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PHYTOGAMY.*

[If this name has not been coined already it ought to be. For "the lives of the plants," so mellifluously sung by Dr. Erasmus Darwin in the days of our grandfathers, have been in our time, through a fallacious star-

* "The Different Forms of Flowers on Plants of the Same Species,"—The Various Contributions by which Organs are Fertilized by Insects," Revised Edition, revised.—"The Effects of Cross and Self-Fertilization in the Vegetable Kingdom," by Charles Darwin, M.A., F.R.S. London: John Murray; New York: D. Appleton & Co., 1876-77. 2 vols. 8vo.

vian, more scientifically if grossly expounded by his grandson, in a series of articles and volumes of which the subject are the principal titles. If we have too long delayed our notice of these books, we make amends by calling attention to them at the season which invites and amply rewards the observation in field and garden which they suggest. Mainly in consequence of these writings, the subject which our new word connotes—namely, the consubstantial relations of plants—has become a popular and fruitful branch of biological science, which has its own laws and rules and technical terms, its distinction of legitimate and illegitimate unions, and tables of forbidden degrees. For example, it is not lawful, at least in *homo*, to marry one's niece; for "divine-eyed" primroses to interbreed, nor for "pin-eyed" primroses to interbreed. Such are illegitimate unions, seldom blessed with progeny. To the unscrupulous observer in Wordsworth's poem,

"A primrose by a river's brim,
A yellow primrose was to him,
And it was nothing more."

But as concerns the primrose, where seed-bearing is in question, if it be of the three-eyed stock, the pollen brought to it must come from the pin-eyed, and vice versa, in order to fall fertile. Tiny blue-eyed *Sonchus*, crawling over meadows in early spring, and fragrant *Mitchella*, carpeting pine-woods at midsummer, are in similar case. It is this kind of arrangement for cross-breeding to which the larger part of Darwin's latest volume on "The Different Forms of Flowers on Plants of the Same Species" is devoted. In such flowers—and they are rather numerous and of many families—the advantage of cross-breeding between different individuals of the same species is unquestionable, for it is essential to full fertility. The difference in structure, which consist of relative and reciprocal lengths of stamens and styles in blossoms otherwise alike, have long been known; the meaning of it was one of Darwin's happy thoughts, and the confirmation is due to his labors. He demonstrated that the structure was correlated to the transport by insects of the pollen of the one sort to the stigma of the other, and that each pollen was inert, or nearly so, upon the stigma of the flower it belonged to, but potent upon the stigma of the other sort, upon which, in passing from blossom to blossom among the plants (of about equal number as to sort), the visiting insects are pretty apt to deposit it.

It is noteworthy that this significant description belongs to certain species of a considerable number of natural families, while others, sometimes even of the same genus, had in most of their species, show no trace of it; as if certain favored species had acquired a peculiarity in which their brethren have not shared. We ourselves call to mind some species in which this acquisition is either incident or the correlation imperfect. But in his earliest work of the present series, on "The Various Contrivances by which Orchids are Fertilized by Insects"—a fascinating volume, which has recently been brought out in a second edition—the "contrivances," as they may well be termed, are the common property of the whole order, although each genus seems to have patented a modification of its own. Here there is no dimorphism, but (with rare exceptions) all the flowers are alike, and all agree in having the pollen placed tastelessly near the stigma, but prevented from reaching it, as well as in having some arrangement for the pollen's being transported by insects from one flower to another, and ultimately from one plant to another. Wonderful arrangements, indeed, they are, which it requires a volume to describe, and of which we can say here only a detail. Suffice it to say that, in its great order, cross-fertilization must be all but universal as between different flowers of the same plant, and commonly between different individual plants.

In both these kinds of hermaphroditic flowers the practical separation of the sexes is hardly less than in oak, willow, and other trees and herbs in which the stamens and pistils occupy distinct plants or different blossoms. To these three classes, then, Mr. Charles Darwin's aphorism, "Nature allows perpetual self-fertilization," undoubtedly applies. But there remains an equal number of plants with hermaphroditic blossoms, all alike, with no obvious obstacle to fertilization with their own pollen, while in many the adaptations are such as most apparently ensure it, and indeed does very occasionally ensue. Wherefore it is curious surprising that self-fertilization was the orthodox doctrine—that there was thought to be a general adaptation for the falling of the pollen upon the stigma of the same blossom. It is true that Christian Conrad Sprengel taught the contrary, in his work entitled "The Secret of Nature Discovered," published eighty-five years ago, and that he—mainly upon good observations—in a measure anticipated Mr. Darwin's aphorism; but he was accused whimsical and unwarrantably by his own generation, and was forgotten

by the next. Not so the contemporary "Laves of the Plants"—the lyrical of the old orthodox cult—which stings the

"In lay and intricate curves of the road"

in verse which our fathers were fond of, but from which we will not further quote. Had Dr. Erasmus Darwin known Sprengel's book, and brought to it the insight of the grandson, how different and how much richer the poem might have been. What curious facts and teaching factors have been left unexplored!

To H. Müller and to Hildebrand, two of Sprengel's countrymen, in our own day, may be credited the confirmation of the latter's thesis as respects the general run of hermaphroditic flowers; and this by showing what a large proportion even of these are functionally unisexual, either by the shedding of their pollen before the stigma of that blossom is ready to receive it, or by the development and subsequent shriveling of the stigma before the pollen matures, or by various other arrangements of like effect. And here, too, comes in the significant fact that for the evolutionist that these arrangements belong to widely different families, but only to certain of their species or groups of species, and not to their near relatives; also that they are more pronounced in some species than in others.

Yet, withal, there is much cross-fertilization, and no one has demonstrated this better than Mr. Darwin, nor so well illustrated its meaning. The more particular and special the adaptations for cross-fertilization—depending, as they mainly do, upon insect-transpiration, consequent upon visits for nectar or other floral products—the greater the chances of no fertilization through the failure of the proper insect visitation. So nature, not scoring a success, arranges for self-fertilization also as the next best thing, indicating her preference, however, by endowing the pollen with greater potency upon other stigmas than its own; the principle throughout being to place the pollen where it will do the most good, all things considered. But Mr. Darwin insists, apparently with reason, that cross-breeding is the general plan and cross-breeding the subsidiary proceeding, or at least that no species of flowering plants is deprived of its chance of wide-breeding, or fails to receive the benefit of it for any long number of generations.

This assumes that wide-breeding is beneficial. The assumption is one which a biologist like Darwin is bound to make, and which an investigator like Darwin is bound to verify, if possible. The assumption is that one elaborately brought to pass in a large number of species, in a variety of ways, and by great nicety and exactness of adaptation, cannot be meaningless or useless—must somehow conduce to the well-being of the species. Happily, this inference holds equally good whether, with the old-fashioned biologist, the word denotes a result aimed at, or, as in Darwinian teleology, a result attained. The two senses are not contradictory, and, as concerns the validity of the inference, it matters not which sense is adopted, or whether the two are combined. Darwin's investigation, undertaken to determine by experiments whether self-closing is beneficial, is published in the remaining volume of the series under consideration—that on "The Effects of Cross and Self-Fertilization in the Vegetable Kingdom." It does not fall within the scope and limits of this notice to set forth the nature and the extent of these experiments. Readers interested will go to the book, and probably have done so already. As to the result, we may only say that, on the whole, they corroborate the inference—in some cases unequivocally and strongly, in others feebly, while in a very few the result was simply negative. While the crossing in many cases showed astonishing vigorization, and self-fertilization evident injury, the maximum good was obtained at the first or second crossing, and some close-fertilized plants soon became tolerant of that condition, and retained their fertility for several close-bred generations. If the Darwinian thesis was on the whole maintained, yet it was also shown that plants have many inexplicable idiosyncrasies, and that many unknown or obscure factors enter into the results of experiment. On looking over the series we are reminded of the late Jeffrey Wymann's aphorism: "No single experiment in physiology is worth anything."

It seems reasonably made out that the benefit of a cross is, *inter se paribus*, in direct relation to a certain difference in constitution between the two parents, or to some difference in their surroundings or antecedents, from which diversity of constitution may be inferred. The benefit is more decided when the parents come together from a distance than when grown side by side for several generations, and "a cross between two flowers on the same plant does no good, or very little good." The qualification is a proper one. It would be hasty to infer that it does absolutely no good, even though the advantage be inappreciable in any single instance. Still,

however just and fairly well sustained the principle of Darwin's aphorism may be, it is confuted by the immense and seemingly endless variety of long-propagated varieties which do not end at all.

If we were writing a popular review of this volume on cross and self-fertilization, we should make much of the tenth and eleventh chapters, on the means of fertilization, and especially of cross-fertilization; on the plants which are sterile, or more than half-sterile, without insect aid; and, above all, on the habits of insects in relation to the fertilization of flowers. A closing chapter in the volume, on the Ferns of Flowers, should also receive attention—that is, which oligocephalous blossoms are discussed, viz., small and inconspicuous ones which never open, but are far more fertile than the showy ordinary blossoms of the same plants; for capital covers testacity, to the effect that all ordinary flowers are in primary reference to cross-fertilization, may be derived from the structure and behavior of these blossoms, in which the contrary is almost a self-evident fact. When nature means cross-fertilization she makes her purpose manifest. Also, we should note that this oligocephaly is sporadic, affects certain families only, and certain members only of families not otherwise particularly related; so that this peculiarity also seems to be of special and apparently late acquisition. When we gather into one line the several threads of evidence of this sort, to which we have barely alluded, we find that they lead in the same direction with the ideas furnished by the study of olivaceous organs: slender, indeed, such threads may be, but they are manifold, and together they lead us firmly to the doctrine of the derivation of species.

The Life of Edgar Allan Poe. By William F. GILL. Illustrated. Fourth edition, revised and enlarged. (New York: W. J. Widdellton.)—The disappointed reader may at least recognize the truth of one sentence in this most unattractive book—the passage, namely, in which it is asserted that "the education late that pursued the unhappy poet [Poe] during his lifetime followed him after death" (p. 206). It is quite true up to this moment, and Mr. Gill's biography is simply Fate's latest instrument. The "phenomenal catastrophe" which, it is stated, prevented the execution of a slab over the poet's grave, has been followed by the serene catastrophe involved in the production of this memoir. Yet, after all, Mr. Gill is simply the last and worst of those relentless friends of Poe who persist in seeing in every criticism upon his sad career only a new proof that "his temperament was totally at variance with the spirit of the age in which he lived" (p. 201). If these deluded people could only recognize the fact that the cloud which rests over the poet's fame is not of Mr. Griswold's creating; that Mr. Griswold himself is almost forgotten; that nobody is fighting for him; and that the world would only be too thankful to anybody who should prove that Griswold was wrong and Poe right! Yet they do not prove it—they do not even attempt proof; they only rain down epithets with a virulence worthy of Poe himself, and end by concluding, and even raffishing, almost every charge that ever was made against the unhappy poet.

Here comes Mr. Gill, for instance, and issues an angry counter-voiced pamphlet of more than three hundred pages. Yet he adds not one fact of importance to our knowledge of Poe, and the only real value of the book is in its concessions. He frankly admits that Poe quarreled with his adopted father for refusing to pay the gambling debts of his unworthy son's (p. 43); that he made his child-widow very unhappy in the early days of their marriage (p. 148); that his wood was utterly worthless when speaking of his own life and writings (p. 136); that he insulted one of his most intimate female friends, Mrs. Elliot, in a way which he afterwards owned to be "a disservice," though he never seemed to have apologized for it. As to the poet's fits of drunkenness, Mr. Gill admits these again and again, and abundantly confesses what he calls a statement of "brooding jealousy" when Griswold makes it, that "his [Poe's] habits of frequent intoxication and his intemperance to the point of self-destruction had reduced him to much more than common destitution" (p. 193). Nay, the new biographer goes so far as to print a fac-simile of a letter of the poet's, during his disastrous visit to Washington, and this for so apparent purpose but to show by the handwriting the "deplorable condition of the author" (p. 200). If it is desirable to cover up the infirmities of genius, Mr. Gill has thus hit upon a refinement of cruelty that never would have occurred to the dulter hostility of Griswold.

As if finally to refute his own theory of the malice of the previous biographer, Mr. Gill prints at the end of his book a review by Poe of Griswold's "Poets of America," alleging that this was what among that prosaic compiler into blackening the memory of the poet. Now, not only

is the criticism itself in the very worst style of that crude and abusive early period of American literature; not only does it show us Poe as introducing puff of himself, over and over again, as thus: "Edgar A. Poe, who has spent more time in analyzing the construction of our language than any living grammarian, critic, or compiler" (p. 204), but it specifically refutes the previous argument for whose sake it is introduced. This review by Poe was aimed at the third edition of Griswold's tedious book; whereas any one who will refer to the first edition will find that the author had already implied them, very distinctly, the same law need outside of Poe which he later showed. In short, it was Poe, not Griswold, who wrote under a grudge.

The conclusion of the whole matter is, that Mr. Gill adds little if anything to our knowledge of Poe; and that little tells against the cause which the biographer so vehemently maltrates. This leaves it in doubt why the book was written until we reach the appendix, and there learn that, at the dedication of the Poe monument in Baltimore, Mr. Gill recited the "Elegy" publicly; that "the large audience was absolutely spell-bound by his perfect elocution" (p. 220); and that he "was made the recipient of an ovation at its close" (p. 208). We fear that he will not win a similar tribute from his readers.

Fridtjof's Saga: A Legend of Ancient Norway. By Emilia Tegné, Translated from the original Swedish by L. A. Sherman. With illustrations. (Boston: James E. Osgood & Co.)—Bishop Tegné, of Wadköping, Sweden, who died on the 21 of November, 1848, is better known outside of his native country than any other Scandinavian poet. His great popularity is mainly due to his justly celebrated poem entitled "Fridtjof's Saga," or perhaps more properly "Fridtjof's Saga," a poem, or rather a combination of twenty-four stanzas or ballads, based on two old Norse Sagas; that of Thorstein Viking's son and that of Fridtjof the Bold. These two Sagas described the plot of the story; but Tegné found many of the finest passages of the poem in the "Elder Edda" and in other Old-Norse Sagas. The poem was published complete by the author in 1822, and in 1821 the twentieth Swedish edition appeared. Sweden has had greater poets, but none whose influence upon the Swedish people has been so decisive. Numerous editions of "Fridtjof's Saga" have appeared in Denmark and Norway, and in Icelandic there is an excellent translation by Mathias Jochumsson. Translations have appeared in nearly all modern languages including Russian, Polish, and Greek. Sixteen versions have appeared in Germany, and of the best one of these (Malkin's) the sixth edition was published in 1865.

The English language boasts just twenty translations, eighteen of which have been made in England and two in America. "Fridtjof's Saga" was first made known to Americans by Longfellow, who about the year 1837 spent some time in Sweden, where he made the personal acquaintance of Tegné, and on his return to the United States published a complete translation of Tegné's "Children of the Loon's Sappes," an enthusiastic, enthusiastic, and critical review of "Fridtjof's Saga," interspersed with copious translations. In 1867 Bayard Taylor published the first complete American edition of the poem, selecting for this purpose the translation by William Lowrey Blackley, one of the eighteen English versions referred to above. Mr. Taylor supplemented the Blackley translation with an original introduction and notes. In 1877 Professor K. E. Anderson published in his "Viking Tales of the North" the two Old-Norse Sagas upon which Tegné based the poem, and added by way of appendix George Stephens's version of the poem. "Viking Tales" also contains an introduction, a biography of Tegné, copious notes, a mythological vocabulary, etc., and is the only edition in any language containing the Old-Norse Sagas complete.

The first American translation of the whole poem was made by Mr. and Mrs. Thos. A. E. Holmsted, and was published in Chicago about a year ago, and now we have Mr. Sherman's. A peculiar feature of both is that every canto is rendered in precisely the same metre as the Swedish original, that the familiar rhymes are everywhere preserved, and that the alliteration in imitation of the scaldic lays is reproduced in *caro xxi*. These features in Mr. Sherman's book is the illustrations from plates purchased in Sweden, being wood engravings from Malinström's celebrated poet sketches. It is safe to say that both these versions are very creditable to the translators and cannot fail to become popular. Mr. Sherman seems to have taken great pains with the beauties, as they are but few lines that will not "read themselves." This is, however, a point to which English readers are not apt to pay much attention, from the fact that we have scarcely any perfect hexameter verse in the English