

In the *treatment* of the disease, chloroform, according to Dr. Reynolds, appears to delay the attacks for a time, but to exert no permanently good influence. Bromide of potassium, recommended by Sir Charles Locock in those cases of epilepsy where the attacks recur only at the menstrual periods, has been found by the author to be of much use in some cases of hysteria, though since Sir Charles's suggestion appeared, he has not met with a case in which epileptic seizures were limited absolutely to the menstrual period.

Dr. Reynolds is opposed to the employment of issues and setons in the treatment of idiopathic epilepsy. "In cases of chronic meningitis, which have been confounded with epilepsy, both these modes of treatment have proved of service." The shower-bath he has never seen productive of any definite good, but often of very distinct harm. "Sitz-baths and sponging baths of a few seconds' duration have generally in this, as in many other maladies, been grateful to the sufferers, and of value in increasing the feeling of health, the enjoyment of food, and the capacity for exercise."

In the *mental* treatment, if we may so term it, of the disease, the most important point is to find "some occupation in which the patient takes interest, which requires some concentration of mind, but not much thought, and which may occupy many hours of the day. Drawing and painting, under the conditions mentioned, are of great value; the fabrication of various articles, amusement with a fernery, garden, vivarium, &c., may also be recommended."

We have thus touched upon some of the leading points in Dr. Reynolds' volume sufficiently to give our readers a general idea of its arrangement and of the nature of its contents. Epilepsy has recently been so frequently brought under our consideration, that a more detailed examination of the present work appeared to be unnecessary. We have already expressed our opinion of its value, not only as a book of reference, but also as containing some original philosophical reflections and useful practical suggestions.

REVIEW IV.

On the various Contrivances by which British and Foreign Orchids are Fertilized by Insects; and on the good Effects of Interbreeding. By CHARLES DARWIN, M.A., F.R.S., &c. With Illustrations.—London. pp. 365.

GILBERT WHITE's objections to botany, or rather to botanists, on the score that too much attention was paid to the mere systematic classification of plants, and too little study bestowed on the laws of vegetation and the practical application of botanical knowledge to the wants of man, still continue in force, though possibly to a less extent than at the time when the amiable vicar of Selborne penned his well-known letters.

The elder De Candolle, by giving his sanction to the botanical essays of Goethe, did much to promote the study of morphology, and thereby

greatly amended the systems of classification, and placed the whole science on a much more philosophical basis.

In this branch of botany there has been much progress, but the march of vegetable physiology is indeed slow. How little do we know of the life-history of any plant! How scanty is our knowledge of the functions performed by the several parts of plants! What little we do know of these matters has been taught us for the most part by "outsiders," by physicians and physicists, country clergymen and chemists, rarely by those who are ranked as botanists. Mr. Darwin, again, would probably shrink from being termed a botanist, and yet he is but another example of the fact, that we have to thank others rather than botanists for the little we know of plants as they live and grow and reproduce themselves around us.

There are many points mentioned in Mr. Darwin's recent work* which have a more or less direct bearing on animal physiology and pathology; while no student of nature can fail to find matter for speculation in the very numerous and carefully elaborated facts which the patient, sagacious observation of Mr. Darwin has elicited. The book is written for a purpose; it forms part of the many-sided argument wielded by the author in his previous work; but, we think, with rare honesty, the facts and the inferences from them are kept sedulously apart, so that the reader of the present volume is not made an unwilling partisan, but may, if he choose, occupy himself solely with the observations recorded by the author. The subject of the book is sufficiently well indicated by its title. The four first chapters are more especially devoted to the British Orchids, the fifth and sixth to sundry of the exotic species, while the final chapter is occupied with an elaborate discussion on the homology of the flower in these singular plants, on the causes of the great diversity in form in parts adapted to fulfil the same purpose, and with a general summary on insect agency.

The grotesque appearance of some Orchids, the beautiful colouring and rich perfume of others; their rarity, except in certain favoured spots, furnish abundant reasons for the partiality so generally evinced towards these plants by lovers of flowers. They will now be rendered tenfold more interesting to the student, when he learns that the extraordinary forms assumed by these plants have a definite purpose; that organs which he may have considered as trifling and unimportant, have a hidden meaning and a special import; that they may, in fact, be compared to the springs which, when touched, set in motion the wheels of some curious piece of mechanism.

To those whose delight it is to dwell upon the manifold instances of intelligent design which everywhere surround us, this book will be a rich storehouse—rich in facts, richer still, if possible, in the promise of further wonders to those who will pursue the subject with the necessary patience and skill. By way of illustration we will select two plants, whose conformation and mechanism are not the least curious of the many similar instances described by Mr. Darwin. The first is *Orchis*

* On the various Contrivances by which British and Foreign Orchids are Fertilized by Insects, and on the good effects of Intercrossing. London, 1862. 8vo.

pyramidalis—a plant not uncommon on limestone soils in various parts of England. The flowers of this Orchid may be described as having three sepals, two at the side of the flower and one at the upper or hinder part; within these are three petals, two at the sides equal in size and shape, while the third, called the “labellum” or lip, is placed at the lower or foremost part of the flower, and differs greatly from the other two petals. This lip at the distal end is broad and divided into three lobes, its central portion is narrow and marked by two prominent ridges, which leave between them a groove directed towards the column in the centre of the flower, and continuous with the long, hollow, spur-like nectary which forms the hinder part of the lip. Quite in the centre of the flower, standing up above the orifice of the nectary, is the “column,” resulting from the fusion of the stamens with the styles, organs which in most other plants are perfectly dis-united. The upper part of this column is formed by the two anther-pouches, which are nearly parallel one to the other, and contain each a club-shaped pollen mass on a little handle or stalk, the two handles being tied together below by a small saddle-shaped piece of membrane called the “viscid disc,” which is enclosed in a little bag called the “rostellum.” The remainder of the column is constituted by the “stigma” and the “rostellum.” The stigma, unlike that of most orchids, is two-lobed, the two lobes diverging one from the other, like the arms of the letter V. Between the two lobes of the stigma, or rather at their point of convergence, is the “rostellum,” a little membranous pouch, containing fluid, and overhauling and partially blocking up the orifice of the spur-like nectary before mentioned. Such is the machine and its parts; let us now examine the working thereof.

If a bristle or a needle be gently passed into the centre of the flower, it is guided by the ridges of the lip to the orifice of the nectary, where it comes into contact with the rostellum; instantly the rostellum opens by a little chink, leaving the saddle-shaped disc that ties the two pollen masses together exposed; this disc is bedewed with viscid mucus, which causes it to adhere to the bristle, and thus, when the bristle is withdrawn, the two pollen masses are withdrawn with it. The adhesion is partly due to the viscid mucus, which, like a cement, becomes hard as it dries—partly to a curious contractile property that the viscid disc has, whereby its two ends curl round the bristle, and firmly attach the disc to it. If by some chance the bristle fail to remove the pollen masses, the chink of the rostellum instantly closes, and thus the disc is kept moist, ready for a future more successful trial; if this closure did not happen, the cement would dry and harden, and the pollen masses would not be so easily removable. The two pollen masses, at the time of the removal, are nearly parallel; but within a very short time of their liberation from the anther-pouches, they are seen to diverge one from the other, and to change a nearly erect for the horizontal position; thus, while each at first forms a right angle with the bristle, it speedily forms an acute one by the bending downwards and outwards of its upper club-shaped end. It will be thus seen, that if a moth alight on the lip for the purpose of sucking

the nectar in the nectary, its proboscis will follow the same course as our imaginary bristle, and the insect will fly away with the pollen masses adhering to its proboscis. Anon the insect will visit another flower, and now the object of the divergence and depression of the two pollen masses is seen. If the pollen masses remained in their original nearly parallel, erect direction, they would, when conveyed by an insect to another flower, be pushed up against the anther lobes of that flower—a situation where they would be useless; as it is, they impinge upon the V-shaped stigma already described; here some of the pollen-grains remain adherent to the viscid surface of the stigma, and ensure the fertilization of the ovules, while the bulk of the pollen mass still remains to fertilize other flowers withal.

Could any one have imagined so ingenious a set of contrivances to exist in these pretty weedlings? Is this mere theory, or is it true? is a question we have been frequently asked since the publication of Mr. Darwin's work. Whenever practicable, we have shown the bristle experiment. Mr. Darwin, moreover, figures the head and proboscis of one unlucky moth, with seven pairs of pollen masses adherent to it; and he gives numerous experiments and facts to show that the pollen-masses are removed by insects, and that if their access to the flowers be prevented, fertilization is not effected.

In the case of the Orchid we have selected for illustration a difficulty arises, from the fact that the nectary seems always to be empty, although there is plenty of fluid in the walls of the nectary; hence, Mr. Darwin surmises that the nectar may be secreted between the two membranes of which the walls of the nectary are composed, and that the moths penetrate the thin walls with their proboscides for the sake of obtaining the nectar; but this does not seem at present to have the support of ascertained facts, nor do we see that the presence of nectar is essential, as the peculiar odour of the plant, as Mr. Darwin suggests, might attract some insects, and the colour of the flowers be an inducement to others, to visit the flower. Supposing the fluid in the walls of the nectary to be really nectar, Mr. Darwin suggests that one reason of its being confined there is to allow sufficient time for the hardening of the cement of the disc of the pollen masses on the proboscis of the insect, this time being gained during the process of penetration of the proboscis into the tissue of the nectary.

Perhaps the most remarkable of all the orchids mentioned by Mr. Darwin are some species of the genus *Catasetum*. Space will not allow us to enter into many details; nor is this necessary, for the general plan of construction is the same in this genus as in the genus *Orchis* selected for our first illustration. In *Catasetum saccatum* the rostellum is provided with two long horns, called by Mr. Darwin "antennæ," one of which projects in front of the upper part of the lip, while the other one is bent downwards and outwards away from it. The pollen-masses have one broad, boat-shaped stalk, common to the two, representing the slender handles of the pollen-masses in *Orchis*, and attached below to a thick cushion-like disc; the stalk of the pollen masses is bent outwards, and the cushion-like disc is enclosed

within a cavity in the upper part of the stigma. When an insect visits one of these flowers it alights on the lip, comes into contact with the antennæ placed in front of that organ, when immediately the pollen-masses, with their curved spring-like stalk, and the heavy disc at its end, are jerked or flung out with considerable force to a distance of two or three feet, and adhere to whatever surface they may come in contact with, by means of the viscid disc. So firm is this adhesion, and so strong the stalk, that Mr. Darwin records that the stalk supported, without breaking, a weight of nearly three ounces for a few seconds, though itself very thin, and not more than the twentieth of an inch in breadth. Supposing the disc to become attached to the body of an insect, no force that the insect could exert would be likely to detach the stalk of the pollen, while, however, ample provision for the application of the pollen grains to the stigma of another flower is afforded by the ready disintegration of the pollen mass and the adhesion of its constituent grains to the stigmatic surface. In the flower under notice, only that antenna projecting in front of the lip has this sensitiveness to touch; when the other antenna, or indeed any other portion of the flower, is touched or shaken with force, the pollen masses remain *in situ*; but once let the point of the sensitive antenna be touched, and out fly the pollen masses, as just described. The antenna is an inch or more in length, and this extreme sensitiveness is instantaneously conveyed along its whole length, till the viscid disc of the pollen mass is detached in the forcible manner already described. This appears to us to be the most extreme degree of sensitiveness or vegetable irritability, or whatever it is to be called, that we yet know of in the vegetable kingdom. Let us hope that Mr. Darwin, or some other able physiologist, will turn his attention to this remarkable sensitiveness of simple cellular tissue; surely much light might be thrown on the contractile tissues of animals, by an investigation into the nature of the same phenomena as shown in plants. No one need be at a loss for materials, the processes of opening and closing of the commonest flowers are scarcely understood at present.

Connected with the genus *Catasetum*, is a circumstance which bewildered botanists, and, as Dr. Lindley remarked, "shook to the foundation all our ideas of the stability of genera and species:" this is the occasional presence on the same plant of two or three very different forms of flowers. These forms, indeed, were well known as existing on separate plants, and were referred to three distinct well-defined genera. No wonder, then, when specimens were brought to this country from abroad, and others were produced in hothouses in this country, showing two or three different kinds of flowers on the same spike, that the botanists were astonished and perplexed beyond measure. We quote from Mr. Bateman's splendid work on these plants the following, referring to the genus *Cychnoches*, which is closely allied to *Catasetum*.

"Among Mr. Skinner's earliest Guatemala collections, attention was particularly directed to the specimens of a plant which to the habit of a *Cychnoches* joined the long pendulous stems of a *Gongora*, and for the possession of which in a living state no small anxiety was entertained. Some plants were speedily

transmitted by Mr. Skinner, but these, on flowering, proved to be only the old *Cychnoches ventricosum*. A mistake was of course suspected, and Mr. Skinner being again applied to, sent over a fresh supply of plants for the authenticity of which he vouched, but they were scarcely settled in the stove when the flowers of *C. ventricosum* were again produced. Mr. Skinner, importuned for the third time, and being then on the point of returning to this country, determined to take one of the plants under his special protection during the voyage, which, flowering on the passage, seemed to preclude the possibility of further confusion or disappointment. The specimens produced at sea were exhibited, and the plant itself placed in the stove at Knypersley, where it commenced growing with the utmost vigour. The season of flowering soon arrived, but brought with it a recurrence of the former scene of astonishment and vexation, for the blossoms, instead of the coveted novelty, were not distinguishable from the old *C. ventricosum*. These were still hanging on the stem, when the inexplicable plant sent forth a spike of a totally different character, and which was, in fact, precisely similar to the specimens gathered in Guatemala and to those produced on the voyage.*

Mr. Darwin supplies us with the solution of this enigma, by showing that some of these flowers are male only, some female, some hermaphrodite; that these are generally borne on separate plants, but are sometimes borne on the same plant. We cannot follow him into the very singular details by which he establishes these facts and supplies the explanation of such remarkable phenomena.

What pains are taken to secure cross fertilization in these plants! how perfectly is the end attained! If some great good were not intended, would all these pains be taken? Have we not, as students of human and animal physiology, something to learn here?

Cross fertilization by insect agency appears to be the rule in these plants. There are a very few exceptions to it, one of the most remarkable being in the case of the bee Orchis (*Ophrys apifera*), in which evident provision exists for self-fertilization—why, we know not. It may be asked what occurs supposing an insect with pollen of one flower attached to it visits another flower of a different kind? The answer is twofold. In the great majority of cases the structural arrangements are such that no effect is, or can be, produced; but when the form and position of the parts do allow of fertilization, hybrids are formed. These are, so far as we know for certain, rare; but it may well be that some of the forms we reckon as species may have had such an origin, and this is the more likely as some of them rarely form seeds, but are propagated by the formation of tubers, &c. In the 'Amœnitates Academicæ,' vol. vi. p. 120, it is stated that if the new bulb of the Orchis be destroyed, the seeds will ripen; but we are not aware whether this assertion has been confirmed of late years. The history of these tubers, too, is almost as remarkable in its way as the history of the flower, and it explains a fact which must have struck many—viz., the abundance of Orchids at a particular spot in one year, and their almost complete absence (above ground) in the following year. After a lapse of years, favourable conditions again

* See also Carpenter's Comparative Physiology, fourth edition, p. 643; Trans. Linn. Soc., vol. xvii. p. 522; Lindley's Botanical Register, fol. 195; Vegetable Kingdom, p. 173.

give rise to the production of numerous flowers, &c. We cannot enter into this subject, but will merely refer those of our readers who may be interested in this subject to a paper of M. Fabre, in the 'Ann. des Sc. Nats.,' quatrième sér. tome iii.

The last chapter of Mr. Darwin's book, 'On the Homologies of the Flowers of the Orchids,' belongs more especially to the botanist, and has less interest for the student of animal physiology; hence we merely commend it to our botanical readers, and to those who may be interested in seeing how the facts mentioned in the earlier chapters are cited in support of the well-known views of the author, as to the origin and progressive modification of existing species.

REVIEW V.

Impaired Vision; or, Long, Short, and Weak Sight, and their Treatment by the Scientific Use of Spectacles. By T. SOELBERG WELLS, M.R.C.S. Lond., M.D. Edin., Ophthalmic Surgeon and Lecturer on Ophthalmic Surgery to the Middlesex Hospital.—London, 1862. 8vo.

OUR German brethren have long been known and justly appreciated as exhaustive workers of the mines of science; frequently, it is true, they have been greater in analysis than in synthesis—not necessarily clear, but always profound; not always successful in conveying the knowledge they themselves have acquired, but patient, faithful, and earnest labourers.

This is not less true in ophthalmology than in literature, art, criticism, and philosophy, with the additional advantage (not always attending their labours) of being eminently practical.

In this school, and under its best master, the author of the work before us—Mr. Wells—has laboured long, assiduously, and intelligently, and has given in a condensed yet full measure the results of those studies. Yet this most useful and practical little book is not a mere translation (nor, indeed, a translation at all) of what the German ophthalmologists have written and taught; this is not one of those bare reproductions by a young hand, designed to launch his name on the stream of professional literature—not a book written to learn instead of to teach the subject.

Mr. Wells has carefully and, as here shown, successfully studied under the indefatigable Professor of Ophthalmic Science at Berlin, and mastered the principles on which he has founded so much that is useful as well as new in this branch of our profession.

Under this able tuition, Mr. Wells has acquired a thorough knowledge of ophthalmic disease, and ophthalmic treatment, and in the book before us has selected one branch only of it, but that one so frequent and increasing, and which interferes so much with the every-day comfort of life, as to make it a very important one.

He has done good service to the profession by placing the whole subject of refraction and accommodation on a sound practical basis,