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PROCEEDINGS AND TRANSACTIONS OF THE BOTANICAL SOCIETY

Sir Robert Christison

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PROCEEDINGS AND TRANSACTIONS

OF THE

BOTANICAL SOCIETY.

SESSION XL.

11th November 1875.—Sir ROBERT CHRISTISON, Bart.,
President, in the Chair.

The President delivered the following address:—

The preparation of an annual address by the president of a scientific society imposes on his ingenuity a task which is sometimes of no little difficulty; so that one is apt occasionally to think that the custom, like some other apparently goodly time-honoured customs, might prove to be now more honoured in the breach than in the observance. The difficulty is all the greater when, as in my present predicament, the deliverer of the address has not the familiar acquaintance that most of his audience possess with the science which for a time he is called on to represent.

On confiding my embarrassment to my colleague, Professor Balfour, he made a suggestion which met both my deficiency in strict botanical resources and my scanty professional leisure at the present busy period of the year—viz., that I should offer you my gleanings in the several branches of natural science, gathered during my recent autumnal intervals of idleness, and while pursuing no definite line of inquiry, but accepting what came accidentally in the way as I roamed through an interesting country, observing little more than the surface of things.

It was my good fortune to spend repeatedly several days

of August and September at the picturesque village of St Fillans, situated at the eastern end of Loch Earn. The district around is one of the most beautiful and interesting in all Scotland to one who has the requisite physical ability to make use of his opportunities; and, in point of attractiveness and convenient distance, I doubt whether there is any other to compare with it for him who, in holiday-time there, must nevertheless occasionally revisit his home professional haunts.

The district I mean is usually called Upper Strathearn. It extends for about twenty miles in the form of a rather narrow, and, on the whole, straight valley, in a direction nearly from west to east, between Lochearnhead and the town of Crieff; after which it opens out into a wide highly-cultivated lowland strath, familiar to the many who pass through it by rail from Stirling to Perth. Upper Strathearn was formerly a cross route, little frequented by the traveller, because not traversed by an unhallowed railway. But it has recently formed the coaching part of one of the Caledonian Railway Company's "circular tours;" and now a fine level road of twenty miles is travelled in the touring season by three large *char-a-bancs* each way, carrying in all about 120 passengers daily in one direction or the other. They pass through charming and ever-varying scenery. But he has seen scarce a tithe of the attractions of Upper Strathearn who does not linger in it, leisurely visiting its waters, its woods, its lateral glens, and its mountain-tops.

The strath commences in the west, where Strathyre from the south, and Glen Ogle from the north, meet at Lochearnhead village. Here its bounding mountains are about 2200 feet high. Their summits on one side are distant fully four miles from the summits on the other; but they usually present steep and lofty slopes of grass or heather near the lake. At the middle of the length of the lake, however—at Ardvoirlich—the mountain summits recede farther from one another. On the south bank, Glen Voirlich opens in the valley wall a wide gap, which is blocked up about three miles from the water's edge by Ben Voirlich, a fine mountain of 3224 feet, which overlooks all the surrounding region, and is familiar to us in Edinburgh as a fine dome,

while in clear weather at a distance of fifty miles ; and opposite Glen Voirlich, on the north side of the lake, Glen Veich rises northward very gently for a long way up, and its terminal heights of 2200 feet are fully five miles from the lake edge. This structure of the country curiously affects the rain of the district. Often, during the frequent intermitting south-westerly rains, heavy showers are seen falling over Lochearnhead, and passing westward half way down the lake ; but the rain-clouds are there caught by a side current of air from Glen Voirlich, and swept northward across the lake to Stron More, the eastern mountain boundary of Glen Veich, and thence transmitted to Loch Tay, without touching St Fillans, though in the original direction of the clouds.

The village of St Fillans consists of a large hotel at the outlet of the lake, a line of old cottages down the north bank of the river, and another line of new villas up the same bank of the lake.

At St Fillans the mountain-tops maintain the same elevation of about 2200 feet ; they approach nearer one another by a full mile than at Lochearnhead ; and their near slopes are much steeper, more rugged, and more broken by scattered cliffs and precipices. Immediately below the village the valley contracts almost to a gorge, with little more room at the bottom than suffices to form a narrow border on each side of the effluent river Earn. But a little lower down the vale opens up again into a wide cultivated flat, on the south edge of which stands the old house of Dundurn, now occupied as a farm-house. Another contraction succeeds, and after that a second wider and more level flat than the last, constituting the manorial grounds of Dunira House, which is situated on its northern edge. Another contraction follows, and then another still wider and much longer plain, in which the river Earn from Loch Earn, the Lednock from the northerly glen of the same name, and the Ruchill, which drains Glenartney in the south, all meet close to Comrie, famous for its earthquakes.

Eastward of Comrie the strath retains for the most part considerable width, is bounded no longer by rugged mountains, but by low, smooth heights, and is richly adorned

with agricultural fields, and the finely wooded grounds of Lawers and Ochtertyre, extending to Crieff. These various, extensive, and generally level flats are obviously the bottoms of ancient lakes, drained by the river having gradually cut through the bulwarks formed by jutting spurs from the bounding mountains. The wild, rugged, steep, mountainous slopes fall abruptly into these lacustrine flats; and thus the contrast between the rough slopes of broken heath, grass, natural wood, and cliff, with the smooth, cultivated fields, manorial lawns, and planted forestry in the plains below, is everywhere very imposing, because unusual.

The geology of the district of Upper Strathearn has not yet been reached by the Government Geological Survey, and would require more time and more endurance than I now possess for its full investigation. But my gleanings may show more competent inquirers what a careful survey may elicit. The prevailing rock everywhere is mica-slate. In most quarters there is nothing else to be seen. On the north side of Lochearn, about a mile east from Lochearnhead village, there is a quarry of fine crystalline bluish-grey primitive limestone, such as occurs here and there in other quarters of the great mica-slate range of the Grampians. This quarry has been long worked for supplying the wants of an extensive neighbourhood. Near St Fillans, Macculloch, in his Geological Map of Scotland, marks a trap dyke as crossing the lake near its lower end. The fact is, that from the west end of the villas on the north margin of the lake, for half a mile of the road westward, a dark brown, fine-grained very hard trap, apparently basalt, is exposed here and there by cuttings for forming the road; several small natural exposures of the very same sort of rock may be also seen on the roadside opposite along the south bank; and on the face of the slopes overhanging the old village on the north several low cliffs of the same kind of rock are met with up and down to the height of 1000 perpendicular feet above the bottom of the valley, on the way to a small upland loch or "tarn," called Loch Boltachan. I have no doubt that this rock may be found extensively in the neighbourhood.

Wherever a horizontal or sloping surface of this hard rock is exposed in the lower parts of the hill-slopes it

presents fine specimens of glacier grooving, scratching, and polishing. Immediately west of the last villas of St Fillans a quarry of the said rock is worked for house-building and road metal. A few yards beyond it, on the edge of an uphill path, there is shown a slab about 21 feet by 8, which is quite covered with characteristic grooves. The face of it rises towards NE. by E., at an angle of about 30° , and consequently it looks up the lake. The grooves, of various sizes, and perfectly parallel, rise obliquely across it, in a direction almost due west to east, which is almost exactly the dominant line of Loch Earn; and the stone otherwise is smoothly polished. I am sorry to add that it is undergoing a farther process of polishing as a slide for the village children, not by any means to its improvement as a geological specimen. On the opposite bank, within a mile of the outlet of the lake, there are at irregular distances three exposures of the same grooved rock on the roadside. Two of them are small. The third, a hundred yards east from Ardtrostan House, is a triangular slab, 18 feet long, and nearly 8 feet at its widest. Its face slopes upwards towards the south, and therefore looks across the lake, the angle of rise being about 25° . It is quite covered with shallow grooves and fine scratches, parallel to one another, ascending the face of the rock at a small angle, and in a direction from 9° S. of W. to 9° N. of E.—being the line of the Loch Earn valley at this part. The two small slabs nearer the lake outlet present scratches whose direction differs only by a very few degrees from that now given. Through the kindness of the Rev. Mr Drummond, I am able to put before the society a photograph taken by him of the Ardtrostan slab. As the prevailing rock on either side of the valley, especially in the lower regions of its lateral acclivities, is mica-slate, marks of glacier action are not to be looked for on so soft and destructible material. Consequently, I long looked in vain for grooved surfaces in the lateral valleys which join Strathearn in a cross direction. At last one instance was found in Glen-Gonan, which joins the main valley from the south nearly at right angles a short distance east of the old village. The glen rises very abruptly from the first lacustrine flat I have mentioned, that of Dundurn. About a

mile from the bottom, and 600 feet above the flat, a very hard coarse sandstone crosses the crack up the glen. On a space about 8 feet square this rock presents a polished surface, crossed by grooves and scratches in a direction nearly north and south, and exactly in the line of that part of the glen where the rock occurs. These groovings, therefore, are nearly at a right angle with all those I have hitherto seen in the main valley.

The evidence thus presented of glacier operations led me to look also for ice-borne boulders. Black's "County Map," which indicates a "Rocking-stone" up Glen Tarken, gave me great encouragement; and when I was told in the neighbourhood that it was a stone bigger than a big cottage, I became impatient for the search. It was easily found, two miles up a most desolate glen, in which, as beheld from the stone, there is not even a bush to be seen, except a solitary Scotch fir, more than a mile farther up, looking great from a distance, but dwindling on close approach to a very ancient-like dwarf, 25 feet high only, and 4 feet 2 inches in girth at 5 feet from the ground. But it grows in a wilderness, 1250 feet above the sea, at the bottom of the green, grassy corry-wall which closes the glen at its upper northern end. The "rocking-stone," unhappily, proved to be no true boulder, but a remarkable mica-slate rock, resting on a beautiful gently-inclined green sward—apparently a slip from a small cliff above at no great distance, shaped like a hay-stack, but with its four under sides much more inclined, and measuring 28 feet in length, 22 in breadth, and 24 in height. Besides for its magnitude, it is also remarkable, inasmuch as there is no other stone of even moderate size visible in the glen around. As for its rocking, the strongest clan in the Highlands could not stir it one inch.

The Strathearn mountains present few precipices of any great magnitude. In the upper part of Loch Earn there are only a few scattered small cliffs. Ben Vorlich has a precipitous appearance on its north face to the spectator passing along the road on the north bank of the lake. But the appearance is deceptive, and is produced by the steep concave acclivity for 1200 feet from the summit, being covered with loose mica-slate stones, which give the moun-

t in a grand imposing appearance, as it closes and overhangs Glen Voirlich at its foot. There is scarcely even a low cliff on it to supply this vast stony accumulation. On its south face, however, there is a precipice of no great height, and occupying but a small proportion of the slope. Lower down the loch cliffs are more abundant; and at the foot of the loch, Dundurn Hill, or the Birren, opposite St Fillans, is a bold mountain of 2011 feet, everywhere steep, and on its east and north-east sides consisting chiefly of a succession of precipices, but with accessible ravines among them.

Loch Earn itself is $6\frac{1}{2}$ miles in length, and at most places three-quarters of a mile in breadth. Unlike many other Highland lochs, it has very little swamp at its upper end, and none whatever at its outlet, close to the Hotel of St Fillans, where it becomes a rapid, narrow, strong river quite abruptly. It is supplied by so many mountain streams from Strathyre, Glen-Ogle, Glen-Ample, Glen-Voirlich, Glen-Veich, Glen-Tarken, and so great a multitude of ravine streamlets besides, that on one occasion of a three-days' rain, last year, the level of the lake rose two feet. But its banks, though they are in general such as to allow easy access to the water's edge, are high enough to prevent overflow, except at a few places in very heavy floods. The water, like that of other Highland lochs among the mica-slate mountains of the Highlands, is always very pure. When much reduced by long drought, Loch Earn seems to be almost exactly akin in all respects to Loch Katrine in point of composition. It contains mere traces of carbonate of lime, chloride of sodium, and colouring matter, with a little free carbonic acid. Although I have not made an exact analysis, I am confident that the whole solids cannot exceed a 40,000th part of the water. The first rains, after long drought, render the water slightly more coloured; but after the three days' rain already mentioned, the colour was less than it was even after long dry weather, probably because the first days of the storm would wash away the greater part of soluble matter produced in peat and turf by exposure to previous sun and air. In this last condition the action of reagents was so much reduced that the water

presumptively held not more than a 50,000th at most—probably nearer a 60,000th only—of solid matter.

I could obtain no sound information as to the depth of Loch Earn. Presuming that it would be considerable, and being anxious to repeat upon this lake the observations I had previously made on the deep-water temperature of Loch Lomond, I took soundings at various parts, but found no deeper water than 43 fathoms, nearly opposite the farm of Derry. I was assured, indeed, that opposite Edinample Castle, at the upper end of the lake, eighty fathoms had been observed; but careful trials across at distances of fifteen oar-strokes, gave only twenty-seven fathoms, for the deepest water there. Forty-three fathoms was not deep enough water for a satisfactory observation. On 22d September of last year (1874), the air temperature being $59^{\circ}5$ F., the surface was $54^{\circ}5$, and the water at 43 fathoms 46° . I expected to have found it lower; for in Loch Lomond at 42 fathoms I obtained $42^{\circ}0$ or $42^{\circ}5$. The extraordinary continuous mildness of the previous winter of 1873-4 may have caused the difference, or perhaps the greatly inferior depth of Loch Earn.

Of course, the feeding streams must be of equal purity with the lake. There are many fine springs in the district, though none of them voluminous. I have examined six, which contained between a 16,000th and 21,000th of solids, the same in nature as the solids of the ordinary simple spring waters of the hilly country both in the Lowlands and Highlands. I have never yet found a true spring water which presented the slightest trace of colour when tested by the severest of all tests—a 16-inch glass tube held over a sheet of pure white paper. In long drought the streams supply the lake chiefly with spring water, which, however, contrives to pick up a trace of colour in its descent, or in passing through peaty hollows near its source. The rain water which floods these streams is of course also free from colour. It is also, and naturally in this midland district, extremely pure in other respects. Collected in a south-easterly rain, when the wind was by no means strong, and at a place where no house stood to windward, the water was not visibly affected by our most delicate chemical reagents. But it soon acquires a trace of salts and of colour,—

but a mere trace, as it descends the mountain sides. The lake water thus is always slightly coloured.

The purity of the water of the streams adds greatly to the beauty of the numerous waterfalls in high floods, because the broken water is of silvery whiteness, not brown or yellow as in flooded lowland rivers. Spout Rolla, a fall of about 135 feet on the Lednoch, about five miles above Comrie, had, in point of volume, when in high flood after three days' rain, all the magnificence of the Falls of the Clyde, though pure white in hue. In similar circumstances a fall in Glenartney, about four miles up the Ruchill, which has in the middle of it a broad shelf, favourable to the ascent of salmon and sea-trout, enables one to see admirably, from a rock overlooking the shelf of broken white water, the frantic efforts of the numerous fish to ascend the upper leap; as their black noses and backs render every attempt most visible, owing to the complete contrast of colour.

Considering the slight peaty impregnation of the water of Loch Earn, it follows that the lake ought to support the life and growth of the green, slimy, confervoid, vegetable-looking matter, which is met with in peaty water, attached to immersed stones near the edge, and which in some lakes such as the now notorious St Mary's Loch, constitutes, in the dried-up, withered, bleached condition after long drought, what poets recognise as the "silver strand." At Loch Earn there are few stony beaches which are left dry in long droughts. But near Ardvoirlich there is a suitable one, and there, accordingly, we have the green slimy confervoid growths on the stones within the water's edge, and fringing it outside a silvery band of stones thickly covered with the same matter, dried and blanched by long exposure to sun and air, and occasionally sprinkling with spray or scanty rain. I have supplied Dr Balfour with specimens for the museum of—1. A stone with this matter dried on it in the fresh and green condition; 2. A specimen of the same extended and dried on a slide for microscopic examination; 3. A stone covered with the bleached matter, in a radiated fibrous sheet, from the silver strand near Ardvoirlich, and 4. A large sheet of the same from the top of a stone much too large for convenient removal. On examining No. 1,

while in the water, the matter is distinctly seen to stream away from the stone in dark green branching tufts, which one would at once pronounce to be vegetable in nature. But on examining a portion microscopically, such as No. 2, it is clearly seen to consist of nothing else than a few delicate cylinders, round which are interlaced numberless diatoms, consisting chiefly of spicular *Synedra splendida*, with a good many ladder-like specimens of a *Tabellaria*, a few of *Achnanthes*, and rarely a *Gomphonema*. The withered specimens, 3 and 4, present the same composition.

Having these rather repulsive-looking, but really most curious and interesting, bodies at command in their living state, I was anxious to test by actual experiment the truth of a suggestion thrown out in my account of the waters of St Mary's Loch and its effluent stream the Yarrow, given to the Royal Society three years ago—that the diatomaceous growths live upon the peaty matter in the water, and consequently abstract from it organic colouring matter, and purify it. The length of time required for making a good experimental trial is so great that I could make only one; and it was not in all respects exactly comparative. But the result so far was that the fresh diatomaceous mass did not thrive in spring water, and was gradually broken off in small fragments from the stone to which it was attached; while in the loch water, supplied from time to time with a little colourless spring water as it lost volume by evaporation, and also in a much stronger peaty water, the growing material thrived better, and did not break off nearly in such quantities, and the colour appeared less in five weeks. I cannot pledge myself, however, to the accuracy of this my first and only experiment.

A mica-slate country covered with grass and heather, or in their absence with stones, is not likely, even although mountainous, to prove a rich field to the botanist. Moreover, as I was not in the district till the middle of August, the season was rather late for the detection of the rare Highland species, if there be any such among the hills and glens of Strathearn. What particularly struck me in regard to vegetable life there is the favourable nature of the climate for the growth of trees and shrubs, owing probably to the frequency of rain, the protection its northern moun-

tains afford against northerly winds, and the small elevation of its bottom above the sea—that being at Lochearnhead only 310 feet, though it is distant nearly sixty miles from the nearest part of the German Ocean, and thirty-five miles in a straight line from the entrance of the river Earn into the Firth of Tay.

The upper part of the banks of Loch Earn is rather bare of wood. But at Edinample Castle, the earliest stronghold of the Breadalbane family, at the upper end, there are some very fine thriving sycamores and limes, measuring from 12 to 14 feet in girth at 5 feet from the ground, already lofty trees, and promising to be still more so. At Ardvoirlich there is on either side of the wide glen a great extent of wild natural copse, of oak and birch chiefly, which only requires to live in order to become a forest; and eastward of the house of Ardvoirlich there is much planted wood, chiefly larches, which, close on the roadside, are from 90 to 100 feet tall by actual measurement, and vary from 8 to 10 feet in girth at 5 feet from the ground. One which had been quite recently cut down presented, where it was cut close to the ground, eighty-two annual rings, twenty-seven of which occupied the first 6 inches of the radius, and the remaining fifty-five 6 inches only. As the ten exterior rings occupied a radius of half an inch only, the tree had plainly ceased to grow, and probably on that account had been cut down. The wood, however, was sound to the core, even to the very bottom. Nearly a mile east from the mansion of Ardvoirlich, a natural mound rises from the roadside to the height of about 80 feet, and is topped by a solitary old Scotch fir, of very picturesque form. As it stands alone, it is a conspicuous object from a considerable distance on the lake or across it. It has the character at St Fillans and Lochearnhead of having been the "hanging-tree" of Ardvoirlich, on which the chief in former days suspended his own rogues as well as his enemies when caught offending; but the present family deny the tradition, and consider the tree not old enough. It is about 55 feet high, and measures 9 feet 6 in girth at 5 feet from the ground. It may be old enough, if it has for some time grown as slowly as between September 1874 and September 1875; for I could not make out the slightest

difference. Among and near the tall larches some native oaks have attained a considerable size, and are thriving vigorously. Between this and St Fillans the natural wood which extends far up the slopes, is only now passing from the state of copse to that of forest. In the grounds of Dunira are again seen in great abundance stately trees, chiefly of larch, silver fir, and spruce, about the same size as those of Ardvorlich. The same luxuriance of pine forest is met with on the west bank of the Lednoch, near Comrie. But the finest forest trees of other kinds are those on the property of Lawers, east of Comrie, and that of Ochertyre, between Lawers and Crieff. On the former the highway passes through a long and splendid alley of beeches and oaks measuring 12 and sometimes 14 feet in girth. In the Ochertyre grounds fine larches and spruce abound, also aged ash trees of great size, one of which, to appearance quite healthy, measures 20 feet in girth at 5 feet from the upper ground of a steep bank on which it grows. I apprehend there are very few growing ash trees in Scotland of the same magnitude. A native tree which grows in this district to a size I was not previously aware of is the alder. About two miles up Glen Veich there is a steep bank of short grass on the east side of the stream, which is dotted like a gentleman's lawn with old but mostly decaying alders. The trunk of several measures 10 feet in girth at the narrowest part before branching, and one measured so much as 12 feet. But the most remarkable thing about them is that about a third of those I inspected have formed a strange alliance with the mountain ash. One of these, of which I present a drawing, consists of a great alder-trunk, enclosing the trunk of a healthy mountain ash, about 3 feet in girth, so closely that the two form seemingly one trunk. (Plate VI.) Another mountain ash rises from the very middle of the trunk of an alder 12 feet in girth, and at the height of 5 feet bends abruptly outwards, as if it were a branch of the alder itself, 42 inches in girth. In all these embraces the two species are so closely pressed together that it is difficult to say whether there is union between them or not. But I came to the conclusion that there is none.

Native shrubs also grow luxuriantly in this district. I

have been much struck especially with the luxuriance of the dog-rose. It must have been a splendid sight when in flower in July, dotted as it is over the extensive green, grassy slopes 300 or 400 feet above the edge of the lake. It was not my good fortune to see the shrub in this state. But its stature, its trunk, its foliage, and, in September, its profusion of crimson fruit, were very striking. I have been able to supply Dr Balfour with a trunk which measures 8 inches in girth. It shows very distinctly twenty-one annual rings, but outwardly looks much more venerable than these indicate. In its fresh state, a transverse section at any point shows beautifully the transverse medullary rays passing through the wood from its centre more than half way into the bark. Young twigs of the dog-rose have a large pith surrounded by pliant feeble wood. But a trunk of eight or ten years is very dense, strong, and tough when dried ; and as it is easy to get one 5, or even 6, feet long, I recommend it to Dr Balfour and the Alpine Botanical Club as a first-rate material for a Scottish Alpenstock. Another example of luxuriance among shrubs is the common juniper. Low down, it tends even to put on the character of the erect variety, and would probably succeed with a little kindly training. In general, however, it preserves the characteristic procumbent modesty of the Highland juniper. On the steep acclivity north of the village, on the way to Loch Boltachan, I found, at the height of 1250 feet, a solitary ancient bush, 6 feet high, and of great extent, rising in several stems, or probably branches, from a trunk concealed by a conglomeration of big stones which cannot be removed. One of these branches, twisted like the letter S, I brought away for Dr Balfour, as evidence that it has attained the girth of 14 inches. It presents fifty-four annual rings ; and both its whole wood and the bush itself are perfectly healthy.

I should like, in conclusion, to say a word or two about Ben Voirlich. With little rock, and none on the side towards Loch Earn, it is nevertheless a very fine mountain, whether seen from a northerly and near point of view or from some distance east ; as, for example, from several points of the Stirling and Perth Railway, whence it is seen with a very pointed top and steep declivities. Its ascent

of 2900 feet from the loch's edge (3224 in all) is, for the most part, easy from Ardvoirlich House gate, first along a rude path, then over luxuriant grass and little heather, next over short grass, then up 300 feet of disagreeable scattered loose stones, and, lastly, over a curious thick, soft, dense carpet of intermingled moss, crowberry, grass, and bilberry. In spite of its altitude, the summit is not bare, like the mica-slate mountains of its own height generally throughout the Highlands. The summit is a narrow, slightly saddle-shaped crest, with two roundish heads, on the east one of which has been erected the Ordnance cairn; and the only stones seen on the top are those of the cairn. The rest of the summit is a thin continuation of the carpet immediately below, all of its component plants being dwarfish, and especially the bilberry. Luxuriant close bilberry, let me add, clothes the whole summit of Dundurn Hill, 2000 feet above the sea; and the top of a hill of the same height, on the opposite side of the strath, is entirely covered with luxuriant bearberry.

Ben Voirlich top commands a magnificent prospect, and I was fortunate in being favoured with a singularly clear atmosphere. I must not dilate upon this theme here. Let it suffice that we saw the Glen Tilt mountains in the east, those of Braemar in the north-east, Ben Lawers, of course, near us to the north, Ben Lomond and the Arrochar mountains westward, and in the north-west Ben Nevis with its great precipice, the sections of which we could analyse easily with the telescope, though forty miles distant—besides Ben More, Stobinean, Dr Balfour's recent favourite Ben Louy, and Ben Douran, and also Meal Girdy, Ben Heschkernish, and others in the same quarter, which at our distance appeared quite as tempting to the botanist as their two neighbours, which Dr Balfour has recently made famous by his discoveries and his misadventure.

I ascended Ben Voirlich a second time a week afterwards, partly to repeat the view from the summit, partly for one of a series of experiments on the alleged property of the Peruvian *Coca*, or leaves of the *Erythroxylon Coca*, to replace food, preserve vigour, and prevent fatigue during such severe bodily exercises. I must reserve details for another occasion. But I must say now that I have con-

stantly experienced the invigorating effects observed on the natives of Peru by travellers in that country.

The following statement respecting the Members was read by the Chairman :—

Honorary Fellows:—

Royal Personages,	3
British Subjects,	6
Foreign,	25

Ordinary Fellows elected during 1874-75.

Rev. George Alison.	John G. McKendrick, M.D
Aghornáth Chattopádhyaý.	F.R.S.E.
Rev. John Clark.	W. J. Normand.
James Cowper.	Charles Pearson, C.A.
D. C. Davidson, L.R.C.P. and	D. Thomson Playfair.
S.E.	C. S. Stephenson.
P. B. Gibb, M.A	Rev. Wm. Turner.

Non-Resident.—John Gibson, B.A.

Associate.—Andrew Brotherston.

Deduct Deceased,	10
„ Resigned,	1
„ Cancelled,	1

The following are the Obituary notices for the year :—

JAMES WILLIAMSON EDMOND was a distinguished student of medicine at the University of Edinburgh. He devoted special attention to botany. In 1870 he received the degrees of Bachelor of Medicine and Master in Surgery, with honours of the second class. He became medical attendant in the Asylum at Inveresk, and was a young man of great promise. He gave much aid to Dr Carrington in the preparation of his work on “British Hepaticæ,” more especially in the microscopical part of the investigations. He joined the Society in 1870, and died on 22d March 1875.

JOHN EDWARD GRAY was born at Walsall in 1800, and died in March 1875 having just completed his 75th year. He was a son of Mr F. Gray, author of the “Supple-

ment to the *Pharmacopæia*," and grandson of Mr S. Gray who translated the "*Philosophia Botanica*" of Linnæus. It was intended that he should enter the medical profession, but his studies were early directed to botany and natural history. In 1819 he joined the London Philosophical Society, and in 1822 he became a fellow and the secretary to the Entomological Society of London, which afterwards became the Zoological Club of the Linnean Society; and ultimately in 1826, was developed into the Zoological Society. Dr Gray was one of its most active members until failing health laid him aside. In 1824 he was appointed an assistant in the Natural History Department in the British Museum, of which he was appointed keeper in 1840. Dr Gray's life was one of unceasing activity for more than half a century, and he published very numerous books, memoirs, and papers in all departments of natural history. In 1852 the honorary degree of Doctor of Philosophy was conferred upon him by the University of Munich, and in 1860 he received the large gold medal of merit from the King of Würtemberg. He was a member of many foreign societies and academies. He was elected a fellow of the Linnean Society in 1857, and of the Botanical Society of Edinburgh in 1837.

FREDERICK HELLWIG was elected a foreign corresponding member of the Society in 1843, and contributed at that time to the Herbarium. He died at Sommerfeld, Berlin, on 17th March 1875.

ANDREW INGLIS was born in Edinburgh in 1837, and was educated, under the care of his father, Dr Archibald Inglis, at the High School and the Edinburgh Academy. He afterwards studied medicine at the University of Edinburgh, and obtained the degree of M.D. in 1859. In 1860, he was admitted a licentiate of the Royal College of Surgeons, and in 1863 a fellow of that body. He continued to pursue his studies in midwifery, and in 1867 lectured on that subject in the Edinburgh Extra Academical Medical School. In 1869, he was appointed to the Chair of Midwifery in Aberdeen, the duties of which he discharged till about two years ago, when his health broke down. He

obtained two years' leave of absence, but his health did not improve, and after a long period of great weakness, he died under an attack of congestion of the lungs, on 13th March 1875, at the age of 38. He joined the Society as a Resident Fellow in 1856. He was a zealous student of botany, an active field botanist, and even after the very serious impairment of his health, lost no opportunity of collecting specimens of interest. Among other things collected during his illness may be noted the very remarkable monstrosity of *Primula vulgaris*, described by Professor Alexander Dickson, at the last meeting of the British Association at Bristol.

Sir WILLIAM JARDINE, Bart., of Applegarth, was born in Edinburgh, in February 1800, and died in the Isle of Wight on 21st November 1874. He was the son of the sixth baronet, by a daughter of Thomas Maule, the representative of the Earls of Panmure. He attended medical classes in Edinburgh with the view of entering the medical profession, but having succeeded his father when he was only 19 years old, he took up his residence at Jardine Hall, his family dwelling-place. He was very fond of botany and natural science, and formed a large collection of natural history objects. In 1825, he and Mr Selby of Twizell, commenced the publication of "Illustrations of Ornithology." In 1833, he began "The Naturalists' Library," which was completed in forty volumes within ten years. He also published a new edition of Wilson's "American Ornithology." He was for some years joint editor of the "Edinburgh Philosophical Journal" along with Professor Thomas Anderson and Professor Balfour. He also wrote the following:—New edition of "White's Selborne," "British Salmonidæ," "Ichthyology of Annandale," "Contributions to Ornithology" in 3 volumes. He was a fellow of the Royal Societies of London and Edinburgh, and at one time president of the Berwickshire Naturalists' Club. He joined the Botanical Society in 1841.

WILLIAM MACDONALD was born in 1798, and died at St Andrews on 1st January 1875. He inherited a good estate in Argyllshire, and applied himself to executing extensive improvements on his property. Unfortunately he involved

himself in financial difficulties, and was obliged to sell the estate. He then studied medicine, and received the degree of M.D. at Edinburgh in 1830. He was a fellow of the Royal College of Physicians, the Linnean Society, and the Royal Society of Edinburgh to which he contributed several Zoological papers. In 1849, he was appointed to the chair of Civil and Natural History in St Andrews, which he held up to the time of his death. He made a large collection of natural history specimens, which he bequeathed to the St Andrews Museum. He was elected a fellow of the Society in 1838.

SILAS PALMER was a native of Stirlingshire. He prosecuted his medical studies at the University of Edinburgh, and received the degree of M.D. in 1836, on which occasion he presented a Thesis on Consumption. He was also a licentiate of the Royal College of Surgeons. He prosecuted his studies also in Paris, Vienna, and Rome, and afterwards settled as a medical practitioner in Newbury, Berkshire. While he studied in Edinburgh, he became a member of the Royal Medical Society. He was also a fellow of the Royal Society of Antiquaries, of the Royal Medico-Chirurgical Society, and of the British Archæological Association. He was the author of articles in the "British Archæological Journal," in the "Lancet," and other periodicals. He joined the Society as a Resident Fellow in 1837.

DAVID WILLIAM ROBERTS was born in the parish of Llanellidan, Denbighshire, on 23d December 1845. He was educated in the Grammar School at Ruthin. At the age of 16 he was admitted into the Chester Infirmary as an apprentice, where he remained for three years. He then prosecuted his medical studies at the University of Edinburgh, and obtained the degrees of Bachelor of Medicine and Master of Surgery in 1869. Two years afterwards the degree of M.D. was conferred upon him. He was appointed House Surgeon to the Carnarvonshire and Anglesea Infirmary, where he remained for about three years, and then removed to Llanfairfechan, where he practised with success for two years and a half, when he

was obliged to retire on account of ill health. He had frequent attacks of hæmorrhage from the lungs, which ultimately led to his death, suddenly, on 4th March 1875. He joined the Botanical Society in 1865.

JOHN TATHAM died at Settle, on 12th January 1875, aged 81. He joined the Society as a non-Resident Fellow in 1841, and contributed to the Herbarium.

GUSTAVE ADOLPHE THURET, an Honorary Fellow of the Society, was born in Paris, 23d May 1817, and died from *angina pectoris*, at his house at Antibes, on 10th May 1875. He was one of the most distinguished botanists and horticulturists of France. He devoted special attention to the structure and physiology of Algæ. One of his earliest papers was on Antherozoids of Chara, published in 1840. He detected Cilia in this order. He described the Arche-gonia and Antherozoids of Fuci in a memoir, in which he was assisted by Decaisne. The fertilisation of Algæ occupied much of his attention, and he published admirable papers on that subject in the "Annales des Sciences Naturelles." He was a man of independent means, and lived on his property at Antibes, on the shores of the Mediterranean. His garden was a remarkable one, and contained a most valuable and varied collection of plants from all parts of the world.

The following communications were read:—

- I. *Note on the Discovery of Naias flexilis* (Rostk) in Perthshire.—By DAVID C. ROBB, B.A., Worcester College, Oxford.—Communicated by JOHN SADLER.

On the 13th of August last, in company with Mr Abram Sturrock, parish teacher of Rattray, I visited the Loch of Clunie for a day's botanising. In the course of the day Mr Sturrock dredged from the loch, among a dense mass of *Callitriche autumnalis*, a fragment of a plant which looked different from the rest, and which on closer examination was found to possess fruit different from that of *Callitriche*. On a critical examination afterwards the plant appeared to be

Naias flexilis; but inasmuch as this plant had not, so far as we were aware, been observed anywhere in Britain before, we were rather doubtful about the accuracy of our diagnosis. A subsequent reference to Bentham's plates put the matter beyond a doubt. The plant was subsequently gathered in larger quantities, and both male and female specimens were found.

The Loch of Clunie is about five miles west of Blairgowrie, between Butterstone and Marlee Lochs, on the road to Dunkeld. Its surface is 157 feet above the sea.

Clunie Castle was the birthplace, or at least the early home, of "the Admirable Crichton." Besides this historical interest, the loch possesses great natural charms, and is particularly noteworthy in a botanical point of view as containing many aquatic treasures, such as *Isöetes lacustris*, *Elatine hexandra*, *Lobelia Dortmanna*, *Subularia aquatica*, *Nuphar luteum*, *Nymphæa alba*, &c.

Naias flexilis appears to be pretty well diffused in the loch. It seems to thrive only on a gravelly bottom, never less than five or six feet under water. We have generally seen it in company with *Callitriche autumnalis*, from which it requires a practised eye to distinguish it when growing in the water. It is of a richer green than *Callitriche* and nothing really can exceed the marvellous beauty of six feet of Clunie's water with the graceful *Nymphæa* on the top, *Callitriche* and *Naias* below, and the sun shining warm through it all.

I cannot, however, conclude this note without a word of caution. I have mentioned the presence of several good plants in the Loch: it further contains, or did contain, *Butomus umbellatus* and *Stratiotes aloides*. But these plants are not natives of Scotland, and if any one will refer to Hooker's "Old Flora" they will find them set down as having been introduced into Clunie Loch by the late Rev. Mr M'Ritchie. Now, Mr M'Ritchie's botanical days were over before Professor Oliver found the *Naias* at Connemara. At any rate, as far as we can learn, it was from Wales Mr M'Ritchie brought his plants, so that unless we succeed in finding *Naias* elsewhere in the neighbourhood, I shall be inclined to conclude that it had also been intentionally introduced; and that stations for it, at least in Wales, ought to be discovered

This, of course, is no more than probable, for as the plant is stated to have been observed in a few scattered localities in Europe, there is no inconsistency in its being found in a few scattered localities in the British Isles.

II. *The Autumn Tints of Trees*.—By JAMES M'NAB.

October is the month when the foliage of trees exhibits the greatest variety of rich colouring. The leaves of some trees, however, as the Ash, Walnut, Elder, &c., only assume a dingy green tint. On October 30, many trees had not lost their foliage, and in some cases it was quite green. Amongst these were the Oriental Plane, *Alnus cordifolia*, *Quercus fastigiata*, *Sorbus vestita*, *Rhamnus catharticus*, and others with smooth leaves. In these cases, however, the leaves eventually fall off more or less coloured. Other trees then in leaf, but with the foliage more or less hairy, generally fall off in their green condition, such as *Celtis occidentalis*, black and white Mulberry, common Fig, *Catalpa syriacifolia*, &c.

During the whole of October this year the tints of foliage on ornamental and forest trees, in Edinburgh have been highly interesting. Some of the leaves had a rich crimson or red hue, some exhibited shades of brown and yellow, while other had all these tints more or less on the same tree, such as the Sugar Maple, Liquidambar, and the Virginian Creeper. The Tulip tree, when it begins to fade, has its leaves equally divided between green and yellow. Afterwards they all become quite yellow, in which condition they remain for eight or ten days, and ultimately assume a darkish brown hue, before they fall off. During October the yellow tints were the most prominent on the *Acer monspessulanum*, *A. campestre*, *Crataegus heterophylla*, *Æsculus Hippocastanum*, *Quercus conferta* (*panonica*) *Q. pyramidalis*, *Mespilus grandiflora*, *Carpinus Betulus*, *Betula alba*, *B. pontica*, *Castanea vulgaris*, *Sorbus Aria*, &c. Some species retain their leaves for a long time in their coloured condition, while others fall immediately on assuming the yellow tint, as observed on the various species of Lime and Wych Elm. When I have assumed a dark red or deep brown hue, they generally remain much

longer on the trees than those having yellow tints. This is observed in the American Oaks, particularly the *Quercus rubra*, also in *Amelanchier vulgaris*, and some varieties of the common Beech.

The ordinary Purple Beech generally parts with its leaves early, and when going off the colour resembles the decaying foliage of some of the green Beeches, particularly the thick-leaved sorts. A variety of the purple-leaved Beech, not uncommon in the gardens at Corstorphine, near Edinburgh, has its leaves in spring of a greenish tint; during summer they are of a rich dark purple; towards autumn they again assume a greenish hue, and ultimately fall of a dark brown colour, not unlike the green varieties. The tree, however, retains its leaves much longer than the ordinary purple form.

The well-known Corstorphine Plane, (*Acer pseudo-platanus* var. *lutescens*) during the spring months has a conspicuous yellow foliage. During the summer the leaves become as green as those of the ordinary *Acer pseudo-platanus*. In autumn no difference is observed from the ordinary typical species. In the variety cultivated under the name of *Acer pseudo-platanus* var. *purpureus*, the purple tinge peculiar to the under side of the leaf only becomes conspicuous during summer. When the leaves fall from the tree in autumn, the purple tinge is distinctly visible, although the upper surface of the leaf has the greenish yellow hue peculiar to the typical species.

The silver or variegated *Acer pseudo-platanus*, in spring has its foliage of a pale green colour; during early summer the variegated or white portions become distinctly visible; when the leaf falls in autumn the variegated parts are of a golden or yellowish hue, and the green portions are of the dingy yellow-green colour common to the species.

Crataegus Oxyacantha var. *lutescens* comes out in spring of a rich yellow, and continues so for many weeks; during summer the leaves become perfectly green, and were so on October 30.

The Scotch Laburnum was noticed in my report for July as having the points of all the top shoots of a rich golden-yellow, contrasting well with the dark green leaves, the trees have now a golden-yellow tint but no leaves have yet

fallen (Oct. 39). Although no flowers were produced in the garden on the Scotch Laburnums this year, the trees have made up for the loss by the charming masses of tufted yellow foliage, particularly when seen growing in a position where the rays of the setting sun have access to them. A similar effect is also produced in this tree during some years when covered with fruit, which hangs down in thick yellow-green masses, long before the ripening of the seed.

The foliage of the *Pavia flava* and *Amelanchier vulgaris* has been remarkably fine this autumn, as they retained their coloured leaves longer than most other trees. The former was of a rich yellow colour, while the latter was of a deep red hue. As both appear in perfection about the same time, they ought to be extensively cultivated as foreground trees, with the view of producing landscape effects in autumn.

During the month of August many leaflets fell from the Locust trees (*Robinia pseudacacia*), all of a deep yellow colour, as noticed in my report on vegetation for that month. In September the foliage of the Robinia assumed a peculiar blue-green tint. In due time they fell off, of a dark green colour.

Owing to the rich and varied tints, and the peculiar circumstances attending the change in colour of the foliage of certain trees, it would be highly desirable to have some eminent chemist to analyse the fluids contained in the leaves, so as to furnish an explanation of the various colours which many of them generally assume.

Although the tints of the arboreous vegetation at Edinburgh have this year been remarkably fine, it does not follow that the same varieties show the same richness of colour in other soils and situations. During a recent tour through several counties of England and Ireland (early in October) I was surprised to find many varieties of the trees here enumerated in their normal green condition, although many were coloured at Edinburgh before I left. Being further south, and therefore better ripened, I certainly expected to find the autumn tints more advanced than in Scotland. Perhaps this may be accounted for by the comparatively dry weather experienced at Edinburgh during the summer. Although showers were frequent here, the

under-stratum or subsoil has been excessively dry, owing to the rains not being sufficient to penetrate.

Nothing could exceed in richness the foliage of the Virginian Creeper as seen in many parts of England this autumn, more particularly on the old College and other buildings at Oxford. The *Ampelopsis Veitchii* and *A. trifurcata* were also gorgeous in several places, but they are not cultivated to the extent they justly deserve.

November set in with much rain, attended with high winds, and afterwards severe frost, which has quickly denuded the trees of their leaves.

9th December 1875.—W. B. BOYD of Ormiston,
in the Chair.

The following Communications were read:—

I. *Observations and Experiments on Ergot.* By A.
STEPHEN WILSON. (Plate V.)

The present paper does not propose any microscopic examination of ergot, or of the structure of the fungus growing from it. Indeed the drawings and descriptions of Tulasne (*Annales des Sciences Naturelles*, 1853) leave little regarding structure to be added. The fault of Tulasne's drawings is, that they are too fine. He has made a neater job of the Claviceps than Nature has done. For example, his vertical section of the hymenium shows a symmetrical arrangement of conceptacles all round; but as these conceptacles are scattered irregularly over the head, no section can cut them all through the centres at equal distances apart. The section of the head, either vertical or horizontal, is as in fig. 3.

What is here intended is simply to set down such facts in the life-history of ergot as seem to hold true in the locality in which they were observed.

In those parts of Aberdeen and Kincardine shires here referred to, about twenty of the grasses are usually ergotised. (See Appendix No. 1). In what way ergot has