



THURSDAY, JANUARY 15, 1880

ERASMUS DARWIN

Erasmus Darwin. By Ernst Krause. Translated from the German by W. S. Dallas. With a Preliminary Notice by Charles Darwin. Portrait and Woodcuts. (London: Murray, 1879.)

THE memory of this great man has suffered from the florid and spiteful biography written by Miss Seward. That she was animated by a feeling of bitterness towards Erasmus Darwin, engendered by disappointment, is clearly shown in these pages; she was an unsuccessful candidate for the post of his second wife, and she seems never to have forgiven him for his blindness towards her merits. A trustworthy life of the author of the "Botanic Garden" was therefore much wanted, and no one could have been better qualified for the task than his grandson, Charles Darwin. He has done his work so well and completely as to leave no room for any subsequent biography; further criticism there may well be, but the facts of the life of Erasmus Darwin can never be better put together, and they are as fully given as there is any need for. The critical essay by Herr Krause forms only little more than one-third of the modest volume, and is really an appendix to the life by Mr. Darwin.

Erasmus Darwin was born of a good family at Elston Hall, Notts, on December 12, 1731. He was educated at a school at Chesterfield, from which he went to St. John's College, Cambridge, and subsequently to Edinburgh to study medicine. In 1756 he settled at Lichfield as a physician, and married in 1757, his wife dying in 1770. He married a second time in 1781, when he settled at Derby, where he died in 1802. From his earliest years he seems to have had a taste for versifying and mechanics, and when very young he made experiments in electricity with a rude apparatus of his own invention. Mr. Darwin gives a most amusing letter addressed to his grandfather when at Chesterfield, by Susannah, the sister of the latter, in which she sets down in a very incongruous fashion the details of four days' fasting in Lent. The reply of Erasmus (ætat 16) was characteristic:—

"I fancy you forget in Yours to inform me y^t your Cheek was quite settled by your Temperance, but however I can easily suppose it. For y^e temperate enjoy an ever-blooming Health free from all y^e Infections and disorders luxurious mortals are subject to, the whimsical Tribe of Phisitians cheated of their fees may sit down in penury and Want, they may curse mankind and imprecate the Gods and call down y^t parent of all Deseases, luxury, to infest Mankind, luxury more destructive than y^e Sharpest Famine; tho' all the Distempers that ever Satan inflicted upon Job hover over y^e intemperate; they would play harmless round our Heads, nor dare to touch a single Hair. We should not meet those pale thin and haggard countenances which every day present themselves to us. No doubt men would still live their Hunderd, and Methusalem would lose his Character; fever banished from our Streets, limping Gout would fly y^e land, and Sedentary Stone would vanish into oblivion and death himself be slain."

Even at this early age is seen his leaning towards vegetarianism and abstinence from alcoholic drinks,

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which he subsequently carried into almost regular practice. This was not the only respect in which Erasmus Darwin was far ahead of his own time and even of ours. In sanitary matters he could read a lesson even to our advanced age, and with his mechanical genius he carried out his ideas in this respect into practice as far as the circumstances of the time would permit. He advocated the abolition of intra-mural interments, a rational treatment of the insane, radical reform in female education, and the abolition of slavery at a time when all the world, including the Society for the Propagation of the Gospel, regarded it as a divine institution. His little work on female education was translated into German, where it was regarded as an authority, and he carried out his ideas on the subject in the case of his own daughters, whom, for example, he taught to swim. He was a radical in politics, and a theist in religion, as his works amply testify, though his indiscriminating and bigoted contemporaries stamped him as an atheist. His friendship was wide, both in England and on the Continent, and included many of the most eminent men of his time. He was a man of great influence among his neighbours, and was specially beloved by the poor and needy, a common epithet coupled with his name being that of Benevolent. He was slightly irascible in temper, his massive face pitted from small-pox, he walked with a limp, and although he stammered in speech, he was one of the best conversationalists of his time. He soon acquired a good practice in Lichfield, and as a physician his fame reached George III., who wanted him to settle in London; but Darwin's desires in regard both to fame and income were moderate, and he preferred the quiet of Lichfield. His chief recreation was in tending eight acres of land near the city, which he converted into a botanic garden. Apart altogether from his position in the history of science, it will thus be seen that Erasmus Darwin was a man of unusual originality and independence of mind, who could rise far above the beliefs and customs of his time. But for us he is mainly interesting for the position his works hold in the history of the doctrine of evolution. We are inclined to think that had Erasmus Darwin not chosen to throw his ideas on this and other scientific matters into the form of verse, the theory itself and his claim to be the originator of it in its modern form would have been much sooner recognised. The works in which he embodied his speculations and theories are "The Botanic Garden," in its two parts, "The Loves of the Plants," and "The Economy of Vegetation," the latter, although the first part, having been published last; the former probably first appeared in 1788. Then followed the "Zoonomia" in 1794, soon after translated into German, French, and Italian; the "Phytologia" was published in 1800, and "The Temple of Nature, or the Origin of Society," the year after the author's death. In England, at least, where these works first appeared, they were treated mainly as poems, the scientific speculations which they contained, if referred to at all, being generally regarded as the mere fancies of a poet, or the dreams of a rhapsodist. As poems they had a reputation which must seem to the readers of to-day wonderful. Such men as Walpole and Edgeworth spoke of them with rapture, though the parody of the "Loves of the Plants," known as the "Loves of the Triangles," seems to have done much to destroy the reputation of the original.

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Coleridge invented the term "Darwinising" to express his contempt for the speculations of the elder Darwin, and the *Edinburgh Review* treated his poems in its well-known "this-will-never-do" style. Still Darwin's poems contain many brilliant passages, yet we fear no reader of the present day would care to read them through merely as literary productions. Any one, however, who desires to master the history of the progress of scientific theory, must study them carefully; and this is what Herr Krause has done in order to be able to write the critical essay appended to the biography by Mr. Darwin, an essay which Mr. Dallas has turned into excellent English.

Herr Krause, then, claims for Erasmus Darwin that he is the real father of the doctrine of evolution in its modern form, and that much of the credit which has been ascribed to Lamarck is really due to his predecessor. No one can read Herr Krause's careful paper, fortified as it is with numerous extracts from the elder Darwin's works, without being convinced that the claim he upholds is just. True, Darwin often saw as in a glass darkly, what his greater grandson has been able to see and to show us face to face. But when we remember the state of scientific theory in his time, and the scanty store of data at his command, we cannot but be struck with the real penetrative genius of the man, and wonder that he was able to see so much. His powerful and thoroughly scientific imagination helped him to leap over many difficulties, which the Darwin of to-day has been able to bridge by an abundance of fresh facts. As might be expected, the elder Darwin's ideas are sometimes crude and undeveloped; when he seems in a fair way to arrive at the full-blown ideas connected with the doctrine of evolution such as we have it now, he sometimes turns aside ere the goal is reached, and concludes with something that is only half the truth. Here is how Herr Krause speaks of him:—

"I was speedily convinced that this man, equally eminent as philanthropist, physician, naturalist, philosopher, and poet, is far less known and valued by posterity than he deserves, in comparison with other persons who occupy a similar rank. It is true that what is perhaps the most important of his many-sided endowments, namely, his broad view of the philosophy of nature, was not intelligible to his contemporaries; it is only now, after the lapse of a hundred years, that by the labours of one of his descendants we are in a position to estimate at its true value the wonderful perceptivity, amounting almost to divination, that he displayed in the domain of biology. For in him we find the same indefatigable spirit of research, and almost the same biological tendency, as in his grandson; and we might, not without justice, assert that the latter has succeeded to an intellectual inheritance, and carried out a programme sketched forth and left behind by his grandfather.

"Almost every single work of the younger Darwin may be paralleled by at least a chapter in the works of his ancestor; the mystery of heredity, adaptation, the protective arrangements of animals and plants, sexual selection, in ectivorous plants, and the analysis of the emotions and sociological impulses; nay, even the studies on infants are to be found already discussed in the writings of the elder Darwin. But at the same time we remark a material difference in their interpretation of nature. The elder Darwin was a Lamarckian, or, more properly, Jean Lamarck was a Darwinian of the older school, for he has only carried out further the ideas of Erasmus Darwin, although with great acumen; and it is to Darwin, there-

fore, that the credit is due of having first established a complete system of the theory of evolution."

Herr Krause then proceeds to analyse "The Botanic Garden" and other works, in order to produce evidence of the claim he maintains on behalf of Erasmus Darwin. It is interesting to read in a note appended by Darwin to a verse in "The Botanic Garden," the following idea and first scheme of the theory of evolution:—

"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."

It is in the "Economy of Vegetation" that the well-known prophetic lines on the power of steam occur:—

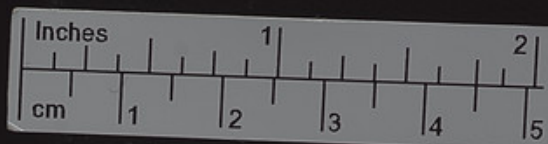
"Soon shall thy arm, Unconquer'd Steam, afar
Drag the slow barge, or drive the rapid car;
Or on wide-waving wings expanded bear
The flying-chariot through the fields of air.
— Fair crews, triumphant, leaning from above,
Shall wave their flutt'ring kerchiefs as they move;
Or warrior-bands alarm the gaping crowd,
And armies shrink beneath the shadowy cloud."

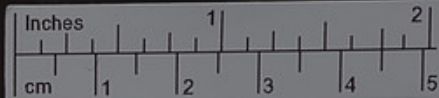
Darwin goes on then to describe the formation of the earth, which he maintains was shot forth from a volcano in the sun, the formation of a nucleus, the precipitation of water, the formation of clouds, &c.:—

"In this connection the fossil marine animals also come under discussion; and after mentioning the singular circumstance that most fossil marine animals as, for example, the ammonites, are no longer found living, whilst the living animals do not occur in the fossil state, the author raises the questions, 'Were all the ammoniæ destroyed when the continents were raised? Or do some genera of animals perish by the increasing power of their enemies? Or do they still reside at inaccessible depths in the sea? Or do some animals change their forms gradually and become new genera?'"

How very near the now accepted truth is this! While he divined the principle of mimicry in plants, and speculated on the interesting subject of their fertilisation and their relation to insects, he here just missed the truth from his want of knowledge of facts; had he had as much power of patient observation as his grandson, he would have come nearer the truth in this matter. While he held even bold speculation to be of value to science, he distinctly recognised observation and experiment as the only true bases of scientific progress, as will be seen in his admirable address to the Philosophical Society of Derby, of which he was one of the founders; he defined a fool as "A man who never tried an experiment in his life." The fundamental idea of Darwin's "Zoonomia," it seems to Herr Krause—

"Is that in plants and animals a living force is at work, which, endowed in both with sensibility, is enabled *spontaneously* to adapt them to the circumstances of the outer world, so that the assumption of innate ideas, of divinely implanted impulses and instincts is rendered unnecessary, and even the process of thought appears attainable as the legitimate activity of a mechanical analysis and combination. All kinds of human knowledge originate from the senses, the action of which is





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regarded as the chief source of knowledge, and is accordingly first of all investigated.

"As regards the apparently inborn faculties which young animals bring with them into the world, the author explains them by repeated exertions of the muscles under the guidance of the sensations and stimuli.

"The author very carefully studied this subject, which has been elaborated by his grandson with so much success, and deduces his formulæ especially from the *first* impressions of new-born creatures. The trembling of fear may perhaps be referred back to the cold shivering of the new-born infant; and weeping to the first irritation of the lachrymal glands by cold air, as well as by pleasant and disagreeable odours. That anger and rage are universally expressed by animals taking the position of attack, is immediately intelligible. As regards smiling and the expression of the agreeable sensations, the author refers them, as well as the feeling of the beauty of undulating lines and of rounded surfaces, to the pleasure of the first nourishment derived from the soft and gently rounded maternal breast."

Here also is a remarkable passage in which the principle of heredity is distinctly recognised:—

"The ingenious Dr. Hartley in his work on man, and some other philosophers," says Darwin, "have been of opinion, that our immortal part acquires during this life certain habits of action or of sentiment, which become for ever indissoluble, continuing after death in a future state of existence; and add, that if these habits are of the malevolent kind, they must render the possessor miserable even in heaven. *I would apply this ingenious idea to the generation, or production of the embryo, or new animal which partakes so much of the form and propensities of the parent.*" And he continues as follows: "Owing to the imperfection of language the offspring is termed a *new* animal, but is in truth a branch or elongation of the parent; since a part of the embryo-animal is, or was, a part of the parent; and therefore in strict language it cannot be said to be entirely *new* at the time of its production; and therefore it may retain some of the habits of the parent-system."

In the "Zoonomia" there are many passages we should like to quote, in which many of the doctrines associated at the present day with the name of the younger Darwin, are enunciated with wonderful clearness, even to sexual selection, the struggle for existence, and the survival of the fittest. Speaking of the weapons with which the males of animals are armed, and their contest for the possession of the female, he says:—

"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."

He concludes as follows the long passage in which this idea occurs:—

"From thus meditating on the great similarity of the structure of the warm-blooded animals, and at the same time of the great changes they undergo both before and after their nativity; and by considering in how minute a portion of time many of the changes of animals above described have been produced; would it be too bold to imagine, that in the great length of time, since the earth began to exist, perhaps millions of ages before the commencement of the history of mankind, would it be too bold to imagine that all warm-blooded animals have arisen from one living filament which THE GREAT FIRST CAUSE endued with animality, with the power of acquiring new parts, attended with new propensities, directed by irritations, sensations, volitions, and associations; and thus

possessing the faculty of continuing to improve by its own inherent activity, and of delivering down those improvements by generation to its posterity, world without end!"

In his "Temple of Nature":—

"About the first hundred verses are devoted to a description of the pitiless struggle for existence which rages in the air, on the earth, and in the water, making the earth, with its incessantly warring inhabitants, like a vast slaughter-house:—

"Air, earth, and ocean, to astonish'd day
One scene of blood, one mighty tomb display!
From Hunger's arm the shafts of Death are hurl'd,
And one great Slaughter-house the warring world!"

Many more passages might be quoted all tending to prove what a really wonderful grasp the elder Darwin had of these doctrines, to which, through his grandson, his name is now so justly attached. But enough has been given to show that he deserves one of the highest places among those who have contributed to the progress of true science, and that the verdict of Herr Krause is amply borne out:—

"That he was the first who proposed and consistently carried out, a well-rounded theory with regard to the development of the living world, a merit which shines forth most brilliantly when we compare with it the vacillating and confused attempts of Buffon, Linnaeus, and Göthe. It is the idea of a power working from within the organisms, to improve their natural position; and thus, out of the impulses of individual needs, to work towards the perfection of Nature as a whole."

Erasmus Darwin's system was in itself, as Herr Krause puts it, a most magnificent first step in the path of knowledge which his grandson has opened up for us. We ought to be grateful to Herr Krause for taking the pains he has done to show the true place of Erasmus Darwin in the history of science. There are many points in Mr. Darwin's intensely interesting, simple, and characteristic memoir we should have liked to notice, did space permit. The memoir is eminently candid and free from bias or anything like strong language, even when rebutting calumnies. Mr. Charles Darwin, we may say, is the son of Robert Waring Darwin, the third son of Erasmus by his first wife. A genealogy of the family is given which is of great interest in connection with the subject of hereditary genius, so well treated by Mr. Francis Galton, himself a descendant of the elder Darwin.

NORTH AMERICAN ETHNOLOGY

Contributions to North American Ethnology. Vol. iii. *Tribes of California.* By Stephen Powers. (Washington, 1877.)

"IT has been the melancholy fate of the Californian Indians to be more vilified and less understood than any other of the American aborigines. They were once probably the most contented and happy race on the continent, in proportion to their capacities of enjoyment, and they have been more miserably corrupted and destroyed than any other tribes within the union. They were certainly the most populous, and dwelt beneath the most genial heavens and amidst the most abundant natural productions, and they were swept away with the most swift and cruel extermination." Words such as these are now only too familiar to the ethnologist, and do not refer alone to the Californian Indians. As the ethnographic

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It is in the "Economy of Vegetation" that the well-known prophetic lines on the power of steam occur:—

"Soon shall thy arm, Unconquer'd Steam, arise
Drag the slow barge, or drive the rapid car;
Or on wide-waving wings expanded bear
The flying chariot through the fields of air.
— Fair crews, triumphant, leaping from above,
Shall view their flut'ring heralds as they move;
Or survive landslides along the piping crowd,
And armies shrink beneath the shadowy cloud."

Darwin goes on then to describe the formation of the earth, which he maintains was shot forth from a volcano in the sun, the formation of a nucleus, the precipitation of water, the formation of clouds, &c. &c.

"In this connection the fossil marine animals also come under discussion; and after mentioning the singular circumstance that most fossil marine animals as, for example, the ammonites, are no longer found living, while the living animals do not occur in the fossil state, the author raises the questions, 'Were all the ammonite destroyed when the continents were raised? Or do some genera of animals perish by the increasing power of their enemies? Or do they still reside at inaccessible depths in the sea? Or do some animals change their forms gradually and become new genera?'"

How very near the now accepted truth is this! While he divided the principle of mimicry in plants, and speculated on the interesting subject of their fertilisation and their relation to insects, he here just missed the truth from his want of knowledge of facts; had he had as much power of patient observation as his grandson, he would have come nearer the truth in this matter. While he held even bold speculation to be of value to science, he distinctly recognised observation and experiment as the only true bases of scientific progress, as will be seen in his admirable address to the Philosophical Society of Derby, of which he was one of the founders; he defined a fact as "A man who never tried an experiment in his life." The fundamental idea of Darwin's "Economy," it seems to Herr Krause—

"It is that in plants and animals a living force is at work, which, endowed in both with sensibility, is enabled spontaneously to adapt them to the circumstances of the outer world, so that the assumption of innate ideas, of divinely implanted impulses and instincts is rendered unnecessary, and even the process of thought appears attainable as the legitimate activity of a mechanical analysis and combination. All kinds of human knowledge originates from the senses, the action of which is

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As regards the apparently inborn faculties which young animals bring with them into the world, the author explains them by repeated sensations of the muscles under the guidance of the sensations and stimuli.

"The author very carefully studied this subject, which has been elaborated by his grandson with so much success, and deduces his formulae especially from the first impressions of new-born creatures. The trembling of fear may perhaps be referred back to the cold shivering of the newborn infant; and weeping to the first irritation of the lachrymal glands by cold air, as well as by pleasant and disagreeable odours. Thus anger and rage are universally expressed by animals taking the position of attack, is immediately intelligible. As regards smiling and the expression of the agreeable sensations, the author refers them, as well as the feeling of the beauty of undulating lines and of rounded surfaces, to the pleasure of the first nourishment derived from the soft and gently rounded maternal breast."

Here also is a remarkable passage in which the principle of heredity is distinctly recognised:—

"The ingenious Dr. Hartley in his work on man, and some other philosophers," says Darwin, "have been of opinion, that our immortal part acquires during this life certain habits of action or of sentiment, which become for ever indelible, continuing after death in a future state of existence; and add, that if these habits are of the malevolent kind, they must render the possessor miserable even in heaven. I would apply this ingenious idea to the generation, or production of the embryo, or new animal which partakes so much of the form and propensities of the parent." And he continues as follows: "Owing to the imperfection of language the offspring is termed a new animal, but is in truth a branch or elongation of the parent; since a part of the embryonic-animal is, or was, a part of the parent; and therefore in strict language it cannot be said to be entirely new at the time of its production; and therefore it may retain some of the habits of the parent-system."

In the "Economics" there are many passages we should like to quote, in which many of the doctrines associated at the present day with the name of the younger Darwin, are enunciated with wonderful clearness, even to sexual selection, the struggle for existence, and the survival of the fittest. Speaking of the weapons with which the males of animals are armed, and their contest for the possession of the female, he says:—

"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."

He concludes as follows the long passage in which this idea occurs:—

"From thus meditating on the great similarity of the structure of the warm-blooded animals, and at the same time of the great changes they undergo both before and after their nativity; and by considering in how minute a portion of time many of the changes of animals above described have been produced; would it be too bold to imagine, that in the great length of time, since the earth began to exist, perhaps millions of ages before the commencement of the history of mankind, would it be too bold to imagine that all warm-blooded animals have arisen from one living filament which the GREAT FIRST CAUSE endued with animality, with the power of acquiring new parts, attended with new propensities, directed by irritations, sensations, volitions, and associations; and thus

possessing the faculty of continuing to improve by its own inherent activity, and of delivering down those improvements by generation to its posterity, world without end!"

In his "Temple of Nature":—

"About the first hundred verses are devoted to a description of the pitiless struggle for existence which rages in the air, on the earth, and in the water, making the earth, with its incessantly warring inhabitants, like a vast slaughter-house:—

"'Ah, earth, and ocean, to avoid'st'd day
One stream of blood, one mighty tomb display!
From Hunger's arm the shafts of Death are hur'd,
And one great Slaughter-house the warring world!'"

Many more passages might be quoted all tending to prove what a really wonderful grasp the elder Darwin had of those doctrines, to which, through his grandson, his name is now so justly attached. But enough has been given to show that he deserves one of the highest places among those who have contributed to the progress of true science, and that the verdict of Herr Krause is simply borne out:—

"That he was the first who proposed and consistently carried out, a well-founded theory with regard to the development of the living world, a merit which shines forth most brilliantly when we compare with it the vacillating and confused attempts of Buffon, Lamarck, and Goëthe. It is the idea of a power working from within the organisms, to improve their natural position; and thus, out of the impulses of individual needs, to work towards the perfection of Nature as a whole."

Krause Darwin's system was in itself, as Herr Krause puts it, a most significant first step in the path of knowledge which his grandson has opened up for us. We ought to be grateful to Herr Krause for taking the pains he has done to show the true place of Erasmus Darwin in the history of science. There are many points in Mr. Darwin's intensely interesting, simple, and characteristic memoir we should have liked to notice, did space permit. The memoir is eminently candid and free from bias or anything like strong language, even when asserting conclusions. Mr. Charles Darwin, we may say, is the son of Robert Waring Darwin, the third son of Erasmus by his first wife. A genealogy of the family is given which is of great interest in connection with the subject of hereditary genius, so well treated by Mr. Francis Galton, himself a descendant of the elder Darwin.

NORTH AMERICAN ETHNOLOGY

Contributions to North American Ethnology. Vol. II. *Tribes of California.* By Stephen Powers. (Washington, 1877.)

"IT has been the melancholy fate of the Californian Indians to be more vilified and less understood than any other of the American aborigines. They were once probably the most contented and happy race on the continent, in proportion to their capacities of enjoyment, and they have been more miserably corrupted and destroyed than any other tribes within the union. They were certainly the most populous, and dwelt beneath the most genial heavens and amidst the most abundant natural productions, and they were swept away with the most swift and cruel extermination." Words such as these are now only too familiar to the ethnologist, and do not refer alone to the Californian Indians. As the ethnographic