

*On the Various Contrivances by which British and Foreign Orchids are Fertilized by Insects, and on the Good Effects of Intercrossing.* By CHARLES DARWIN, M.A., F.L.S., &c. With Illustrations. London: John Murray. 1862.—Whatever of truth or of error there may be in Mr. Darwin's theory as to the Origin of Species by Natural Selection, there can be no question as to his being one of the most accomplished naturalists his country can boast, and one of the clearest and most scientific expositors of the wonders which nature contains. No one acquainted with even the very rudiments of botany will have any difficulty in understanding the book before us, and no one without such acquaintance need hesitate to commence the study of it. For, in the first place, it is full of the marvels of Divine handiwork, and these are so described that to numbers it will prove fascinating beyond all comparison with the literature that is commonly intended to be such; and, in the second, it is perfectly simple, and contains a lucid explanation of almost every technical expression used. The object of the work is to 'show that the contrivances by which orchids are fertilized are as varied and almost as perfect as any of the most beautiful adaptations in the animal kingdom; and, secondly, to show that these contrivances have for their main object the fertilization of each flower by the pollen of another flower.'

Roughly stated, the pollen of one flower is carried away by some moth, or bee, or other insect visiting it, and is deposited more or less freely in another flower adapted for it, and there is ultimate reproduction in consequence. The contrivances for the successful removal and conveyance of these pollen masses are perfectly beautiful. Orchids might, as we may imagine, have been made just as easily to fertilize themselves; and, made as they are, they will constitute to most of us but an additional illustration of the boundless variety of design and adaptation in the works of God. Mr. Darwin, indeed, justly reminds us that 'the study of organic beings may be as interesting to an observer who is fully convinced that the structure of

'each is due to secondary laws, as to one who views every trifling detail of structure as the result of the direct interposition of the Creator;' a statement to which there cannot be the smallest objection,—unless, indeed, the expression of the latter part of the sentence is intended to have a wider application than appears on the surface. To ourselves it appears simply frivolous and petty, unscientific and undevout, to demand 'the direct interposition of the Creator' to produce 'every trifling detail of structure.' We recognise the apparent infinitude of the domain of secondary causes, and our inability to take scientific cognizance of any other; but there we stop; and if (as we assume) Mr. Darwin stops there too, and if, again (as we believe) much of the opposition to his teaching, *and some of its advocacy*, will one day be reduced to a *caput mortuum* of logomachy, we are so far agreed, and may be permitted to rejoice in his success.

His conclusion and suggestion we present in his own words. Absolutely unlimited, we should demur to the latter on every ground. It lacks the middle term necessary to warrant its change into dogmatic assertion; but as a suggestion it may be provocative of useful thought. 'Considering how precious the pollen of orchids evidently is, and what care has been bestowed on its organization and on the accessory parts; considering that the anther always stands close behind or above the stigma, self-fertilization would have been an incomparably safer process than the transportal of the pollen from flower to flower. It is an astonishing fact that self-fertilization should not have been an habitual occurrence. It apparently demonstrates to us that there must be something injurious in the process. Nature tells us, in the most emphatic manner, that she abhors perpetual self-fertilization. This conclusion seems to be of high importance. For may we not further infer as probable, in accordance with the belief of the vast majority of the breeders of our domestic productions, that marriage between near relations is likewise in some way injurious—that some unknown great good is derived from the union of individuals which have been kept distinct for many generations?'