

*The Different Forms of Flowers on Plants of the same Species.*

By CHARLES DARWIN, M.A., F.R.S. John Murray.

Mr. Darwin, who is recognized by all as the greatest living observer of, and the most acute reasoner on, the various forms of animal and vegetable life, has pursued in this highly interesting volume his researches into the laws of the propagation of plants. His well-known work on the fertilization of orchids proved how much more was due to the agency of insects in conveying the pollen of one plant to the stigma of another, and so in promoting the cross-fertilization, than to the mechanism of plants tending to accomplish self-fertilization. This alone was a subject of no little importance, even in an economic point of view. It is therefore a matter of interest to all, but especially to scientific inquirers, that certain curious abnormal forms in the stamens and pistils of some plants, *e.g.*, of the

common violet and the primrose, should be so explained in the present work as to bear on the great general law first enunciated by the author. This kind of flower, in which the shape or construction of the corolla differs in two plants of the same species, he calls 'dimorphic;' and some, as the beautiful 'Lythrum salicaria' (the tall purple spike of flowers that adorns our river-sides), are even 'trimorphic.' In plants, as well as in animals, the one great effort of Nature is propagation of their kind. Between animal and vegetable procreation there is an identity rather than a mere resemblance or analogy. But in plants there is this one primary distinction, that in the absence of natural animal appetite the fertilizing product (pollen) from the male, inclosing the protoplasm, or initial form and condition of life, is often, if not generally, conveyed to the female indirectly, that is, by the medium of wind or insects, to the stigma crowning the ovary. Some, as is the case with most of the *gramineæ*, and as may be seen in a wheat-ear, are 'cleistogamic,' or self-fertilized in an inclosed calyx without the intrusion of insects. In some, as in the conifers and all catkin-bearing trees, the wind is the principal agent. Strike with a stick a bough of yew in full flower, and a cloud of pollen is dispersed, which alights like a subtle dust, and fertilizes the female germ wherever it adheres. 'When' (says Mr. Darwin, p. 312) 'it is believed on fairly good evidence that the flowers on a plant in its native country do not open at any hour of the day or night, and yet set seeds capable of germination, these may fairly be considered as cleistogamic, notwithstanding that they present no peculiarities of structure.' Nature, in fact, in the performance of her great work of universal propagation, has contrived that if fertilization does not take place in one way it shall do so in another. A man has an orchard, and he keeps bees; or in a sunny spring he observes flies and insects to abound. Let him expect an abundant crop of fruit, if no other conditions interfere to prevent it. Otherwise, he must trust to what the wind may do, or the chance contact of a stamen with the pistil in particular flowers. What we call a 'good apple year,' a 'good nut year,' &c., is due to some obscure special conditions, perhaps largely depending on the prevalence of certain insects. This year, for instance, there is an extraordinary abundance of nuts, and an unusual dearth of acorns. The former is probably due to the male catkins being matured precisely at the right time to impregnate the pistils, which are on different flowers. The beautiful red berries of the mountain ash are now more than usually conspicuous, though from a different cause; perhaps because some insect which is attracted by the peculiar smell of the flower was itself very abundant in the spring. The forms, the colours, the scent, the honey in flowers, are (as Dr. Hooker well says) so many 'traps for insects.' They are all connected with the fertilization of plants, and however much they please the senses of man, that is not the primary purpose that they fulfil.

It is impossible to discuss in a brief notice any of the facts or theories put forth in this important and most interesting work. The laws producing hybrids, varieties, and perhaps ultimately species, are becoming more and more clearly understood, as bearing on the great question of

‘evolution.’ A large part of Mr. Darwin’s present work is devoted to the difficult and complex subject of plant fertilization. As far as insects are concerned, there are few subjects of observation more generally interesting than the watching closely the action of bees, moths, and other flies, as they flit from plant to plant, collecting honey for themselves, but unconsciously leaving life and increase wherever they alight. Connected with this is the curious fact mentioned by Mr. Darwin (p. 7), that the corolla in many plants becomes more conspicuous, as if purposely to attract insects, in proportion as the means of self-fertilization become abortive or feeble. It is on this principle that double flowers are created by the art of the gardener. In these, the stamens, or the greater part of them, revert to leaves, *i.e.*, to petals, as if Nature ceased to undertake propagation when it was conducted by the external aid of human art. Thus we can cultivate a vine or an orange-tree till every pip disappears: the seed has vanished, though the seed-vessel, the fruit, is even enlarged in size. The truly wild orange is so full of pips that little room is left for the pulp.

If it be true, and it seems impossible to deny it, that all organic life is liable to an absolute law of flux, or incessant change, and that nothing stands still, a doctrine inculcated even by the early Greek philosopher Heraclitus, then it becomes important to ascertain the effects of cross fertilization in creating varieties. The production of hybrids, and their powers of becoming established and adding to existing species, is a very obscure subject, and one that can be ultimately solved only by the minute observation and the reasonings of such naturalists as Mr. Darwin. As a rule, hybrids flower profusely, and their flowers are of long endurance (p. 232), and hence they are especially cultivated by gardeners. On the other hand, flowers which readily fertilize fade immediately after impregnation is effected, as if they were in a manner conscious that they have nothing left to live for.