ERASMUS DARWIN.*

FOR those who uphold the theory of hereditary genius there could scarcely be a more typical or confirmatory instance than that supplied by the successive generations of the Darwin family. Not only in the possession of great mental powers and high moral purpose or energy of will, without which the highest gifts of intellect are too often wasted, but no less in the singular aptitude or bias of mind towards a specific range of knowledge and speculation, is it interesting to mark a strain of continuity such as is rarely traceable even from father to son. As the child is father to the man, so is the parentage of the *Origin of Species* to be seen in the *Zoonomia* and the *Botanic Garden*. The same quick intuition for truth in nature, the same power of rapid induction and wide generalization, with the same sympathetic affection for everything that lives and breathes, gives philosophical continuity to a series of writings parted by an interval of well-nigh a hundred years. This strongly marked heredity of mind and character has so impressed Professor Krause of Berlin, as exemplifying the operation of one of the primary laws of the Darwinian system, that he has made it the subject of a special study, published in February last in the well-known German scientific journal *Kosmos*, under the title of a "Contribution to the History of the Descent Theory." We are glad to see this interesting monograph put forth in an English dress, with the addition of an outline of his grandfather's life, character, and works prefixed by our distinguished naturalist himself. For this biographical sketch materials were furnished by

* *Erasmus Darwin*. By Ernst Krause. Translated from the German by W. S. Dallas. With a Preliminary Notice by Charles Darwin. London: John Murray. 1879.

a number of letters of Erasmus Darwin, his commonplace book in folio (in the possession of his grandson Reginald Darwin), and a few family notes and recollections. The Memoirs written by Miss Seward, though containing valuable matter, are shown by citations in the course of the present narrative to be so mixed with inaccurate and spiteful bits of tittle-tattle and innuendo as to yield anything but a truthful estimate of their subject.

The Darwins, a Lincolnshire family, are first heard of in the reign of James I., to whom and to his son Charles, William Darwin was yeoman of the armoury at Greenwich. Dying in 1644 of gout, he is believed to have left that disease as a legacy to later generations. The name of Erasmus came into the family tree from Serjeant Earle, whose daughter was married to a son of this William Darwin, and by the marriage of this third descendant with the heiress of Robert Waring of Wilsford, the family became possessed of Elston Manor and Hall, where, after the lapse of one generation, Erasmus Darwin was born, December 12, 1731. From his father, a great friend of Stukeley's, he may be said to have inherited a taste for natural history and science as well as poetry, as also did his elder brother Robert, who succeeded to the Elston estate, and published late in life *Principia Botanica*, a work rich in biological matter. Among the earlier indications of Erasmus's turn of mind are his making an alarum and electrical apparatus, and a quaint correspondence at sixteen with his sister Susannah, who had, on the authority of a learned divine, held hog's flesh to be permissible Lenten diet, the animal having been turned into fish since the herd of swine were driven by the devil into the sea. Thus early he declares himself a disciple of temperance, as a check perhaps to the hereditary malady. At Cambridge he won a scholarship at St. John's, and came out at the head of the junior optimes in 1754. Here he already wrote poetry; and thence proceeding to Edinburgh, where he studied medicine, he rose to eminence as well as to freedom from the narrow system of Boerhaave, then in vogue amongst most of the professors. In 1756 he entered upon medical practice at Lichfield with good success, a memorandum of his profits showing a progressive increase of income, reaching in fifteen years to 1,000*l.* a year and upwards. He was thus emboldened to marry, which he did in December 1757; when his quaintness, humour, and philosophic calm are brought out in a characteristic letter to his affianced bride, Mary Howard, four days before the wedding, beginning with a recipe for making love from an old mouldy volume he had just turned up, going on to most methodical arrangements for keeping the ceremony private, and ending, "P.S.—Nothing about death in this letter, Polly." From this hint, combined with what her letters show, a community of tastes and pursuits between the pair may be inferred. She must have been, her grandson is convinced, an admirable and charming woman, making her husband happy for thirteen years. Eleven years after her loss (1781) he took to wife the widow of Colonel Chandos Pole, of Radburn Hall, to which place he moved from Lichfield, leaving it after two years for Derby, and ultimately settling at Breadsall Priory, a few miles from that city, where he died, April 18, 1802.

To assign a date or an individual authorship to the theory of evolution is what no historian of philosophy would consider possible. The germ of this view of the origin and development of life is unmistakably to be traced in the system of Aristotle, to go no further back. Enthusiastic interpreters of Scripture, in their eagerness to reconcile the facts of science with those of revelation, have recognized the theory in the opening chapter of Genesis. Equally devoted followers of the scholastic philosophy have satisfied themselves of its being clearly upheld in the treatises of Aquinas. It was by no means as an original suggestion, or as the dogmatic assertion of a new law, but as the result of a long line of philosophic research and a tentative interpretation of nature, that Erasmus Darwin unfolded his idea of evolution. In a note to verse 101 of the first canto of his *Botanic Garden* Herr Krause quotes him as saying:—"From having observed the gradual evolution of the young animal or plant from its egg or seed, and afterwards its successive advances to its more perfect state, or maturity, philosophers of all ages seem to have imagined that the great world itself had likewise its infancy and its gradual progress to maturity. This seems to have given origin to the very antient and sublime allegory of Eros, or divine love, producing the world from the egg of night, as it floated in chaos." Carrying on the classical ideas of mythology, or personifying the powers of nature in the deities of the Greek Pantheon, he introduces in successive cantos of this poem the forces of fire, air, water, and earth, representing the Goddess of Nature addressing herself to the different groups of elementary spirits in a figurative discourse, setting forth in allegorical language the parts severally taken by each in the formation and vitalization of the world. Matters which can be but lightly and poetically touched upon in the poem are further elaborated in detail, partly in short foot-notes, partly in ampler memoirs relegated to the end of the volume. To these we have to turn for the more definite and substantial exposition of the author's system. Under the first "art," the power of fire, and the application of this elementary principle to the use of man, we have the celebrated invocation of "Unconquered Steam," with the prophetic vision of its marvels. The second canto, addressed to the earth-spirits, or gnomes, unfolds the gradual development of the earth, which the author believes to have been with the other planets cast forth from a volcano in the sun, receiving its axial revolution and spheroidal form from stronger friction or adhesion to one wall of this volcano. "By refrigeration a solid nucleus was formed upon which the waters were precipitated as a primæval ocean free from salt, the lighter gases forming the atmosphere, and the sea becoming salt from the lixiviation of the rocks." All the lime or calcareous earth in existence originated, he thought, from animal and vegetable bodies, corals, shells, and other living forms; though from what source these animals in the first instance drew the material of their calcareous frame or covering it does not seem to have occurred to him to ask. In the third canto, addressed to the water nymphs, the formation of clouds, the sea and its life, springs, rivers, geysers, glaciers, &c., are described. In treating of the gradual unfolding of life upon the earth, the transformation of species and their evolution into higher forms comes into view, and this is a favourite topic throughout the writer's works. So in the poem already quoted he speaks, in language with which we have of late years been familiarized, of some apparently useless or incomplete appendages to plants and animals which seem to show that they have gradually undergone changes from their original state, such as the stamens without anthers, and styles without stigmas, of several plants; citing also the *halteres* or rudiments of wings in some two-winged insects, the paps of male animals, and the fact of swine having four toes, of which two are imperfectly formed and not long enough for use. Perhaps, he suggests, all the productions of nature are in progress to greater perfection—"an idea countenanced by the modern discoveries and deductions concerning the progressive formation of the solid parts of the terraqueous globe, and consonant to the dignity of the Creator of all things." Buffon, who had before Darwin regarded such rudimentary organs much in the same way, was far from seeing with equal clearness the evidence they bore in favour of the theory of descent. He was dimly arguing against the physico-theologians on behalf of the general uniform connexion of natural objects by fixed laws.

Dr. Krause describes the last century as a period of the most laborious and endless search after design. In opposition to the French materialistic philosophy a host of pious writers came forward in England, Holland, and especially in Germany, to prove the divine origin of all things from the evidence of nature itself. A list of the chief writings of this class is given by our author, beginning with Swammerdam's *Biblia Naturæ* and John Ray's *Wisdom of God Manifested in Creation* (1691), and including a dozen or more German works inspired by the Leibnitz-Wolfian philosophy. Against this school Henry Brooke led the way in a didactic poem entitled *Universal Beauty* (1735), devoted to a representation of the glories of creation in accordance with the physico-theological views of the period. Darwin has been erroneously charged with plagiarism from Brooke's work. Without expressly opposing himself to the theological teaching of the time, he took for his basis the study of forces or aptitudes inherent in nature. Instead of inquiring whether this or that property of plants or animals was directly or indirectly serviceable to man, he sought to find out whether particular properties were not useful to the organisms themselves, and whether it was not conceivable that they had acquired such properties as favoured their well-being by an internal impulse and gradual improvement. He seems to address himself to every creature in turn. Why has this plant poisonous juices? Why has that one spines? Why have birds and fishes light-coloured breasts and dark backs? What we have learnt to call Darwinian questions are richly interspersed throughout the *Botanic Garden*, the *Zoonomia*, and the *Loves of the Plants*. Though the works of Kölreuter (1761) and Sprengel (1793), which explained the contrivances in plants for the allurement of insects, appear to have been unknown to Darwin, or to have left him unconvinced—so that he remains in error even in his latest posthumous work, *The Temple of Nature*, in believing that plants are generally equipped so as to keep insects and other lovers of honey away from the flowers, and that the aspect of flowers already occupied by insects had been acquired by certain orchids for the purpose of protection from other honey-seekers—yet he was keen in noting numerous contrivances for the protection of plants. He was interested in the means possessed by them for preventing the crawling up of wingless insects into the flowers, together with many similar arrangements in nature which have been specially illustrated by his eminent descendant, and more recently by Dr. Kerner. He fell short of realizing the carnivorous property of Dionæa Muscipula and Drosera, which Diderot, as Dr. Krause shows, had already discovered; for he describes merely as "a wonderful contrivance for preventing the depredations of insects" the long teeth, like the antennæ of insects, wherewith the leaves are armed, lying spread upon the ground around the stem, and so irritable that when an insect creeps upon them, they fold up and crush or pierce it to death. The principle of mimicry as a protective agent is correctly expounded by him, perhaps for the first time, though he is far from exact in instancing the flowers of the Fly-Ophrys as formed to resemble so closely a small wall-bee (*Apis ichneumonea*) as to appear at a little distance already occupied. As the hidden cause of the secretion of honey he could only suggest the purpose of nutriment and excitation of the sexual organs of the plant—the honey only flowing, as he held, until fertilization has taken place. A philosophic friend seems to have almost persuaded him that insects were gradually formed from flowers, some acquiring wings, others fins, and others claws, from their ceaseless efforts to procure their food or to secure themselves from injury. Had he but heard, remarks his biographer, the magic words "Benefits of Cross-fertilization," on which his grandson has so forcibly descanted, the scales would have fallen from his eyes. He firmly believed that flowers are as far as possible adapted for self-fertilization, and he stigmatizes as "adultery" a case of fertilization by the stamens of other flowers

observed by chance in Collinsonia. In the general principles of evolution he anticipated, in his *Zoonomia*, the theory of Lamarck by fifteen years, and in one expressive passage he embodies, in words all but identical with the famous formula of the survival of the fittest, the pregnant doctrine of natural selection:—"The final cause of this contest amongst the males seems to be that the strongest and most active animal should propagate the species which should thence become improved."

As the general conclusion of his acute and clear analysis, Dr. Krause remarks that Erasmus Darwin was the first who propounded and consistently carried out a well-rounded theory with regard to the development of the living world; the merit of which theory shines forth when we compare it with the vacillating and confused attempts of Buffon, Linnæus, and Goethe. "It is the idea of a power working from within the organisms to improve their natural condition or place in nature, and thus out of the impulses of individual needs to work towards the perfection of nature as a whole." It stood in contrast to the old theory that all adaptation to purpose in the arrangements of the world was fore-calculated and fore-ordained, as if all organisms were merely wheels in a gigantic machine made once for all, and incapable of improvement. "The Cartesio-Paleyan comparison of nature with a great piece of clockwork (a fundamentally mistaken comparison, because every complete mechanical work has only been attained by many gradual improvements in the course of generations) is finally got rid of." Working on the lines thus laid down, and guided, we cannot doubt, by his grandfather's recorded principles, no less than inheriting his genius and character, Mr. Charles Darwin has in our day given scientific form and precision to what was as yet in many respects shadowy or conjectural. His vastly larger familiarity with the facts of nature, the fruit of wider travel and constant research, has given him a more positive basis for his system of biology, and enabled him to underpin, as it were, many a point at which the elder fabric of Darwinism tottered or gave way. Above all, in the great idea of natural selection he laid his hand upon the key which the elder thinker failed to grasp. How far Erasmus Darwin was in advance of his own generation may be seen in the criticisms, ridiculous as they now seem to us, which his philosophical poems called forth. His first great work of mark has to this day perhaps been most popularly known by Canning's clever parody of it in the *Loves of the Triangles*. No one—it is a pleasant trait in his character—was more amused by this witty piece of mimicry than the philosopher himself. How strangely false are in many cases the prognostics of the most confident and authoritative literary critics may be judged from the sentence passed upon the *Temple of Nature* by the *Edinburgh Review* (1803):—"If his fame be destined in anything to outlive the fluctuating fashion of the day, it is on his merit as a poet that it is likely to rest; and his reveries in science have probably no other chance of being saved from oblivion, but by having been married to immortal verse."