Thursday, 10th June 1858.—Dr SELLER, President, in the Chair.

The following donation to the Library was announced :—

Examination of species of Algæ, compounded under the name of *Laminaria digitata*. By M. Le Jolis of Cherbourg.—From the Author.

Dr Balfour announced the following donations to the University Herbarium and the Botanical Museum :—

From Dr Greville—Collection of Madagascar Plants, and of Fungi, named by Fries.

Mr Keddie, Glasgow—Specimens of Plants from Syria.

Mrs Nasmyth—Flowering panicles of *Gynierium argenteum*.

Captain Archer—Peculiar long narrow Basket used in the preparation of Cassava Starch.

Mr Thomas C. Davies—Silky Hairs from a Cape Plant (*Protea*?).

Mr Archibald—Woods from the Irish Bogs, accompanied by the following note :—

“I send you a few specimens of Oak, Willow, and Fir, which were dug up on the boggy ground of my farm at Deescart, in the county of Monaghan, Ireland, four miles from the town of Carrickmacross. The bog surrounds the Lake of Deescart, the depth of the water of which, by the arterial drainage, a few years ago, was reduced about 3 feet, and in the reclaiming of the bogs, these specimens were found from 1 to 4 feet under the surface. One peculiarity I am not able to account for is, that both large and small blocks are quite black, others the natural colour of Oak, and a few of a very light colour, and found within one or two yards of each other.

Rev. Zerub Baillie, Calabar—Pod of the Calabar Poison Bean, called by the natives “Esere.” Pod of a Leguminous Plant, the seeds being furnished with a beautiful aril.

Mr Fortune—Thick stem of *Buddlea globosa*.

Mr Brander—Bark of a Myrtaceous Tree from the Azores.

J. G. Booth jun., Esq.—Cones of *Pinus Coulteri*, *Pinus palustris*, *Pinus pseudo-strobus*, *Pinus caroliniana*, and *Pinus patula*; also specimens of the following plants :—

Specimens of Java plants from J. G. Booth jun., Esq. Among these are the following :—*Krankinia chrysantha*, De Vriese (*Primula imperialis*), collected at the height of 9000 ft.; *Andropogon acicularis*; *Sericura elegans*, Harsk.; *Phacilanthus multiflorus* (?), 9980 ft.; *Scleria purpurea* (?), 5000 ft.; *Eriocaulon*, sp. (?), 5000 ft.; *Xyris*, sp. (?), 5000 ft.; *Equisetum*, sp. (?), 2000 ft.; *Sclaginella*, sp. (?), 7500 ft.; *Lycopodium*, sp. (?), 9800 ft.; *Lycopodium Hippuris*; *Polypodium Horsfieldi*, R. Br., 6000 ft.; *Hemi-*

onitis semicostata ; *Gleichenia vulcanica*, Bl. ; *Polypodium*, sp. (?) ;
Niphobolus, sp. (?)

Dr Balfour called the attention of the Society to the death of one of its members, in the following terms:—"It is with deep regret that I have this night to record the death of Dr James Barnston, Professor of Botany in the University of M'Gill College, Montreal, who was for several years an active member of the Society, and who prosecuted his botanical studies with great zeal and ability. He was the eldest son of George Barnston, chief factor of the Honourable Hudson's Bay Company, and was born at Norway House, in the territories of that Company, on 3d July 1831. He commenced his studies at Red River Settlement in 1840, and remained there for a period of five years. He then went to Canada. In 1847 he came to Edinburgh and entered on the study of medicine. He was a student of the Botanical class here in 1848 and 1849, and gained prizes for proficiency, and he became a Fellow of this Society on 13th December 1849. He graduated in Edinburgh in August 1852, and wrote a thesis on Scarlatina, which was one of those selected for competition for the Dissertation Prizes. He passed an excellent examination, and returned to Canada in 1853, and commenced practice in Montreal. His love of science did not desert him amidst the cares of professional life. He still continued to prosecute Botany,—a taste for which he had imbibed during his residence here. He was instrumental in getting a Chair of Botany instituted in M'Gill College, Montreal ; and he was appointed the first Professor in 1857. His lectures met with high approbation in the College, and he was the means of diffusing a taste for his favourite science. He became botanical editor of a periodical entitled the "Canadian Naturalist and Geologist," which is published bi-monthly at Montreal. He was an active member of the Natural History Society of Montreal. He has been mysteriously cut off in the midst of his usefulness. His loss will be felt in no ordinary degree by that institution in which he was an eminent Professor. Those of us who knew him during his residence here feel that we have lost a friend with whom we had much pleasant intercourse. He was one who secured universal esteem and respect. He was an enthusiastic

student, a genial companion, and an obliging friend. I had great reason to rejoice in his success. I saw, with feelings of pride, a zealous pupil attaining eminence as a botanical instructor, and I looked forward to his occupying a still more eminent position among the naturalists of Canada. But the hopes of his friends have been checked by the hand of death. He has been cut off in the prime of life, at the early age of twenty-seven. He exhibited throughout life a Christian deportment; and his latter end was peace. He died on 20th May 1858. In his introductory lectures to the course of Botany in M'Gill College in 1857, the following concluding remarks occur, which seem to be a fit conclusion to this hasty notice:—"The deeper your study of the operations and phenomena of nature, the more intimate your acquaintance with the structure and functions of the plant, the greater will be the pleasure and gratification you will experience, and the more profound will be your admiration of this portion of God's creation. With a knowledge of botanical science, you cannot but take delight hereafter in the contemplation of those beautiful and varied objects of nature that will constantly meet your eye; and if you look on them as living organizations, and study the manifestations of life they exhibit, and the laws which govern them, in the true spirit of wisdom, they will subserve a better and higher purpose than the mere gratification of the mind. They will enrich it with pure and lofty thoughts, and raise your souls in admiring contemplation to Him, at whose fiat, at the beginning, 'the earth brought forth grass, the herb yielding seed after his kind, and the tree yielding fruit, whose seed is in itself, after his kind.' The beauty and perfection of the plant can never be ignored, when we remember that it is recorded that 'God saw that it was good.'"

The following communications were read:—

- I. *Notes in regard to the Production of Forked Varieties of Ferns from Spores*. Illustrated by Plants and Specimens. By Professor BALFOUR.

The term spore, as used by botanical authors, has different meanings. It is applied to the small cellular body produced

by a direct process of reproduction,—*i.e.*, by the contact of antheridian and pistillidian cells or their contents,—as well to a cellular body produced in certain parts of plants without the influence of reproductive organs. Each of these kinds of spores, when placed in favourable circumstances, germinates, and gives origin to an independent plant or vegetable organism.

As an example of the first kind of spore, we may take that of *Confervæ*, in which conjugation takes place. As the result of this process, a cellular germinating body is at once produced. Sometimes the cell has cilia, and moves about until it reaches some spot in which it becomes fixed, and then sprouts. The same kind of spore is common in seaweeds, some of which are monœcious or dioœcious. In these the contact of the spermatozoids from the antheridian cells, and the archegonial cell of the pistillidium, gives origin to a germinating spore, which forms at once a new plant, bearing, like its parent or parents, antheridia and pistillidia. In the case, however, of the higher *Cryptogams*, as ferns and mosses, and their allies, the archegonium produces a cell which, after contact with spermatozoids, becomes a spore, which germinates and produces a plant bearing other kinds of sporoid bodies, which are contained in sporangia or cases, and which become finally detached from the plants. When placed in favourable condition, these separable spores or sporoid cells sprout and produce, not the ordinary plant, but a peculiar cellular expansion or prothallus, either external or internal, which bears upon its surface antheridian and archegonial cells, or proper reproductive organs. An impregnated archegonial cell of the prothallus then produces the plant in its ordinary form. These spores, when taken from forking or crisp varieties of ferns, seem to have a remarkable tendency to keep up the variations present in the plants whence they have been taken.

Mr M'Nab has noticed that the forked varieties of ferns are easily propagated in this way. He finds that the spores almost invariably produce these varieties; and he has no difficulty in keeping up a stock of these abnormal forms. These spores would thus appear rather to resemble the buds of higher plants, which keep up varieties more certainly than seeds do. The spores of ferns and of mosses have been

looked upon by some as peculiar separable buds, which are contained in cases, and are detached at certain periods. Besides these spores, some ferns, as *Asplenium bulbiferum*, produce fixed buds or bulbils, which germinate while attached to the plant. The spores of these varieties of ferns, in a wild state, do not seem to propagate similar ferns readily; for such varieties are comparatively rare in a native condition. Yet it would appear that when grown in the garden they are abundantly produced from spores.

A point in regard to the fern spores requires attention, and that is, that they do not at once produce a frond bearing similar spores, but they pass through a prothalloid stage with antheridia and archegonia, and after impregnation the archegonial cell produces the sporiferous frond.

Here, then, the analogy with buds will not hold, for the sporoid bud passes through a reproductive stage before producing the frond.

But a question arises, is it necessary that a sporiferous frond must pass through this reproductive stage. It would appear not, for in a tree fern, while there is produced at first a prothallus with reproductive organs, yet this is not the case subsequently. It would appear, therefore, that sporiferous fronds may continue to be regularly produced without any evident direct impregnation.

Some, however, may be disposed to take the view, that when once an archegonial cell has been impregnated, its influence may extend through successive generations, while others may say that these spores, which are not the direct product of organs of reproduction, may be analogous to parthenogenetic seeds, or embryos produced without any contact of pollen; in fact, that they are germinating cells, which require no influence from the antheridia, and are therefore developed by a true process of parthenogenesis.

On such a supposition, a tree fern, produced from a spore at first, and passing through a prothalloid stage, with organs of reproduction, continues to produce ever afterwards parthenogenetic spores or cells. Such cells may have a tendency to propagate particular forms of plants, just as is the case in the *Cælobogyne*, where female plants have always been produced from seeds not acted on by pollen. In this

way we may account for the spores of these fully-developed anomalous ferns always producing varieties like their parents.

The subject is a curious one, and well worthy of further investigation. The experiments of Mr M'Nab are remarkable, and deserve to be recorded. What we want to know is:—

1. Is a sporiferous frond produced without a previous archegonial stage?

2. Is there anything peculiar in the structure of the spores in the sporangia of ferns, and more especially in those of the anomalous forked ferns to which we have referred?

3. Do the spores, when produced on the first frond, directly proceeding from the archegonial cell, differ from those produced on subsequent fronds?

4. Have the spores in the first frond the same tendency to reproduce these marked varieties as those on subsequent fronds without a prothallus?

5. Do these spores exhibit anything analogous to parthenogenesis in the higher orders of plants?

For one who has the patience to investigate the matter, there is an interesting field open. It requires that the observer should examine spores, prothalli, with their antheridia, and archegonia, microscopically in all stages, and that he should have the means of growing these spores under his eye, so as to watch their development in all stages. To any who may wish to undertake such an investigation, the resources at hand in the Botanic Garden will be fully laid open, and all assistance will be given in the investigation. Mr M'Nab has led the way in this interesting cultivation of fern varieties, and he is able and ready to impart fully the result of his observations. On the table are displayed a series of interesting forms of ferns, which he has now cultivated for many years.

In connection with the subject of the production of ferns from spores, Mr M'Nab remarked that it was of great importance to collect the spores properly. He stated that where a number of ferns are growing together, and the spores are allowed to ripen, they seem to spread about in a remarkable way, and to be attracted by the sporangiferous fronds

of the ferns around. Thus, he collected spores for two years from the ripe sporangiferous fronds of *Osmunda cinnamomea*, and on sowing them, under bell-glasses, there came up crops of *Polypodium Dryopteris*, and nothing else. So also, spores from the sporangiferous fronds of *Anemia fraxinifolia* for two years gave rise to crops of *Polypodium caespitosum*; and the spores collected from the ripe sporangiferous fronds of *Darea diversifolia* produced a crop of *Blechnum braziliense*. Mr M'Nab remarked that the spores of the above were matured on the plants, and were growing along with many other species in the neighbourhood of the kinds produced. Spores of the above species taken from plants in a young state, and ripened in a book carried in the pocket, have now come true. In order, therefore, that the spores may produce the species or variety wanted, it seems necessary to collect them in a young state, and to take care that the spores of other ferns do not come into contact with the fronds.

II. *On M. S. De Luca's Claim to be the Discoverer of the Non-presence of Iodine in the Atmosphere, in Rain-Water, and in Snow.* By STEVENSON MACADAM, Ph.D., F.R.S.E., Lecturer on Chemistry, Edinburgh.

A communication, entitled "*Recherches sur l'Iode Atmospherique*," has lately been published by M. S. De Luca, in the "*Journal de Pharmacie*," in which the author details the results of a number of experiments conducted by him in reference to the general distribution of iodine, and in which he lays claim to be the first discoverer of the non-presence of iodine in the atmosphere, in rain-water, and in snow. Had M. De Luca confined himself to the recital of the apparatus and re-agents employed by him in his researches, and to the simple expression of the negative results obtained by him, I would not have considered it necessary to ask the Botanical Society of Edinburgh to allow me to protest against his non-recognition of the earlier labours of others; but since he has appended to his memoir an extract from a communication by M. Cloez on the same subject, in which priority of discovery is yielded to M. De Luca, I think it due to myself that the