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I. Has Colour in Flowers a Function to perform in the Fertilisation of the Ovule

Mr Neil Stewart

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12th July 1871.—ALEXANDER BUCHAN, Esq., M.A.,
President, in the Chair.

The following Gentlemen were elected—

1. *Non-resident Fellows.*

JOHN JEFFREY, Balsusney, Kirkcaldy.

Dr A. E. DAVIES, Holly House, Warrington.

2. *Corresponding Member.*

Dr E. G. POST, Beyrout.

The following Communications were read :—

I. *Has Colour in Flowers a Function to perform in the
Fertilisation of the Ovuie ?* By MR NEIL STEWART.

Mr Stewart stated that he found colour in flowers so intimately connected with light, that the two cannot well be considered separately ; and that flowers, by the manner of their illumination, are naturally arranged in two divisions, the erect and the pendulous. The flower bud receives the light upon its exterior surface, and under this influence it expands. Being expanded, say to half bloom, it then receives the light upon its interior surface, and under this apparently opposite influence, it expands to full bloom. In both the erect and pendulous divisions, the bud is presented to the light in much the same way, but in the latter, during expansion, it gradually assumes the drooping position.

The erect flower receives the light in lines which form acute angles with the middle line of the pistil. The pendulous flower, from its drooping attitude, receives the light in lines forming wide angles with the middle line of the pistil. The erect flower receives the light into the interior of the corolla ; the pendulous flower receives it upon the exterior of the corolla. The corolla of the erect flower reflects light upon the essential organs, or around the pistil, with a variable focus, arising from its power of opening and closing to the light. The pendulous tubular flower, while it remains open, has light transmitted through the corolla with a constant focus, regulated by the relative diameters of the tube of the corolla and the pistil. The calyx of the erect flower is large, in order to protect

the exterior of the corolla from reflected green light. The calyx of the pendulous flower is small, so that the greater volume of light may fall upon the exterior of the corolla. The limb of the petal of the erect flower reflects light into and over the tube of the corolla. The limb of the petal of the pendulous flower transmits light, which it brings to focus in front of the orifice of the corolla. It also reflects light, which may be reflected from objects below the flower. The stamens of the erect flower, while they are themselves illuminated by the aid of light reflected from the corolla, act as focalisers of the reflected rays. And when in either division an individual organ or whorl would prove to be unnecessary, or to interfere inimically in the illumination of a flower, such organs are either left undeveloped, or are designed to fall off before becoming injurious. Thus we have the calyx caducous as in *Papaveraceæ*; the corolla absent as in *Urticaceæ*; the outer whorl of stamens undeveloped as in *Geraniaceæ*, and the fifth or odd stamen undeveloped in *Gesneraceæ* and *Scrophulariaceæ*.

After showing how these organs, had they been developed and persistent, would have acted inimically in the illumination of the flower, Mr Stewart explained how the erect and pendulous divisions blend into each other; and notwithstanding the attitude of a flower in any of its earlier or later periods of existence, if, during the shedding of the pollen, transmitted light predominates over reflected light, the flower belongs to the pendulous division, and the predominance of reflected light over that which is transmitted places the flower in the erect group.

Then, as examples of how the direct light and its reflections are excluded from the interior of the pendulous flower, he showed that in the flask-flowered heaths the anthers occupy the throat of the corolla, and so effect that purpose. The spring-closed lips of the corolla in *Antirrhinum* perform the same office, and flowers which are more drooping exclude direct light by their greater inversion. The erect flower, on the contrary, has its parts arranged so as to secure the entrance of direct light and its reflections into the interior of the flower. In *Cruciferae* two of the six stamens are left short, thus leaving open spaces in the throat of the corolla for the entrance of light. In *Prinu-*

laceæ, when the stamens are situated at the top of the tube of the corolla, the pistil is short, reaching only half-way up the tube; but when the pistil is long, reaching the top of the tube, the stamens are placed half-way down, so that in either case the light is admitted to the base of the pistil. The ligulate flowers of Compositæ appear as if slit down the superior side of the corolla, so as to receive the greatest possible volume of light, and the flowers of the outer ray being first developed, reflect the light over the entire capitulum for the benefit of those still in process of development.

Mr Stewart then adduced photography as evidence that colour has the power of changing the properties of light, and argued that the consequence of this natural law is, that every flower, by means of its own colour, is endowed with the power of changing the solar light to meet its own requirements, as no solar ray can reach the essential organs without first passing through the coloured walls of the corolla of the pendulous flower, or through coloured light reflected from the corolla of the erect flower.

The pollen exercises its influence on the pistil, fertilisation is accomplished, and the flower passes into a new phase of life, which is sufficiently indicated by the state of the seed-vessel. Accompanying this gravid change, a revolution takes place in the illumination of the ovary; the colour of the corolla has played its part, and the author asks, is it, then, an unwarrantable conclusion that colour in the flower has a function to perform in the fertilisation of the ovule?

II. *Notes of Botanical Excursions in the neighbourhood of Edinburgh.* By PROFESSOR BALFOUR.

1. *June 7.*—Melrose, Eildon Hills, and Rhymer's Glen. Among the plants collected were *Cryptogramme crispa*, *Valeriana dioica*, and *Camelina fetida*.

2. *June 24.*—Cupar and Leuchars. *Chelidonium majus*, *Hesperis matronalis*, *Teesdalia nudicaulis*, *Cerastium arvense*, *Sagina subulata*, *Malva moschata*, *Doronicum Pardalianches*, *Centaurea Scabiosa*, *Helosciadium inundatum*, *Scrophularia vernalis*, *Rhinanthus major*, *Trientalis europæa*,