adjustment; so that whilst they gradually consume away, the place of the light shall not be altered. The electric wires end in the two bars of a small railway, and upon these the lamp stands. When the carbons of a lamp are nearly gone, that lamp is lifted off and another instantly pushed into its place. The machines and lamp have done their duty during the past six months in a real and practical manner. The light has never gone out, through any deficiency or cause in the engine and machine house: and when it has become extinguished in the lanthorn, a single touch of the keeper's hand has set it shining as bright as ever. The light shone up and down the Channel, and across into France, with a power far surpassing that of any other fixed light within sight, or any where existent. The experiment has been a good one. There is still the matter of expense and some other circumstances to be considered; but it is the hope and desire of the Trinity-house, and all interested in the subject, that it should ultimately justify its full adoption.

[M. F.]

WEEKLY EVENING MEETING,

Friday, March 16, 1860.

Sir Benjamin Collins Brodie, Bart. D.C.L. Pres. R.S. Vice-President R.I. in the Chair.

Maxwell T. Masters, Esq.

LECTURER ON BOTANY, ST. GEORGE'S HOSPITAL, ETC.

On the Relation between the Abnormal and Normal Formations in Plants.

The object of this discourse was to point out certain interesting facts, relating to the natural and abnormal development of plants, and to the impossibility of drawing any absolute distinction between the two; to show their bearing upon the theory of vegetable morphology, and on the views lately propounded by Mr. Darwin. Premising that no general law can be laid down to include all plants, as each large group has, to a certain extent, its own special organization, the speaker briefly adverted to the natural conformation of plants under the following heads: 1st, Alimentary system; 2nd, Tegumentary; 3rd, Reproductive; 4th, Fibrous; 5th, Appendicular System.

All plants possess alimentary, tegumentary, and reproductive

systems, and the humblest plants have no others. All plants, but Thallogens, possess in addition a fibro-vascular system, and an axis, co-existent with which is the presence of an appendicular system, in the form of scales, leaves, and in the higher plants of sepals, petals, &c. All these organs have a common origin, and this relationship is only partially obliterated throughout life; so that there is a much closer homology between the organs of one plant, and between the organs of one class of plants, and those of another, than is the case in the animal kingdom.

In considering what is natural and what is not so, a great deal is of necessity assumed. Naturalists construct for themselves a sort of type or ideal standard of perfection, which does not of necessity exist in nature, but which enables us to gain a clearer insight into the truth. If this be not borne in mind, in speaking of "the laws" of creation, etc. we are likely to be charged with the sin of presumption, and to foster the very prevalent error, that because one hypothesis is shown to be false by arguments derived from another, that the latter is of necessity true. In natural science, that theory has the greatest claims to acceptance, which satisfactorily explains the largest number of facts, and by means of which our store of knowledge is most augmented.

For the present purpose, the speaker assumed the correctness of the heretofore generally received opinion of the existence of "species," endowed with a very variable, but a limited power of variation; and then proceeded to discuss what degree or extent of variability might be considered natural, and what unnatural. The distinction is not always easy, and in many cases it is impossible. Where the variation is slight, and apparently co-existent with a change in the conditions of growth the variation is evidently natural. Allusion was made to such facts as that of peaches and nectarines found growing on the same bough, to alterations effected by changes in climate, &c. When the variation is greater, of course greater difficulty exists in determining whether or no it be natural. Reference was made to the primrose, the cowslip, and the oxlip, which differ in many important points one from the other, but which, nevertheless seem to be variations of one form; in evidence of which, amongst other facts, are these, that all three have been raised from seeds derived from the same fruit; and that in the Hookerian herbarium there exists a specimen wherein a primrose and a cowslip spring from the same stem. Some plants are especially liable to vary; such are orchids, ferns, grasses, and especially fungi, some of which latter have no less than five different modes of reproducing themselves by as many distinct organs. The speaker was enabled, through the kindness of Professor Buckman, to exhibit specimens illustrating the very curious experiments of that gentleman in ennobling the wild oat, and in producing from the seeds of two so-called species of aquatic grasses, *Glyceria aquatica*, and *Glyceria fluitans*, when grown in a dry soil, a form unlike either of the parent plants,—a form in which the herbage of *Glyceria aquatica* was combined with the inflorescence of *Poa trivialis*. The experiments of Professor Buckman have the

more value as they have been made without any reference to theoretic views.*

Another difficulty in distinguishing the abnormal from the normal in plants, arises from the fact that what is unnatural or unusual in one plant, is the common condition in another nearly allied plant. In illustration of which several instances were cited; and one in particular, which led Herr S. Reissek, in some measure, to anticipate the views of Mr. Darwin. The changes took place in a species of *Thesium*, affected by a parasitical fungus, in consequence of which apparently, the plant underwent many changes, some of which caused it to assume many of the characteristics of allied species and even genera. "Suppose," says the author, "the condition originally caused by the fungus to become constant in the course of time, the plant would, if found growing wild, be considered as a distinct species, or even as belonging to a new genus. Nature appears to have set up a fingerpost, to show the way in which species and genera may have been formed out of a previously existing type," &c.† Here, however, there is no reference to the ceaseless process of natural selection, and of very gradual change. Another circumstance which adds to the perplexity that is felt in distinguishing the normal from the abnormal in plants, is that irregularity of growth can hardly be considered abnormal, because it is in many instances a constant condition; the health of the plant is in no wise impaired, the irregularity does not exist at first, but arises during development, and it is subject to definite laws.

Certain changes may be physiologically abnormal, because they interfere with the due fulfilment of the functions of the part affected; and yet morphologically they can hardly be considered abnormal, because they do not violate any of the laws of morphology, and are caused perchance by a mere reversion to a simpler form.

Reference was then made to the classification of malformations in plants, adopted by M. Moquin Tandon, in his standard work on the subject, in order to exemplify the impossibility of drawing a line between what should and should not be deemed a malformation, for the reasons already mentioned. Even in the class of Malformations grouped under the head of "Deformity," the change was so slight as not to interfere with the physiological functions, or it was one which occurred naturally in other plants. "Peloria," or that change whereby a flower usually irregular becomes regular, may occur in two ways—one where the flower becomes regular by the increase of its irregular portions, so as to restore the symmetry, as in the Pelorian varieties of the common *Linaria*; the other, almost entirely overlooked, is where the flower preserves throughout life its original equality of proportions. The calyx of the double *Tropæolum* affords an illustration of this. The calyx of the simple form is coloured, with its upper sepal prolonged in the shape of a spur; in the double variety

* Buckman, Rep. Brit. Assoc. 1857.

† Linnæa, Vol. 17, 1843.

all five sepals are green, and of equal size. We can hardly consider a return to regularity, in whatever way it be effected, as anomalous ; and it has been before shown that irregular flowers are not necessarily monstrous. It is not requisite to go through the classification of M. Moquin Tandon, at any greater length, as the same remarks, to a greater or lesser extent, apply to all the groups.

As confessedly artificial distinctions, it may be said that a variety is some change from the ordinary condition of a plant—a change in nowise impairing the exercise of the physiological functions—a change affecting the whole, or at least several parts of the plant,—a change which is more or less constant and permanent and which is reproduced. On the other hand, in a monstrosity, there is a change which does more or less interfere with the due exercise of the functions of the organs affected—a change usually affecting one organ, or one set of organs in a plant,—a change, less constant and permanent than in a variety,—a change which is rarely reproduced.

Allusion was then made to the value of Teratology, as affording the basis on which the now generally received theory of vegetable morphology rests. No doubt the unusual conditions of plants, whether they be called varieties or monstrosities, arise frequently from the operation of that ceaseless struggle for existence in the battle of life, to which Mr. Darwin, as well as the late Dean Herbert attribute so much importance ; but we should be extremely careful in reasoning from malformations, and even from varieties, either in support of, or in opposition to Mr. Darwin's views, especially if the word species be understood in its widest acceptation. The amount of change, great as it is in certain instances, is not greater than is the diversity of form under which the same individual plant may occur: moreover, the changes on which Mr. Darwin relies are small in degree, but constantly increasing. Violent and sudden changes are disavowed by him ; for though the result of a struggle for life, yet they tend rather to the extinction of the organ or of the plant, than to the production of a new species. If Mr. Darwin's views be pushed to their fullest consequences, it would appear as if there were no limits to variation ; and it is of the highest importance to ascertain whether this be so or not. Without forgetting the necessity of caution in employing teratological facts in such a question, the speaker cited as tending to show the probability that there were limits to variation, the fact that in the malformations of what are considered to be the most highly specialized groups of plants, those whose structure is most complex, most concentrated, and furthest removed from the leaf type, as *Compositæ*, *Umbelliferæ*, &c., little or no exaltation of the type ever occurs, whereas in other orders whose structure does not so widely depart from the leaf type, such an exaltation is frequent, though always less so than the opposite process of degeneration.

The degree of constancy is very various, and most important to be considered in questions of this kind. The speaker is under obligations to his father for the following interesting facts bearing on this point.

A tree of that variety of the weeping willow, whose leaves are rolled up in a spiral coil, after retaining its character for twenty-five years, at length sent forth a shoot in an ascending direction. this shoot being clothed with flat leaves, as in the common form, There are several varieties of the sweet pea : many years of observation have shown that the white flowered sweet peas seldom, if ever, vary ; but that in proportion as the flower becomes darker in colour, so is the liability to vary greater : and these changes are not confined to the colour merely, but affect the pods and other organs. So too, the yellow varieties of the hyacinth are more constant than those of other colours. On the whole the varieties, and still more the malformations, are characterized by a want of constancy and a tendency to degenerate : a tendency not overlooked by Virgil, as witness the following lines :—

> " Vidi lecta diu, et multo spectata labore,
> Degenerare tamen ; ni vis humana quotannis
> Maxima quæque manu legeret : sic omnia fatis
> In pejus ruere, ac retro sublapsa referri :
> Non aliter, quam qui adverso vix flumine lembum
> Remigiis subigit, si brachia forte remisit,
> Atque illum in præceps prono rapit alveus amni."
>
> *Georg.* i., 197.

[M. T. M.]

[The speaker takes this opportunity of expressing his obligations to several of his friends who supplied him with illustrations for his discourse, especially to his father, to Mr. Ward, Mr. Baxter, and Prof. Buckman.]