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I. On the Fertilization and Ripening of Seeds

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Thursday, 14th April.—Professor BALFOUR, President, in the Chair.

The following Gentlemen were elected Resident Fellows:—

WILLIAM RUTHERFORD, M.D.
JOHN WILSON PATON, Esq.
DAVID YOUNG, Esq.
A. H. ALLSHORN, Esq.

The following donations to the Library were laid on the table:—

Transactions of the Scottish Arboricultural Society, Vol. III., Part I.—From the Society.

Proceedings of the Royal Horticultural Society, Vol. IV. No. 6.—From the Society.

Proceedings of the Agri-Horticultural Society of Madras.—From the Society.

A series of Botanical Labels, published by Messrs Kemp and Co.—From the Publishers.

A Vindication of the Present State of Aural Surgery, by a Member of the New Sydenham Society.—From the Author.

Remarks on the Sexual Changes in the Inflorescence of Zea Mays, by John Scott.—From the Author.

Notice of the State of the Open-Air Vegetation in the Edinburgh Botanic Garden, during December 1863, by J. H. Balfour, M.D.—From the Author.

List of British Ferns and their varieties, by P. Neill Fraser.—From the Author.

La Réunion de la Société Helvétique des Sciences Naturelles en Aout 1863, by Charles Martins.—From the Author.

Beitrag zur Fossilen und Lebenden Flora, von Dr H. R. Göppert.—From the Author.

The following donations to the Herbarium were announced:—

From Rev. John Baillie and Archibald Hewan, Esq.—Plants from Old Calabar.

From William Brand, Esq.—Parcel of Plants from the Isle of Skye.

The following donations to the Museum at the Botanic Garden were noticed:—

From Rev. John Baillie, Old Calabar.—Fruit of Mimbo Palm, Seeds of Wild Cherry, Soapberries, Kola Nuts, Bitter Kola, Wild

Mango Seed, Garlic, Edaing, Duffa Fruit, Ninkong, used for sweetening water, Gaboon Candle or Torch, Pineapple fibre, Sea Island Cotton, grown at Old Calabar, leaves, flowers, and fruit of the Calabar Ordeal Bean (*Physostigma venenosum*).

From Archibald Hewan, Esq., surgeon, Old Calabar.—Preserved specimens of *Strophanthus*, sp., *Mucuna* pods, Araninoi oil, fruit, and seeds, &c.

From Mr Thomas Kerr.—Crocuses with peculiar rhizomes, besides the ordinary corms.

The following Communications were read :—

- I. *On the Fertilization and Ripening of Seeds.* By J. BIRKBECK NEVINS, M.D., Lond., Lecturer on Materia Medica, Liverpool Royal Infirmary of Medicine. Communicated by DYCE DUCKWORTH, M.D., Edin.

This paper was copiously illustrated by coloured drawings—The first part was devoted to showing the arrangements adopted in nature to secure the fertilization of seeds, and prevent the destruction of the pollen by moisture in plants growing in water; and the second part exhibited the changes which take place in the growth of plants during the period of ripening, so as to ensure the perfect accomplishment of this process. After alluding to the position and length of the stamens in erect and pendulous flowers, by means of which the pollen shall always come in contact with the stigma, the great natural food-bearing orders of *Gramineæ*, *Cruciferae*, and *Leguminosæ* were mentioned as proofs of the importance of studying the dissection of inflorescence. These orders all expand their flowers first below, and gradually upwards, so that if the pollen of the lower flowers should happen to be injured by rain, their ovules may still be fertilized by the pollen which falls upon their stigmas from the flowers above. Attention was called to the great preponderance of this mode of inflorescence above that which expands first at the summit, and gradually descends, and its importance in nature was pointed out with reference to the preservation of the different species.

The special arrangements in water plants for preserving the pollen from injury were illustrated by the spiral and

uncoiling flower-stalk of *Vallisneria spiralis* and *Ruppia maritima*; by the rapid development of air-bladders which occurs in the *Jussiea repens* during a flood, by means of which the flowering stem is floated above the water; by the constant elongation in the stem of the *Callitriche*, by which the head of flowers is always floating upon the surface; by the water-tight spike of the *Potamogeton*, whilst in and below the water, and by the peculiar and curious structure of its flowers, when the stalk rises above the water. The *Subularia*, which flowers entirely below the water, and the *Elatine Hydropiper*, which is also below the surface, were shown to have fertilized their seeds whilst the flowers were still in bud and perfectly water-tight; and the same remarks applied to the *Zostera marina*.

The changes which take place during the process of ripening the seeds are often associated with the notion of decay; and the drooping heads, the withered leaves and the faded colour of many of the most beautiful plants, do certainly favour the opinion. The object of this division of the paper was, however, to show that these apparent proofs of decay are really processes of growth, and to point out their importance for the perfect ripening of the seeds. Most seeds require both air and light, as well as warmth, during this process; for if they are collected before they are perfectly ripe, and are placed in a warm and dark place from which air is also excluded, they soon become mouldy, instead of ripe; and many of the apparent signs of decay, such as the drooping head, are in reality mere processes of growth by which the seeds may be exposed to air and light, or by which undue access of moisture may be prevented. The following illustrations were given, and they were classed in twos and threes, for the purpose of contrast. For example—

The Poppy has a drooping flower-bud, but a rigidly erect seed-vessel; whilst the Campanulas have a more or less erect flower, but the seed-vessels hang perpendicularly from an abruptly curved stalk. The Poppy capsule opens by valves at the summit, by means of which, air and light are admitted to the seeds, which are kept from falling out by the erect position of the seed-vessel; but the Hare-

bells open by valves at the base of the capsule through which the seeds would fall if it were erect. It is, however, closed at the summit, and the stalk, in ripening, turns abruptly down, so that the seeds are preserved whilst air and light still have access.

Anagallis and *Lychnis*.—In these flowers there is no change of direction in the seed-vessel; for the capsule of the *Anagallis* is so thin as to offer no obstruction to light, and little to air, whilst its box-like character preserves the seeds from falling out, whatever its position. They ripen, therefore, in every direction, vertical, horizontal, and drooping. The *Lychnis*, on the contrary, has an erect flower and an erect capsule, which opens, like all the Caryophyllaceæ, by teeth at the summit.

American Cowslip, Cyclamen, and *Campanula persicifolia*.—The first has a drooping flower, but an erect seed-vessel, for it opens at its summit. The Cyclamen capsule, however, also opens at its apex—and yet it is drooping; but in this flower the seeds ripen in the earth; and the stalk of the seed vessel *grows* downwards in a curved direction (but does not *droop*), until the apex of the capsule has pierced the earth, where it opens and deposits its seeds. The *Campanula persicifolia*, unlike the other Campanulas, has an erect seed-vessel, which appears to militate against the view here advocated, until the capsule is examined, when it is found to have its valves at the summit instead of the base. The same purpose is accomplished by the erect capsule in this Campanula, which is gained by the drooping ones in the Order generally.

The Limosella (*Scrophulariaceæ*), with an erect flower, and a reversed seed-vessel; and the Foxglove (also *Scrophulariaceæ*), with a drooping flower, and an erect capsule. The Hollyhock (*Malvaceæ*), with a flower generally erect, and a withered calyx in autumn, turned abruptly down; and the common Mallow, with both flowers and seeds erect. The Dandelion with an erect flower and erect head of seeds; and the Coltsfoot, (also Composite), with a drooping bud and erect flower; then a drooping head, after withering commences, and at last an erect head again of seeds. The Michaelmas daisy, with an erect head of flowers, and also an erect head of seeds. The African

Marygold with abruptly drooping receptacle at the time of seeding. The *Centaurea nigra*, with a head always erect; and the *Carduus heterophyllus*, with the seeding head drooping—all however, belonging to the same Natural Order.

The Hyacinth, with its flowers drooping and its capsule erect; and the “nodding, nodding, Violet” with its capsule also erect. These and others were shown, and the connection was pointed out between the various positions of their seed-vessels, and their habits of life, the structure of their seed-vessels, or the period of year at which they flower—and it was shown, that whether drooping or erect, and whether uniformly so or not, as in the case of the Coltsfoot, the changes were all connected with the requisites for ripening the seeds, and were stages of growth and not of withering or decay.

II. *On the Accessory Organs of the Hybrid Selaginella, referred to by Mr John Scott, in a paper read before the Botanical Society 10th March 1864.* By CHARLES JENNER, Esq.

The notice of a Hybrid Selaginella, by Mr Scott, read before this Society at its last meeting, induced in me the desire to examine the minute structures called accessory organs. They are found by Karl Müller, who first observed them, in the axillæ of both sets of leaves in all the Lycopodiaceæ. It appeared to me interesting to know, whether these organs, too, manifested the same hybrid character so carefully noted by Mr Scott, and so well set forth by him in his valuable and interesting paper. The hybrid, you will remember, was raised in the Edinburgh Botanic Garden by Mr Scott, and it was a cross between the macrospores of *Selaginella Danielsiana* and the microspores of *Selaginella Martensii*. Although some writers have regarded these two forms as varieties only of one species, the individuals on the table here, and which are the original plants from which the two sets of spores were taken to raise the hybrid, show a strongly-marked difference, sufficiently strong, indeed, to enable us to note, with all the minuteness one could desire, the intermediate character of the plant