, the most of which, however, was registered between the 21st and 29th. The average maximum temperature was 47° and the average minimum 37°. The same as in the previous November.

The rainfall was again low, as only 2·07 inches were registered. There were 15 dry days.

The unusual mildness of the season caused pasture lands to retain an unwonted freshness, and that precocious blooming plant *Jasminum nudiflorum*, began to flower early in the month.

*December.*—The weather during the first week was fresh and mild, with frequent showers. A sharp gale was experienced on the 4th and 5th. Frosts were frequent between the 7th and 11th, with some snow on the 10th. Then for eight days the weather was changeable, with heavy rain at times. From the 20th, it was dry and fine, with slight frosts and fogs until the night of 29th and morning of 30th, when another sharp gale swept over the district.

The variations of the atmospheric pressure were very pronounced, and the barometric readings show a wide range. From 29·58 inches on the 1st, the pressure steadily declined to 28·95 inches on the 7th. Rising sharply on the 8th to 29·50 inches, it varied little until the 12th, when it suddenly dropped to 28·70 inches, and on the following day it rose to 29·40 inches. Following a drop of four points on the 14th, the pressure rapidly increased to 30·30 inches on the 19th, declining gradually after that date until the 26th, when it touched 29·80. After a rise of two points, it sharply fell to 29·40 inches when the gale was at its height on the 30th. An equally sharp rise followed, and on the closing day of the year the barometer indicated 30·09 inches.

Frost was registered on eleven days during the month, the greatest amount for one day was 16° on the 11th. The total amount was 54°. On the 8th the temperature did not rise above 31°, the day being overcast and slightly foggy. The average maximum temperature was 42° and the average minimum 34°.

The rainfall amounted to 3·48 inches, and on two occasions the fall for twenty-four hours exceeded half an inch. There were 13 dry days.

The freshness of the grass lands, which was so noticeable at the end of November, was equally so at the end of the year.

In comparing the records with those of previous years we find the rainfall of 1904 was slightly under the average, which, broadly speaking, is about 36 inches. The amount, 34·87 inches, is in marked contrast, however, to the abnormal amount registered for 1903, when we had a fall of 55·52 inches. March proved the driest month, with only 1·43 inches, though June nearly approached it with 1·54 inches. The wettest month was April, when the rainfall amounted to 4·64 inches.

The heaviest fall for 24 hours was registered on the morning of 23rd July, when the amount was 1·40 inches. This was the only occasion during the year when over an inch of rainfall for one day was recorded.

The number of days on which no rain was registered was 163, whereas in 1903 there was only 138.

The following table of rainfall recorded in the various Public Parks of the City is interesting as showing the variations in the different parts of the City. Due allowance must always, of course,

be made for local conditions, as the exposure, altitude, and surroundings are different in each case:—

RAINFALL DURING 1904 IN THE PUBLIC PARKS.

	QUEEN'S.	MAX- WELL.	KELVIN- GROVE.	SPRING- BURN.	ALEX- ANDRA.	GLASGOW GREENS.	BELLA- HOUSTON.	TOLL- CROSS.	RUCHILL.	BOTANIC GARDENS.	GEORGE SQUARE.
Height of Gauge above Sea-level.	145 ft.	69 ft.	48 ft.	361 ft.	141 ft.	34 ft.	160 ft.	85 ft.	220 ft.	110 ft.	40 ft.
January, -	Inches. 3·93	Inches. 3·90	Inches. 3·53	Inches. 3·31	Inches. 3·57	Inches. 3·80	Inches. 3·53	Inches. 4·10	Inches. 3·56	Inches. 3·48	Inches. 3·29
February, -	2·28	2·23	2·36	1·87	2·35	2·04	1·96	2·14	2·39	2·03	2·14
March, -	1·43	1·04	1·40	1·34	1·55	1·39	1·44	1·57	1·46	1·07	1·34
April, -	4·64	4·09	4·22	3·97	4·36	4·07	3·81	4·72	4·54	3·56	3·75
May, -	3·36	3·17	3·19	3·10	3·64	3·35	2·88	3·71	3·39	3·10	3·54
June, -	1·54	1·58	1·77	1·54	1·54	1·40	1·67	1·79	1·89	1·16	1·60
July, -	3·80	3·26	3·73	2·73	2·78	3·31	2·59	2·64	3·68	3·76	2·81
August, -	3·49	3·17	3·60	3·37	3·24	3·23	3·41	3·76	4·06	3·69	3·19
September, -	2·73	2·94	3·21	2·09	2·56	2·45	3·52	2·68	3·17	3·15	2·33
October, -	2·12	1·92	1·78	1·52	1·80	1·66	1·76	1·68	1·87	1·31	1·75
November, -	2·07	1·72	2·01	1·70	2·27	2·09	1·88	2·21	2·20	1·68	2·17
December, -	3·48	3·50	3·39	2·92	3·59	3·45	3·06	3·86	3·19	2·55	3·26
Totals, -	34·87	32·52	34·19	29·46	33·25	32·24	31·51	34·86	35·40	30·54	31·17

With regard to the temperature, the averages are slightly higher than those of the preceding year, more especially during the spring and summer months. As a degree or two on the mean temperature has a vital effect on vegetation, the importance of higher averages in the "growing months" is obvious.

The thermometer in the shade was at or below freezing point ( $32^{\circ}$  Fahr.) on 68 days, though actual frost was only recorded on 58 days to the extent in all of  $246^{\circ}$ , as compared with  $286^{\circ}$  on 48 days and the freezing point reached on 67 days in 1903. The lowest reading was on the 11th December when  $16^{\circ}$  of frost were registered. March was the coldest month, with  $61^{\circ}$  on 15 days. It is somewhat remarkable that no frost was registered during April, May, June, July, August, and September, while only  $2^{\circ}$  were recorded for October.

The warmest months were July and August. The former had an average maximum of  $64^{\circ}$  and an average minimum of  $51^{\circ}$ , while the figures for the latter month were  $63^{\circ}$  and  $52^{\circ}$  respectively. The warmest day was in July, when the thermometer in shade indicated  $75^{\circ}$  on the 12th. The maximum thermometer was at and above  $70^{\circ}$  on 11 occasions, against 3 times in 1903.

The winds throughout the year were generally moderate, though several severe gales occurred. The preponderance of south-west winds, perhaps, was more marked than usual, especially during the second half of the year. Excluding the direct north and south which are less frequent, the western group prevailed on 291 days, and the eastern 70 days. In the preceding year the figures were 283 and 82 respectively.

In regard to the atmospheric pressure, the range throughout the year was exactly two inches. The highest reading was 30.50 inches on the 22nd January, while the lowest reading was 28.50 inches on the 13th February. The pressure, however, was uniformly higher than that recorded for 1903, as during the year under notice the barometer indicated 30.00 inches and over on 107 days, and 29.00 inches and under only on 16 days, against 71 days for the former, and 20 days for the latter in the preceding year.

In regard to the general effect of the weather on vegetation, the abnormal rainfall of 1903 and the unsatisfactory growth made

that year did not make one look for good results. However, matters turned out better than anticipated, and with the diminished rainfall and warmer temperature vegetation on the whole was satisfactory. Growth began early, and, escaping spring frosts, was fairly continuous, though slow at first, with the too dry atmosphere in May and June. The hay crop harvested better than anticipated. Cereals were almost throughout satisfactory, and were harvested under excellent conditions. Root crops were slow and rather unsatisfactory for a time, but improved greatly after midsummer. Tree and bush fruit crops were irregular and below the average. There was much diversity in the flowering of many trees and shrubs, some varieties of the same species, notably Rhododendrons, bloomed splendidly, while others were flowerless. Deciduous trees and shrubs, on the whole, were good, though they failed to "set," consequently there was a scarcity of seed on many species. That, however, was a gain to the plants, as the bulk have made excellent growth, and the promise of bloom generally is good for the coming season. Rhododendrons, however, somewhat irregularly set with flower buds; probably they lacked sufficient moisture at the right period. The season therefore, may be considered as a good one for vegetation.

Subjoined is the abstract of the meteorological record for the past three years, as kept at Queen's Park, and the averages for the past twelve years.



### Reports on Excursions.

LARGS, 10th September, 1904.—Joint with the West Kilbride Ramblers' Club. — On arrival the party proceeded to the old churchyard, and examined the structure known as the " Skelmorlie Aisle." This was erected in 1636 by Sir Robert Montgomerie of Skelmorlie, to contain the burial-place and monument of himself and his wife, Dame Margaret Douglas, daughter of Sir William Douglas of Drumlanrig, ancestor of the Marquesses of Queensberry. Sir Robert's name is associated with the great feud which was long carried on between the families of Montgomerie and Cuninghame. His most notable act of vengeance was the assassination of Alexander Cuninghame of Montgreenan, Commendator of Kilwinning Abbey. The Commendator, who was the third son of the fifth Earl of Glencairn, was regarded by the Montgomeries with particular hatred as having been accessory to the murder of Hugh, fourth Earl of Eglinton, in 1586, and accordingly he was waylaid and mercilessly shot by Sir Robert at his own gate at Montgreenan, on 1st August, 1591. In his later years, however, Sir Robert is said to have been seized with remorse for the bloodshed of which he had been guilty; and he therefore constructed the " Aisle," with its finely carved monument and gloomy burial-vault, into which he was accustomed to descend at night and spend long hours in solitude and penitential devotions. He died in 1651 at an advanced age. In the vault immediately beneath the monument are deposited two leaden coffins bearing appropriate descriptions, and containing the remains of Sir Robert and his lady.\*

After a pleasant walk along Largs Bay and the north shore, the party reached the policies of Knock Castle, access to which had been kindly granted by the proprietor, Mr. F. G. MacAndrew of Knock. Nothing worthy of being recorded was observed during the excursion. Report supplied by Mr. D. A. Boyd.

KILWINNING AND MONTGREENAN, 1st October, 1904.—The Society's programme of excursions for the present season was brought to a close on this date by a visit to the Kilwinning

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\* For a full description of the Skelmorlie Aisle and Monuments, with figures illustrative of the carvings, &c., see *Archæological and Historical Collections relating to Ayrshire and Galloway*, vol. vi. (1889), pp. 58, 72, pl. ix., x.

district. A visit was made to the remains of the Abbey buildings, where some interesting features of the ancient structure were pointed out by the custodier, Mr. James Gibson. The clock-tower was afterwards ascended, and some time was spent in enjoying the magnificent view obtainable from its summit. On the arrival of the majority of the party by the next train, the excursionists proceeded by way of Fergushill to Montgreenan, where they were met by Mr. Bogie, land steward, who conducted them to various places of interest in the policies. Sir James Bell of Montgreenan, himself a life-member of the Society, showed his sympathy with the pursuits of the visitors by kindly granting liberty of access to the beautiful woods on his estate, and entertaining the company to tea at Montgreenan House. The foliage of many of the trees in the park was already glowing with brilliant autumnal tints, while the garden presented a rich and varied floral display. By no means the least attractive feature of the excursion was a walk along the banks of the Lugton, where the winding path, passing between lines of stately beeches, afforded delightful vistas of woodland and river scenery, over which the shades of twilight had already begun to fall. The estate of Montgreenan has been much improved by its later proprietors, and especially by its present owner, Sir James Bell. Although the woods afford conditions favourable to the growth of fungi, there was not sufficient time available for making a careful search, and those observed were mostly common species. *Erysiphe Martii*, Lév., occurred on living leaves of *Trifolium medium*, and produced in abundance its white mycelium, dotted over with tiny black perithecia. *Marsonia populi* (Lib.), Sacc., was detected on fading leaves of poplar, and does not appear to have been hitherto recorded for the West of Scotland. A Silver Fir (*Picea pectinata*, Loudoun) on the side of the Lugton, which was measured, had a girth of 8 ft. 10 ins. at 4 ft. on high side, 7 ft. 7 ins. on low side.

ARDROSSAN, 8th April, 1905.—Joint with the West Kilbride Natural History and Archæological Society. Mr. D. A. Boyd, Conductor.—There was an attendance of thirty. On arrival at South Beach Station a visit was made to the garden, plant-houses, and conservatories at Kilmeny, which were made acces-

sible to the party through the kindness of Mr. James Cant. The party next proceeded to the Public Park, where the remains of the Castle of Ardrossan were visited. Very little now exists of the ancient structure, which appears to have extended to a considerable size. Its history is involved in obscurity; but Pont, who wrote early in the seventeenth century, states that it was for many ages possessed by the Barclays, one of whom—Sir Richard de Barclay, Dominus de Ardrossan—was a witness to a charter by Sir Richard Morvill, Lord of Cuninghame, &c., to the monastery of Kilwinning. This document is supposed to have been the foundation charter of the Abbey, granted about the year 1140. It is said that Ardrossan Castle was destroyed by Cromwell, and part of its materials used in the erection of the Fort at Ayr. A visit was also made to the site of the old church and churchyard of Ardrossan, in the vicinity of the castle. The original church was blown down during a severe storm in the year 1691, but the line of its foundations can still be traced. The graveyard contains comparatively few monuments, and none of a date prior to the middle of the seventeenth century. During a walk up the north shore, comparatively few plants, and these only the commonest species, were observed in bloom. On the roadside beyond Burnfoot, the whitlow-grass (*Erophila vulgaris*, DC.) was common. At Glenfoot a short detour was made for the purpose of examining one of a series of prehistoric hill-forts which occur at frequent intervals along this part of the western coast. The main road was followed to West Kilbride, where tea brought the afternoon's proceedings to an appropriate close.

SAUCHRIE, MAYBOLE, 24th April, 1905.—Mr. John Smith, Conductor. Joint excursion with the Geological Society of Glasgow.—On this date Sauchrie, an estate with a glen on the Brown Carrick Hill, was visited, by permission of Mr. W. H. Dunlop of Doonside. Among the plants observed were *Arum maculatum*, L., and *Scolopendrium vulgare*, Sym. The following trees were measured:—

Near Maybole, a Black Poplar (*Populus nigra*, L.), girth 10 ft. at 5 ft.; bole, 18 ft.

At Sauchrie, between 300 and 400 ft. above sea level—Holly (*Ilex Aquifolium*, L.), 4 ft. 9½ ins. at 5 ft.; bole, 30 ft.

Laburnum (*Cytisus*), 7 ft. at base ; bole,  $1\frac{1}{2}$  ft. Walnut (*Juglans regia*, L.), 6 ft. 5 ins. at 5 ft. ; bole, 20 ft. Another Walnut, 5 ft.  $9\frac{1}{2}$  ins. at 5 ft. ; bole, 16 ft. Oak (*Quercus Robur*, L.), 9 ft.  $8\frac{1}{2}$  ins. at 5 ft. ; bole, 22 ft. Silver Fir (*Picea pectinata*, Loud.), 12 ft. 6 ins. at 6 ft. ; long bole. Another, 12 ft.  $3\frac{1}{2}$  ins. at 5 ft. ; long bole. A third, 11 ft.  $11\frac{1}{2}$  ins. at 5 ft. 3 ins. ; bole, 11 ft.

Near an old limestone quarry, below Newark Castle, close to new light railway—Crab Apple (*Pyrus Malus*, L.), 8 ft. 11 ins. at 2 ft. ; bole,  $3\frac{1}{2}$  ft. ; a large example of this species.

DALRY TO KILWINNING, 6th May, 1905.—Mr. Archd. Shanks, Conductor. Joint with the West Kilbride Natural History and Archæological Society.—There were twenty-four present at this excursion. The route was towards the Potyan, where *Petasites albus*, Gaertn., covers some hundred square yards. Proceeding along the Saltcoats high road the "Green Knowe," in a field on the left, is passed. This is marked as a "tumulus" on the Ordnance Survey Maps, but Mr. Shanks, who had dug into it for six feet some years ago, found nothing to make him think that it was artificial. It was composed of sand and gravel. From the bridge carrying the Saltcoats road over the Caaf Water two exposures of limestone were pointed out. *Productus latissimus* is the characteristic fossil in them. This limestone appears on the shore at Saltcoats. The Linn Spout was then visited by the party. The Linn limestone is worked in a quarry here for road metal, and is rich in spirifers. The "Spout" comes over limestone and shale some thirty-four feet thick. The Caaf Water has cut through this limestone for a distance of over a hundred yards, as the banks are seen to extend in front. The limestone is covered with sandstone, which has fallen in huge blocks into the bed of the stream, and forms the prominent feature known as the Pinnoch Point. Proceeding, the party examined Bankhead Quarry. The columnar form and the spheroidal weathering of dolerite were well seen. Along the joints of the rock the earthy form of manganese oxide called "wad" occurs. The trap forms a cliff along this part which at some former period would have a mould formed of sandstone, as limestone occurs at the Tower Farm. This farm takes its name from a "tower," the site of which is still pointed out on

the opposite side of the road. Coalhill, Knock Jargon, and Knockrivock mound forts were then visited. At Bankhead a clump of *Sedum Telephium*, L., was observed. *Senecio erucifolius*, L., grows near the boundary between Ardrossan and Kilwinning, on crossing the Monkcastle Burn. Mr. D. A. Boyd reported observing the following microfungi:—*Uromyces alchemilla*, Pers.—uredospores on *Alchemilla vulgaris*; *Puccinia bunii* DC.—on *Conopodium denudatum*; *Uredo scolopendri*, Fekl. (= *Milesia polypodii*, B. White) on *Lomaria Spicant*.

SHEWALTON, 20th May, 1905.—Joint with the West Kilbride Natural History Society.—The party, who numbered about twenty, travelled by rail to Dregghorn, and walked to Drybridge and Irvine. Through permission kindly granted by Mrs. Kenneth, access was obtained to the policies and gardens at Shewalton. The gardens contained some fine species of *Azalea* and other ornamental shrubs in bloom, while the collection of herbaceous plants included several varieties seldom seen in private collections. In the woods, &c., numerous microfungi were noted, including *Uromyces poae*, Rab. (as *Æcidium*), and *U. ficariae*, Schum., both on *Ranunculus Ficaria*; *Æcidium albescens*, Grev., on *Adoxa Moschatellina*; *Puccinia bunii*, DC., on *Conopodium denudatum*, &c. In the course of the walk from Shewalton to Irvine, Mr. John Smith conducted the party for some distance along the river-bank, and pointed out various features of geological interest, including a large shell-bed through which the stream has cut its way. Numerous specimens of *Scandix Pecten*, L., were observed growing on the river-side, while *Teesdalia nudicaulis*, Br., occurred in sandy places on Shewalton Moor. The following trees were measured, viz.:—Gean (*Prunus Avium*, L.), 5 ft. 7½ ins. in circumference of trunk at 3 ft. 6 ins. from the ground, with a bole of 5 ft.; Beech (*Fagus sylvatica*, L.), 11 ft. at 5 ft., bole 11 ft.; Copper Beech (*Fagus sylvatica*, L., var. *atro-virens*, Duroi), 6 ft. 5 ins. at 5 ft., bole 20 ft., and another of 6 ft. 0½ ins. at 5 ft., bole 12 ft. The rocks near Shewalton belong to the carboniferous period, and consist of sandstones, shales, coals, &c. Of later date is a small tract of agglomerate exposed in the River Irvine at Shewalton Mill. It is apparently the neck or stump of a volcano, and is probably

of New Red Sandstone or Triassic Age. When the volcano was in active life the appearance of the country was totally different from what it is now. After it ceased a long period followed, during which the wasting forces of Nature carried off seaward many hundreds of feet of solid rock, and gradually carved out the surface of the ground to something resembling its present condition. The boulder clay which covers most of the lower parts of the country, and which was seen at several places, is the result of ice action upon this long-continued aerial waste and upon the underlying solid rock. Before, and probably during, the intensely cold glacial period, the country stood very much higher than it does just now, as is shown by the deep river valleys of the Kelvin, the Forth, the Almond, &c. But before it passed away the land had sunk to about 100 feet lower than it is at present. The sea flowed up the Clyde valley as far as about Bothwell, up the Kelvin to about Kirkintilloch, and up the Irvine to above Hurlford, a distance of eight or nine miles from the present shore; indeed, it is quite likely that Irvine Bay, if we may so speak, continued up the Garnock valley, and by the narrow straits of Lochwinnoch joined the bay of Paisley or Renfrew, and the waters of the Clyde reached the sea by Lochwinnoch, or perhaps the ice from Loch Lomond closed the Firth. During this time were laid down the extensive deposits of clay that now form what in the East are called the *carse-lands*, and the corresponding level tracts along the Clyde. The land began to rise till it came to within fifty feet of its present level, when it paused for some time and formed another beach, which has, however, been very largely wasted away. To this period belong the shells which were dug out of the laminated clay on the side of the river. Sundry misguided whales sporting in the prehistoric sea became stranded on the shore, and their bones and skulls were in these later days exhumed from under about thirty or forty feet of clay and drifted sand, nearly four miles from the sea as the river flows, but less than one in a straight line. The upward movement of the land continued for about other twenty-five feet, when a long pause took place, sufficient to allow the waves to carve out a terrace of varying width all round the Firth. Where the rocks are very hard, as on the Cowal coast, this shelf is only a few yards in width, but

in this neighbourhood it is much broader; *e.g.*, in the Eglinton policies it is about  $2\frac{3}{4}$  miles from the shore. The primeval coast-dwellers may have seen the latest terrace being formed, but neither they nor their successors have left any record of it or of the subsequent rise of the land to the present level. There may have been movements downwards as well as upwards, but, on the whole, the movement has been upwards since the time of the 100-foot raised beach. The old inhabitants have left records of their existence in their flint implements, &c., which have been found in great abundance among the sandhills from Ardeer to Irvine by various investigators, such as Mr. John Smith and Mr. Joseph Downs, both of whom were present at the excursion. These sandhills are composed of drifted sand blown in from the present beach by the prevailing south-westerly winds, and cover the 25-foot beach for many miles from near Saltcoats to Ayr. The drift is so great that it has more than once altered the courses of the streams and rivers. From the parish boundaries we can infer that the Irvine at one time turned northward about a quarter of a mile higher up than it does now, where the whale remains were found, and joined the present course of the Annick Water, which falls into the Irvine about half-a-mile below the said bend. Another alteration has taken place below the town, the river now making a wider loop than it used to do. Timothy Pont, in 1620, wrote that "the chief porte of ye country of Cunninghame is now much decayed from qwhat it was anciently, being stopt with shelves of sand which hinder the near approach of shipping." Cultivation, railway walls, roads will help to prevent further encroachments of the drifting sand. Whether the extension of golf links will do so or not may depend on the skill of the players!

ABERDOUR AND BURNTISLAND, 25th May, 1905.—A joint-excursion with the Geological Society of Glasgow took place as above, under the leadership of Mr. J. G. Goodchild, F.G.S., F.Z.S.

TINTO, 3rd June, 1905.—An excursion to Tinto, conducted by Mr. James W. Reoch, took place on this date, but nothing of special interest appears in the report.

ROSSDIU, DUMBARTONSHIRE, 17th June, 1905.—Mr. John Renwick, Conductor.—This excursion was well attended. Pro-

ceeding southward by Camstradden House, two splendid Silver Firs (*Picea pectinata*) attracted attention. One on the east side of the road has a girth of 14 ft. at 6 ft. up, and rises to a height of 125 ft. This is the highest tree we have yet measured. Nearly equalling it are the White Poplar at Mauldslic Castle, 119 ft. in 1899, and the taller of the two celebrated Silver Firs at Rosneath, 118 ft. in 1899 (the other being 106 ft.). Not far below these are a Beech at Daldowie, 111 ft. in 1899, and a Silver Fir at Auchendrane, 110 ft. on 10th June, 1905. Next comes the Silver Fir at Camstradden, on the west side of the road, with a height of 105 ft. in 1899, probably 108 or 109 ft. now, as the other tree has grown 3 to 4 ft. since then. It has a much greater girth than the taller tree, being 17 ft. 7½ ins. at 6 ft., and among all the Silver Firs we have measured is excelled only by the two at Rosneath, which were, in 1903, 22 ft. 4½ ins. and 21 ft. 11½ ins. respectively at 4 ft. 6 ins. up, the narrowest parts of rough boles.

On the shores of Loch Lomond, at Camstradden Bay, *Scutellaria galericulata*, Linn., was found.

Near Arnburn, on the side of the highway, is a fine Sweet Chestnut (*Castanea sativa*, Mill.), measuring 14 ft. 4 ins. in circumference at 5 ft.; bole, 12 ft. It is the largest yet recorded in Dumbartonshire, and it is to be hoped that the Road Trustees will spare it.

At the entrance, in Glen Finlas, to Rossdhu is a fine Yew tree (*Taxus baccata*, Linn.), also the largest recorded for the county. It has a height of 38 ft. and a girth of 13 ft. 6½ ins. at 7 ft. 8 ins. from the road, or 3 ft. 8 ins. from the top of a mound surrounding the tree. Near this lodge a *Thuja gigantea*, 58 ft. high, an Elm with a curious curly leaf, and a *Picea excelsa*, rising to a height of 86 ft., with a girth of 9 ft. at 5 ft. up, were seen. Specimens of the Elm were sent to Dr. A. Henry, who replies that "the Elm is *Ulmus campestris*, var. *antarctica*."

In the park near Rossdhu House are a Scots Fir (*Pinus sylvestris*, Linn.), with a fine bole of about 40 ft.; height, 68 ft.; girth, 11 ft. 5 ins. at 5 ft.; and an Evergreen Oak (*Quercus Ilex*, Linn.), girth, 6 ft. 4¼ ins. at 4 ft.; bole, 8 ft. On a ridge beside the house is a fine Douglas Fir (*Abies douglasii*, Lindl.), 12 ft. 1¾ ins. at 4 ft. These three trees are also the largest of their kinds yet known in Dumbartonshire.

Near this "are the ruins of a chapel erected, it is believed, about the commencement of the twelfth century. The portion of the building still remaining is used as the burying-place of the Colquhouns of Luss."\* Beside it is a Yew tree (*Taxus baccata*), nearly as large as the one in Glen Finlas, being 13 ft. 2½ ins. in girth at 5 ft.; bole, 10 ft.†

CRUACH ARDRAN, 15th July, 1905.—Mr. Peter Ewing, F.L.S., President, Conductor.—Six members attended at the rendezvous (Criannlarich), but one of them preferred the botany of the valley. Cruach Ardran is the central hill of a semi-circular group flanking Glen Falloch on its eastern side, and commanding, even at a very moderate altitude, a magnificent prospect of Glen Falloch, Glenorchy, Strathfillan, and part of the Black Mount. The etymology of the name is obscure. "Cruach" seems to have reference to its appearance—stack-shaped—and the nearest approach to an explanation of "Ardran" seems to be "the hill of plunder." The ascent was made from the southern side of the hill, a rather long and uneventful slope having to be traversed before reaching the great outcrop of rocks on which the real work of the day was begun. These slope gradually upward, the lower much moister than the higher groups, but both yielding a good proportion of the forms we were in search of. The rocks are schistose, very much interspersed with diorite. Considering the dry nature, generally speaking, of the upper rocks—those situated about 2,500 feet—and the fact that those of a moister nature only reached the altitude of about 2,000, one would be surprised at the list of alpine plants that could be made. Here *Arabis petraea* seems to attain its southern limit,

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\* Irving. Book of Dumbartonshire.

† The following measurements of trees at Rossilhu were taken on 5th September, 1905, by Messrs. John Renwick and James Whitton:—*Castanea sativa*, Mill, near Glen Finlas Lodge, 11 ft. in girth at 5 ft., the bole being 14 ft.; *Thuja gigantea* (the one referred to in report above), height 58 ft.; *Abies canadensis*, near Glen Finlas Lodge, 6 ft. 4 ins. in girth at 4 ft. from ground, with a bole of 5 ft., at which point the trunk divides into four; *Abies grandis*, near mansion-house, 7 ft. 11 ins. in girth, at 5 ft. from ground; *Cedrus deodara*, in same vicinity, 6 ft. 10 ins. in girth at 5 ft. from ground; *Pinus strobus*, on east side of avenue, 8 ft. in girth at 5 ft., bole 50 feet, height 67 ft.

and the same might be said of *Juncus castaneus*, a plant which is unfortunately becoming rare in the district, but which we saw here in great abundance. What appeared to be *Hieracium alpinum* and *H. calenduliflorum* made a very striking piece of colour as they stood out from one of the rocky shelves, all the more pleasing because the alpine forms of this species have been so nearly exterminated on all our hills. *H. holosericeum*, though common all over the district, was not seen on Cruach Ardran. A few plants of *H. chrysanthum*, var. *tenellum*, as well as a considerable quantity of the species itself, were seen. *Saussurea alpina* was abundant, just breaking into flower, while *Silene acaulis* was just over. *Cerastium alpinum* was flowering freely, and exhibiting two or three of its different forms. This we did not find on Am Binnein. Among the grasses a form of *Poa alpina* was gathered, which gave the conductor great pleasure. This form was hitherto only known to occur in the Glen Shee district, and its station there was known only to Mr. Ewing, who discovered it many years ago. It is one of the well-marked Scandinavian forms of *Poa alpina*, and is more attractive in the growing condition than might be guessed from the appearance of the dried specimen. A few stems of *Aulacomnium turgidum* were seen, but no patches of respectable size. The usual run of dry rock and bog mosses which affect such situations we saw in abundance, but it was very difficult to detect any of the rarer forms. Among the hepatics we noticed *Jamesoniella Carringtonii*, *Bazzania tricrenata*, *Jungermania Mulleri*, *Pleurozia cochleariformis*, and the like common alpine forms, but no outstanding discovery was made. After much unsuccessful searching, *Moerkia norvegica* was given up. It is common on all the adjoining hills.

BLACKHOUSE, 5th August, 1905.—Conductor, Mr. John Renwick. —Owing to very unfavourable weather, this excursion, although arranged jointly with the West Kilbride Natural History Society, was attended by only three. The party travelled by rail to Wemyss Bay, and walked along the shore from Skelmorlie to Blackhouse. Numerous specimens of the galls formed on rushes by *Livia juncorum*, Latr., consisting of conspicuous tassel-like clusters of leaves, were observed in a small roadside marsh. Various microfungi were also noted, including *Tilletia decipiens*,

Pers., on *Agrostis vulgaris*; *Puccinia arenariæ*, Schum., on *Arenaria trinerva*, &c. The following trees were measured, viz.:—*Araucaria imbricata*, R. and P., 5 ft. 8 ins. in girth of trunk at 5 ft. from ground; height, 47 ft.; *Acer platanoides*, 6 ft. 10½ ins. in girth at 2 ft. 10 ins.; bole, 5 ft.

MARINE STATION, MILLPORT, 19th August, 1905.—The annual excursion of the Society to the Marine Station took place on this date, under the leadership of Mr. Alex. Patience.

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## Proceedings of the Society.

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SESSION 1904-1905.

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27TH SEPTEMBER, 1904.

Mr. Peter Ewing, F.L.S., President, in the chair.

The Chairman read a short paper referring to the death of Dr. William Ferguson, of Kinmundy, which took place on the 11th of September. Dr. Ferguson was one of the founders of the Society, regarding whose early days he contributed an interesting paper published in these *Transactions* (Vol. VII. (N.S.), pp. 9-17). He was an active worker in the early years of the Society's existence, and edited the *Proceedings* for the first five years. Business affairs and public life, however, caused him to forego his scientific pursuits early in life, to his regret at its close, as he felt that much pleasure had thus been taken out of it.

Mr. D. A. Boyd reported on an excursion to Largs (p. 290).

The President (Mr. Ewing) read a paper entitled "An Ecological Problem" (p. 225).

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25TH OCTOBER, 1904.

Mr. Peter Ewing, F.L.S., President, in the chair.

This was the Society's Fifty-third Annual Business Meeting, and the usual Reports were submitted.

*Meetings.*—There were Eleven Ordinary Meetings and one Special Meeting during the Session. One of the Ordinary

Meetings was held, on the invitation of Professor Bower, in the Botany Class-room of the University. At the Special Meeting a lecture was delivered on "Scottish Rivers and River Gorges" by Mr. Goodchild, F.G.S., F.Z.S. The meetings were well attended.

*Excursions.*—A programme of excursions was carried out as usual, but the attendances were unsatisfactory.

*Membership.*—This is as follows:—

Honorary Members, - - - - -	17
Corresponding Members, - - - - -	47
Life Members (Ordinary), - - - - -	23
Ordinary Members, - - - - -	210
Associates, - - - - -	11
	308
	308

This shows a falling-off of 13 compared with the previous year. The difference arises chiefly through the deaths of members. The obituary contains the names of Dr. Ferguson, of Kinnundy, and the Rev. Dr. Stevenson, of Glamis.

*British Association.*—The Society continues to be enrolled among the corresponding societies of the Association. The President (Mr. Ewing) was the delegate at Cambridge.

*Finance.*—The Hon. Treasurer's (Mr. John Renwick) Statement of Account was submitted, duly audited. It showed a balance of £133 19s. 3d. at the credit of the Ordinary Fund, and £157 10s. at the credit of the Life Members' Fund (see page 308).

*Library.*—The Hon. Librarian (Mr. James Mitchell) reported that 210 volumes had been taken out of the Library during the year, which is about the average of recent years. Ten volumes were added by gift, and fifteen by purchase. The books in the Library are in good condition, and Transactions and Magazines nearly all bound up to date.

*Transactions.*—Rev. Mr. Knight (Honorary Editor of *Transactions*), reported that Vol. VI. (N.S.), Part III., was issued in January, 1904, and the succeeding part was nearly all in type.

The vacancies in the Council were filled up as follows:—

As Vice-President, Mr. John Cairns, Jun.

As Members of Council, Messrs. John Paterson, Robert Henderson, D. A. Boyd, and Geo. Herriot.

The Auditors, Messrs. Jas. Jack and Joseph Sommerville, were re-appointed.

The following gentlemen were elected Ordinary Members of the Society :—Professor David Ellis, 214 West Princes Street ; Messrs. Walter Wingate, M.A., Penrioch, Tollcross ; James Knight, M.A., D.Sc., F.C.S., F.G.S. ; W. J. Dewar, 202 Bath Street.

Mr. John Smith read a paper "On the Occurrence of Conodonts in the Arenig-Llandeilo Formations of the Southern Uplands of Scotland" (p. 235).

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29TH NOVEMBER, 1904.

Mr. Peter Ewing, F.L.S., President, in the chair.

Dr. Augustine Henry, M.A., F.L.S., delivered a lecture on "Forests, wild and cultivated," which was illustrated by many lantern slides. The meeting was held in the large hall of the Philosophical Society's Rooms, and was well attended.

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27TH DECEMBER, 1904.

Mr. Peter Ewing, F.L.S., President, in the chair.

Mr. Thomas R. Marshall, Woodcroft, Crow Road, was elected an Ordinary Member.

Mr. James Eggleton read a paper on "The Occurrence of Risso's Dolphin (*Grampus griseus*, Cuvier) at Kincardine-on-Forth" (p. 253).

Under the auspices of the Photographical Committee of the Society, an interesting and extensive collection of lantern slides of natural history subjects was exhibited. The exhibition was very much appreciated.

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31ST JANUARY, 1905.

Mr. Peter Ewing, F.L.S., Vice-President, in the chair.

Miss Wanda Zamorska exhibited the nest of the Trap-door Spider ; Dr. T. B. Henderson a specimen of the Horned Toad

(*Phrynosoma coronatum*, Boulenger); Mr. James Mitchell the skin of a monkey from Uganda; and Mr. John Paterson, on behalf of Mr. Charles Kirk, a Little Gull (*Larus minutus*), caught at Dunbar on 20th January.

Dr. Robert Brown read a paper on "The Engadine," and gave an account of its physical configuration and striking features—describing its lateral valley and high passes, its high mountains and series of lakes—also the general geological features of its mountain ranges, with short description of its fauna and flora. He exhibited many botanical specimens collected by himself, among which were *Oxytropis pilosa*, Dec.; *O. Sordida*, D.C.; *Ranunculus glacialis*, Linn.; *Gagea liottardi*, Sch., *Agrostis alpina*, Scop.; *Draba dubia*, Sut.; and *Saxifraga Androsacea*, Linn.

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28TH FEBRUARY, 1905.

Mr. Peter Ewing, F.L.S., President, in the chair.

Mr. John Thomson, 241 West George Street, was elected as an Ordinary Member.

Mr. James Eggleton exhibited two specimens (♂ and ♀) of the Bittern (*Botaurus stellaris*, Linn.) which were shot quite recently within two miles of Ayr. Mr. James F. Gemmill, M.A., M.D., exhibited a deep-water Antarctic Worm, brought to this country by the Scottish Antarctic Expedition. It is a green-blooded worm, with long thread-like hairs on the surface of the body. The Chairman, Mr. P. Ewing, F.L.S., exhibited *Hymenophyllum tunbridgense* and *H. Wilsoni*, from Islay. Mr. J. Ballantyne read a paper on "Coal and its origin."

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28TH MARCH, 1905.

Mr. Peter Ewing, F.L.S., President, occupied the chair.

Mr. John Tannock, 6 Walmer Terrace, Paisley Road, West, was elected as an Ordinary Member.

Mr. John Renwick read a paper entitled "Notes on the Trees in Auchendrane, Ayrshire" (p. 262). Mr. R. S. Wishart, M.A., read a paper on "Some East Fife Flowers" (p. 257), and exhibited some of the rarer plants mentioned in his paper (*q. v.*).

28TH APRIL, 1905.

Mr. Peter Ewing, F.L.S., President, in the chair. who exhibited *Saxifraga oppositifolia*, gathered on the summit of the Yorkshire hills.

Professor J. Graham Kerr, M.A., F.G.S., M.B.O.U., delivered a very interesting lecture, his subject being "The Evolutionary History of certain Organs of the Vertebrata."

30TH MAY, 1905.

Mr. T. B. Henderson, M.D., Vice-President, in the chair.

Reports on excursions to Ardrossan and West Kilbride (p. 291), Sauchrie and Maybole (p. 292), and Dalry to Kilwinning (p. 293), were read.

Mr. Ludovic M'L. Mann, 142 St. Vincent Street, was elected as an Ordinary Member.

Mr. D. A. Boyd exhibited specimens of *Matricaria eximina*, illustrating phyllody of the floral organs. Mr. James Eggleton exhibited two specimens of the Egg-eating Rough-keeled Snake (*Dasypeltis scabra*, L.), from South Africa, and read a paper descriptive of the species and its habits. Mrs. Peter Ewing exhibited growing specimens of *Woodsia ilvensis*, R.Br., and *W. hyperborea*, R.Br., and read a paper giving details of the genus and of its geographical distribution, as also the peculiarities of the species exhibited. She also exhibited specimens of *Phegopteris calcareum*, Sm., and *Primula farinosa*, L., from Ribblesdale, Yorkshire. Mr. John Renwick showed specimens of *Teesdalia nudicaulis*, R.Br., and *Scandia Pecten-Veneris*, L., from Shewalton. Mr. P. Ewing, F.L.S., exhibited a series of Scandinavian Carices. Mr. D. A. Boyd read a paper entitled "Bryological Notes" (p. 273). He also drew attention to the support given by *The Countryside* to the idea of forming fresh colonies for wild animals and flowers, and pointed out the desirability of protesting against such an interference with natural conditions. The matter was referred to the Council for consideration and report.

28TH JUNE, 1905.

Mr. P. Ewing, F.L.S., President, in the chair.

Mr. D. A. Boyd reported that the Council had decided unanimously to recommend that the Society should enter an

emphatic protest against the scheme outlined by the weekly journal *The Countryside*, whereby plants, &c., were to be established in colonies away from their native haunts. It was agreed by the Society that it be left to Mr. Boyd and the Secretary to prepare a note to be sent to the journal above mentioned.

Reports of Excursions to Shewalton (p. 294) and Tinto (p. 296) were read.

Mr. John R. Lee exhibited the moss *Bryum Duvalii*, Voit., from Tinto. As far as Mr. Lee knew, this was the first record for Clyde. It had hitherto only been found on heights such as Ben Lawers, Ben More, &c.

Mr. Johnstone Shearer showed a white variety of Ragged Robin (*Lychnis Flos-cuculi*, L.). The specimen shown was grown from seed collected from a white plant found at Millport three years ago. Hooker mentions that the petals of this plant are rarely white.

Mr. P. Macnair read a paper entitled "Additional Notes on the Geological Factors in the Distribution of the Alpine Plants of the Highlands." At the outset he stated that the object of his paper was to supply further details regarding the secondary structures which had been set up in the Ben Lawers schists by the intense folding to which they had been subjected, and to emphasise again the importance of these structures in determining the present distribution of the Alpine plants of the Highlands. The great bulk of the rocks constituting the Scottish Highlands consists of crystalline schists, originally of sedimentary origin, which had been subjected to dynamic metamorphism. These schists have been differentiated out into well-marked zones, and it was shown that the Alpine plants grew in greatest luxuriance on a band of schist known as the Ben Lawers phyllite, wherever that schist rose to a sufficient altitude, as in Ben Lui, the mountains to the north of Loch Tay, and the Clova Mountains, in Forfarshire. Proceeding to deal with the tectonics of the Highlands, the great axial lines of folding were described, more particular attention being directed to the structure of the ground north of Loch Tay. In this region it was shown that a great facher, or fan-shaped arrangement of the rocks, existed, and that the Ben Lawers

schists occupied the centre or crest of this structure. From the centre of this fan, the pushing forces had exerted themselves in a north-westerly and south-easterly direction, and the rocks had been plicated into deep isoclinal folds respectively, pointing away from the central axis in these directions. Many of these folds had been dragged forward or pushed over as if by some differential movement, which had resulted in the production of strain-slips running in a parallel direction to the lines of thrust. As a rule they were developed to a greater degree of perfection in the finer argillaceous beds than in the more arenaceous rocks. In a phyllite, for example, they were often to be seen to an extent of eight or more to the inch, cutting through an earlier foliation and sending the mica flakes into a series of sigmoidal curves. In cases where further stretching had to take place, actual rupture seems to have been the result, and the plates of mica have been rearranged along the lines of strain. These strain-slips are developed to perfection in the Ben Lawers schist; and it was maintained that they are the principal factors which have determined the present distribution of our Alpine flora, as the plants have been enabled to retain a footing on rocks of this type.

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29TH AUGUST, 1905.

Mr. P. Ewing, F.L.S., President, in the chair.

A Report on an excursion from Aberdour to Burntisland, by Mr. Goodchild, F.G.S., F.Z.S., was submitted by Mr. John Renwick, who also read reports on excursions to Luss (p. 296), and Blackhouse and St. Fillans (p. 299).

The President reported on an excursion to Cruach Ardran, and Mr. A. Patience on one to Millport and Little Cumbrae.

Mr. P. J. Bell showed specimens of *Agriotypus armatus* (Curtis), an Aquatic Ichneumon, parasitic on the larvæ of Trichoptera. This remarkable insect was discovered by Henry Walker on the Clyde, near Lanark, and was described by Curtis in 1832. It does not appear to have been observed in this country since its discovery until April, 1905, when Mr. Bell found it in a stream four miles west of Bearsden. Mr. Bell described it as parasitic on the larvæ of several species of caddis-fly. The female goes under water and deposits her eggs

on the body of the host. The resultant larva devours its host, after which it moors itself by a curious thread-like process from the head-end of the Trichoptera case. It then spins a cocoon and becomes a pupa until the following spring.

Mr. Alex. Ross exhibited fresh specimens of the Dwarf Elder (*Sambucus Ebulus*) from Blairmore.

Mr. James Whitton's report, entitled "Meteorological Notes and Remarks upon the Weather during the year 1904, with the general effects on Vegetation," was held as read.

Mr. P. Ewing, F.L.S., exhibited varieties of a few Alpine grasses and other Alpine plants.

Mr. A. Hill showed growing in a pot a plant of *Osmunda regalis* L., raised from seed.

Mr. John Renwick exhibited *Cichorium Intybus*, L., and *Melilotus parviflora*, Lamk., from Maryhill.

Mr. R. Brown, M.D., exhibited *Aquilegia alpina*, from the neighbourhood of Zermatt, Switzerland.

ABSTRACT STATEMENT OF ACCOUNTS—SESSION 1903-1904.

1903.—Sept. 1.	To Balance—Life Members' Fund, 2½ per cent. Debentures, £87 10 0		
	Do., on loan at 4 per cent., 70 0 0		£17 3 0
	Ordinary Fund, on loan, £17 0 0		15 13 9
	Do., in Bank, and in Treasurer's hand, 101 6 11		5 17 0
			40 0 0
			2 9 8
			1 9 6
			£6 12 3
			0 12 0
			0 4 1½
			4 19 8
			12 8 0½
			1 1 0
1904.—Aug. 31.	By Rent and Attendance, - - - - -		£17 3 0
	Postage, Stationery, &c., - - - - -		15 13 9
	Printing Circulars, - - - - -		5 17 0
	Printing <i>Transactions</i> , 1900-1901, - - - - -		40 0 0
	Illustrations for <i>Transactions</i> , 1901-1902, - - - - -		2 9 8
	Carriage on <i>Transactions</i> , - - - - -		1 9 6
	Library—New Books, - - - - -		£6 12 3
	Insurance, - - - - -		0 12 0
	Postage, Stationery, &c., - - - - -		0 4 1½
	Binding, - - - - -		4 19 8
	Donation to Marine Biological Association, - - - - -		12 8 0½
	Balance—Life Members' Fund, 2½ per cent. Debentures of the Modern Permanent Building and Investment Society, Melbourne, - - - - -		1 1 0
	Do., on loan @ 4 per cent., - - - - -		£81 5 0
			*76 5 0
			£157 10 0
	Balance, Ordinary Fund, on loan @ 4 per cent., £10 15 0		
	Balance, Ordinary Fund, in National Security Savings Bank and in Treasurer's hands, 123 4 3		291 9 3
			£387 11 2½

\* On Security of Guaranteed Railway Stock.

1903.—Sept. 1.	To Balance—Life Members' Fund, 2½ per cent. Debentures, £87 10 0		
	Do., on loan at 4 per cent., 70 0 0		£275 16 11
	Ordinary Fund, on loan, £17 0 0		66 7 6
	Do., in Bank, and in Treasurer's hand, 101 6 11		18 0 0
			1 15 0
			0 5 0
			7 15 6
			1 1 8½
			15 2 7
			0 7 0
			1 0 0
			£387 11 2½
From Balance of £133 19s. 3d. falls to be deducted cost of <i>Transactions</i> for 1901-1902, for 1902-1903, and for 1903-1901.			

GLASGOW, 17th October, 1904.—We have audited the above Accounts, compared same with relative Vouchers and Securities, and find them correct. Cash in Treasurer's hands, Eleven pounds Sixteen shillings.

(Signed) JAMES JACK, } Auditors.  
JOSEPH SOMMERVILLE, }

## Natural History Society of Glasgow.

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schaft.
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