DARWIN ON FLOWERS.

The Different Forms of Flowers on Plants of the Same Species. By Charles Darwin, M.A., F.R.S. With Illustrations. London: John Murray. 1877.

It was only last year that Mr. Darwin produced his work on 'Cross Fertilisation' of plants, and a new edition of his charming work on the 'Fertilisation of Orchids,' which, as we remarked in reviewing it, was practically a new book on the subject, and now we have before us the present work. True it is that Mr. Darwin has great help in the collection of his materials, not only from the whole scientific world, but also of late years from his son, Mr. Francis Darwin, who, we believe, undertakes many experiments and observations under his father's direction; but still all the material has to be sifted and arranged, and deductions made from it, before pen can be put to paper, and then the book has to be written. Mr. Darwin's style is well known; he seldom spares a line for simile or any other ornament, but writes in close short sentences, every one of which contains some fact or some deduction from facts; indeed, to quote what Professor Huxley—perhaps the ablest and most sympathetic critic of Mr. Darwin's work—wrote years ago, in discussing the criticism on the 'Origin of Species,' his work is a sort of "intellectual pemmican." Anyone who will think of the labour and time necessary for producing such work will, we feel sure, sympathise with the feeling of wonder and awe with which we look at the list of Mr. Darwin's books. He has produced no less than fifteen important books—'On the Origin of Species,' 'The Descent of Man,' 'The Variation of Animals and Plants under Domestication,' 'The Expression of the Emotions in Man and Animals,' 'The Fertilisation of Orchids,' 'Insectivorous Plants,' 'The Movements and Habits of Climbing Plants,' 'The Effects of Cross and Self Fertilisation in the Vegetable Kingdom,' 'The Different Forms of Flowers on Plants of the Same Species,' 'A Naturalist's Voyage Round the World,' 'On the Structure and Distribution of Coral Reefs,' 'Geological Observations on the Volcanic Islands and Parts of South America,' 'A Monograph of the Cirripedia,' 'A Monograph of the Fossil Lepadidæ of Great Britain,' 'A Monograph of the Fossil Balanidæ and Verrucidæ of Great Britain.' It really seems as if it would be the work of an ordinary lifetime to write out the contents of these volumes from dictation, and the work of several other lifetimes to collect the material for them.

In the work under notice, and indeed in all the works on the sexual relations of plants, the fertility of the offspring of plants fertilised in different ways has to be tested, and, therefore, the experiments have often to extend over several years. However, this enormous mass of work has been done by Mr. Darwin, and we have the privilege of enjoying the results of his labour. How much will hereafter be obtained by the consideration of the results of his later work, we can hardly as yet say. They have advanced our knowledge of vegetable physiology enormously, and thrown great light on the important questions of variation, hybridism, and relative fertility—questions of the highest importance, not only in relation to Mr. Darwin's theories of natural and sexual selection, but also in relation to evolution generally. And here we may observe that opponents of all theories of evolution are very fond of trying to embarrass defenders of such theories by selecting some very complex and perfect

piece of organic machinery, and asking the evolutionist, "How he accounts for that by his theory." We trust that the consideration of the fact that perhaps the most profound investigation of such complex and perfect machinery, in vegetable organisms at least, have been undertaken by Mr. Darwin, the greatest upholder of evolution that has ever lived, and the promulgator of the first theory of evolution which was deserving of serious consideration, may show such people that the leaders of scientific thought, who, for the most part, accept evolution in some form or other, and generally follow Mr. Darwin's theories more or less, are not absolutely ignorant of the anatomy and physiology of living organisms, and that evolution is not the wild, foggy, metaphysical dream of the "closet naturalist," but is the theory put forward and supported by men who are not only learned, but who are also good "field naturalists," and who know not only bones, skins, and dry plants, but who are acquainted with the habits, distribution, and general economy of animals and plants during life.

We have spoken of Mr. Darwin as the promulgator of the first theory of evolution which was deserving of serious consideration, but we must not be understood thereby to detract, or wish to detract, from the merits of Mr. Wallace, who promulgated the same views independently of, and almost simultaneously with, Mr. Darwin. It is perhaps to be regretted that Mr. Darwin's second title of his work has fallen into disuse. 'Natural Selection' conveys but little to non-scientific people who have not read 'The Origin of Species'—who, by the way, form the bulk of the persons who make the life of an evolutionist a burden to him in general society—but "the preservation of favoured races in the struggle for life" is a phrase which conveys a good deal, even to a non-scientific mind. In reading all this author's works, persons who are not familiar with his style are apt to be led away and confused by his habit of speaking of "Nature," "provisions of Nature," &c. It may be well to remind such persons that in 'The Origin of Species' he explains that this personification of Nature is with him only a conventional symbol, and says, "it is difficult to avoid personifying the word 'Nature,' but I mean by Nature only the aggregate action and product of many natural laws, and by laws the sequence of events as ascertained by us."

In the work before us, Mr. Darwin examines the sexual relations of those species of plants which produce flowers of different forms. These may be divided into two groups—the *heterostyled* and the *cleistogamic*. The result of this examination goes to show, even more strongly than the author's previous work, the importance to plants of cross fertilisation, all these differences of form being (always in the sense explained above) devices of Nature for ensuring—in the case of the first group continual, and in that of the second frequent—cross fertilisation. Heterostyled plants are such as produce flowers having pistils of different lengths in different forms. No form is provided with anthers of the same length as its own pistil, but bears anthers of the same length as the pistils of some other forms, the result being that when an insect gets dusted with the pollen of any one form of flower, it cannot put this on the pistil either of that flower or of any other flower of the same form, but only fertilise a form of which the pistil corresponds in length to the anther whence it has got the pollen. Mr. Darwin finds, as the result of his experiments, that very often such plants are quite sterile when fertilised with pollen from their own form, even though the pollen be taken from a different individual; also that such a flower is only fully fertile when fertilised by pollen from an anther corresponding to its style in length. He also discovered the curious fact that in all cases the sterility of a plant increases with the difference in length between its style and the fertilising anther. Cleistogamic plants are those which bear closed flowers. These can obviously only reproduce by self fertilisation; but also in their case there is great economy of pollen, and most of their anthers are accordingly aborted; but as continual self fertilisation is always injurious, plants bearing these closed flowers almost always bear others adapted for cross fertilisation, so that the vigour of the race can be from time to time restored by a few individuals, the offspring of cross fertilised parents.

The labour and time spent in these experiments has been very great. Many of the heterostyled plants producing three different forms of flowers, it is often necessary to effect no less than eighteen distinct unions, and that many times over, before the problems could be solved for one species. For the details of the experiments, and the tabulation of their results, the book itself must be consulted, as they are only of interest to men of science who are interested in the subject of vegetable reproduction. One fact which appears in this work may be noticed as not being generally known, except amongst botanists, and that is that the common oxlip is a hybrid between the cowslip (*Primula veris*) and the primrose (*Primula vulgaris*).

This work is a most valuable addition to the literature of vegetable physiology, and is well worthy of its great author, whose untiring energy will enable him we hope before long to add yet another book to the long series which he has produced.

YOUNG MUSGRAVE.

Young Musgrave. By Mrs. Oliphant. London: Macmillan and Co.

The rapid succession in which Mrs. Oliphant produces her novels is very remarkable; still more remarkable is it that all her novels are good. Each, indeed, is so strongly impressed with the stamp of real excellence, that the idea unavoidably arises that if Mrs. Oliphant wrote less, if she were content to devote to one novel the period in which she generally produces three, she could create some really remarkable book. Such speculations are, however, as a rule, idle. What people can do, they do; and if Mrs. Oliphant chooses to spend her talent in the manufacture of a multiplicity of works, it is doubtless because she knows that this is what she can do best, that thus the artistic force she possesses is expended to the best purpose. And as we have said that Mrs. Oliphant's novels are always good, that is, well conceived, well told, and well written, it is hardly fair to grumble because they are not better still. Only genius of the highest order could afford to pour out incessant work without great loss in one way or another; not even genius of the highest order is often able to do so. It speaks well for Mrs. Oliphant that she never allows her work to bear the impress of hurry or incompleteness; all is well and carefully done from first to last, and 'Young Musgrave' is no exception to the rule.

When the story opens we are introduced to old Squire Musgrave, seventy years old, and his daughter Mary, an unmarried woman of forty, living together in Penninghame Castle. Their life, we soon learn, is saddened, for the eldest son, John Musgrave, or young Musgrave, as he used to be called, has fled over the seas under suspicion of a murder of a rival in love, Lord Stanton; while the younger son, Randolph, who has become a clergyman, rarely comes near his father and sister. The old man has devoted himself to county histories, to heraldry, and to *Notes and Queries*, and is happy in his quiet way; the daughter manages the estates, looks after the father, and is happy too—quietly happy. "She has not married; why has she not married—that once admired of all admirers?" This no one knows, but father and daughter pass their days peacefully enough, till, one day, an event changes greatly the current of their lives. From abroad, John Musgrave, who has been so long unheard of, sends his two children—a girl and a boy—to his sister Mary. Their mother has died, and he begs her to care for them. She receives them, and tells her father, but he is obdurate, and will not see them; though he suffers her to keep them in the house, he never speaks of them, never sees them, never recognises their existence in any way. But they make Mary very happy. Lilias, the girl,