[April 23, 1881.

Q. CHARLES DARWIN AND "THE ORIGIN OF SPECIES."—*Kindly furnish a sketch of the life of this celebrated naturalist; also enumerate his principal works, and explain his theory of man's descent.*—A. W. J.

A. Charles Robert Darwin was born at Shrewsbury on 12th February, 1809. He is the son of Dr. R. W. Darwin, F.R.S., and the grandson of Dr. Erasmus Darwin, F.R.S., the author of "The Botanic Garden." After elementary education at Shrewsbury Grammar School, and two years' attendance at lectures in Edinburgh, he went to Christ's College, Cambridge (1827), where he took his B.A. and M.A. He became attached as naturalist to "The Beagle," during her voyage round the world, in 1831-37. In 1839 he married the grand-daughter of Josiah Wedgwood. He now published his "Journal of Researches into the Geological and Natural History of the Various Countries, &c.," and edited "Zoology of the Voyage of 'The Beagle.'" In 1842 appeared "The Structure and Distribution of Coral Reefs"—an important work, containing the first adequate explanation of the organic agency of the coral animal. In 1844 and 1846 there issued from the press "Geological Observations on Volcanic Islands," and "Geological Observations on South America." In 1851 his "Monograph on the Family Cirripœdia" bore witness to the exemplary care with which he can observe and systematically work out the relations of the minutest details. After "Fossil Species," appeared "Origin of Species by means of Natural Selection" (1859). In this work it was held that nature in successive generations gives varieties; that these varieties in the struggle for existence have unequal fortune; that those most adapted to the circumstances of time and place prosper, and give origin to descendants, which run the same risks, but which, under the principle of "natural selection," acquire more and more the character of superiority; and that thus in this struggle, while the weakest "go to the wall," there is a survival of the fittest." Mr. Darwin's next works were "Fertilization of Orchids" (1862), and "Domesticated Animals, and Cultivated Plants; or the Principles of Variation, Inheritance, Reversion, Crossing, Inter-breeding, and Selection under Domestication" (1867). In 1871 appeared "The Descent of Man and Selection in Relation to Sex" (2 vols., second edition enlarged, in 1 vol.). It is in this work that the principle of selection is carried out to an unpalatable end. Its conclusion is clear and definite. It is that "man, the wonder and glory of the universe," is, to use Mr. Darwin's own words, "descended from a hairy quadruped, furnished with a tail and pointed ears, probably arboreal in its habits, and an inhabitant of the Old World." This creature, he assures us, "if its whole structure had been examined by a naturalist, would have been classed among the Quadrumana as surely as would the common and still more ancient progenitor of the Old and New World monkeys. The Quadrumana, and all the higher animals are probably derived from an ancient marsupial animal, and this through a long line of diversified forms, either through some reptile-like, or some amphibian-like creature, and this again from some fish-like animal. In the dim obscurity of the past we can see that the early progenitor of all the vertebrata *must* have been an aquatic animal, provided with branchiæ, with the two sexes united in the same individual, and with the most important organs of the body (such as the brain and heart) imperfectly developed. This animal seems to have been more like the larvæ of our existing marine ascidians than any other known form." "The expression of the Emotions in Man and Animals" (1872), "Movements and Habits of Climbing Plants." "Insectivorous Plants" (1875), and "Effects of Cross Fertilization in Plants," are the titles of this learned naturalist's latest works. He is a Fellow of the Royal Society, which awarded him the Royal and Copley medals. From the Geological Society he has received the Wollaston Palladian medal. The Prussian Government have created him a knight of the order *Pour le Mérite*. In 1871 he was elected corresponding member by the Academy of Vienna, and in 1875 he was created M.D. by the University of Leyden.

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Q. EVOLUTION.—*Please explain Darwin's theory of evolution and state on what basis it rests.*—W. D. F.

A. The theory of evolution, and the collateral hypotheses which express some ingenious modern attempts to solve the problem of life and organization, have made an amount of progress in scientific and even popular estimation which is really astonishing in view of the wide-spread hostility they first excited. There is now, perhaps, hardly a distinguished naturalist with whom the bold theory of Darwin and Haeckel is not an accepted doctrine, including, of course, many who are not prepared to allow that it accounts for all its authors would claim for it. Even uninstructed prejudice—usually a much more stubborn opponent than scientific hostility—has gradually given way before the extraordinary force and vitality of this new phase of scientific teaching. For the theory as it at present stands Mr. Darwin is not wholly responsible. Of the elaborate superstructure he is unquestionably the chief architect, but the foundation of the belief had already been laid by Lamarck, Goëthe, Wallace, and Mr. Darwin's own father. Lamarck taught that varying types were not the result of independent creative acts, but were due to the direct influence on organized forms of changes in their physical surroundings. Mr. Darwin adopted this view, but pointed out that those animals which might happen to develope any special adaptation to surrounding circumstances would be more likely to succeed in the struggle for existence, and therefore to leave a greater number of offspring than others less favourably situated; and that these offspring would in their turn transmit the favouring peculiarity in a more permanent and extended form to their posterity. This proposition forms the key-note of the series of works whose publication has created so much enthusiasm among the *savants* of England and Germany. These are the "Origin of Species"; the "Variation of Plants and Animals under Domestication," and the "Descent of Man," and whatever opinion one may hold with regard to the views which Mr. Darwin has enunciated in these volumes, it is impossible not to admire the force and lucidity of his arguments, the charm of his style, and the erudition of his illustrations. How far his position is tenable and how much of his reasoning is sophistry are questions which we cannot take the responsibility of answering. The two chief factors in Mr. Darwin's theory of the origin of species by evolution are (1) the tendency of individuals to vary from the typical form of the race; and (2) the influence of the surrounding conditions or environment on both the variation and the parent form. A consideration of these inter-related premises will, Mr. Darwin seems to think, explain the difficulty of the occasional persistence of species through many ages without any apparent tendency to variation, a fact which Cuvier established beyond doubt, and which he and his followers have regarded as absolutely fatal to any hypothesis of evolution. For it will entirely depend on the nature of these surrounding conditions of country or period, whether the variation shall survive and supplant the parent form, or whether the parent form shall survive and supplant the variation. If the surrounding condition happens to be favourable to the variation it will survive, and the parent form become extinct by a process of gradual elimination; but if, on the other hand, the derived form should find itself less competent to deal with the conditions of its environment than its parent, it will assuredly be vanquished in the struggle for existence, and what may be called the normal type will persist. In the first case, types may become altered to any conceivable extent, minute modifications will be multiplied into specific differences as distinct from each other as if each were the result of a new creative fiat; in the second the parent form may persist through countless ages without any change of sufficient importance from nature to take note of. The shell deposits of Goat Island, Niagara, formed there thirty thousand years ago, contain animal remains almost identical with the forms which yet inhabit the mud of Lake Erie. Whatever variations may have arisen from time to time have apparently not found themselves better able to cope with the special difficulties of their circumstances than their ancestors. Moreover it has been contended that even when variations do happen to result in advantage to the race, the proved tendency to sterility more than strikes a balance in favour of the parent form, and hybrids are notoriously sterile. Yet it is but fair to say that all these points are carefully considered by Mr. Darwin; indeed, he seems to have anticipated every possible objection that could be urged against his theories, and to have prepared replies which, if not convincing, are at least worthy of careful consideration. His illustrations of the principles of natural and sexual selection are collected from every possible source. The green colour of leaf-eating insects, the mottled grey of bark feeders, and the white feathers assumed by the Alpine ptarmigan in winter, are samples of the perfect adaption to special conditions which are cited as the result of natural selection. The brightest berries will prove the most attractive to the birds which feed on them and, as a consequence, will have the best chance of wide and thorough dissemination, and the gayest flowers are just those whose fertilization is carried on by the agency of insects; those which have to depend on the wind for fertilization or indeed any agency that does not work selectively have either weak faint colours as the docks and nettles, or are entirely colourless as the flowers of grasses. The brilliant plumage of many birds and the radiant beauty of insects are referable for their evolution and maintenance to *sexual* rather than to natural selection. But in regard to some of those peculiarities in colour or form which may seem to us unimportant or even useless to their possessors, we must remember that a variation in one particular direction to which natural selection has given permanence will, by the law of correlation, be accompanied by some other modification of form. For example, natural selection may have brought the larva of an insect, by a series of progressive changes, to the highest state of fitness for the condition of its larval existence; yet these very changes may, by correlation, modify the form of the adult insect, and possibly in some direction unfavourable to its success in the battle with nature; in this case natural selection will eventually have to strike a balance between the opposing variations, and the most favourable to the species under *all* the circumstances will persist. But in the midst of these laws which theoretically are so inevitable and produce such unvarying results, we must be prepared for every conceivable and eccentric exception. Vigorous parents frequently have feeble offspring and *vice versâ*; such anomalous individual cases will not affect the working of any real law, but they sometimes lead good observers to erroneous conclusions. Unquestionably the really weak point in the whole theory of evolution will be found by examining it from its paleontological side. The Darwinian postulate, that each form of life must have been preceded by some very slightly different form is certainly to some extent supported by modern geological researches, but the two ends of some chain of special development have often been found without a trace of the intermediate links. Professor Huxley has maintained that this apparent hiatus in the "testimony of the rocks" is really demonstative evidence of the clearest kind. He attributes the imperfection of the geological record to the action of heat or water on the strata containing organic remains, and their consequent destruction; and points to specimens of hardened sandstone containing cavities which, if filled, form perfect casts of fossils, the bones having been dissolved out by the action of water, and the sandstone mould left entire. Footprints of colossal birds have been found stamped in the sandstone, but no trace of their skeletons. The gigantic animal and vegetable forms which flourished in the protoplastic state of the young world, have left us wonderfully few physical evidences of their existence. This may, however, perhaps be due to the small area over which skilled search has been made. The most complete evidence of the theory is that which pertains to the ancestry of the horse. All mammals have a fore limb which is modified from a typical form of which the human arm may be taken as the normal type. Now the fore leg of the horse, widely as it differs from this, presents rudimentary bones which seem to suggest its origin, and an examination of the fossils of the horse of the tertiary period has resulted in a collection of specimens which are modified in just perceptible gradations from the orohippus of the Eocene with its four toes, through a large number of intermediate forms, to the modern horse. And the great gap between birds and reptiles is filled just as completely; and our scientists are constantly claiming to have found fresh evidence of their pet theory. As a matter of fact, the possibilities and limitations of evolution, actual and potential, are beyond what we dare conceive. It is either a scientific *fact*, an ever-abiding apocalypse, as sacred in virtue of its truth as if a part of Holy Scripture; or it is the most tremendous chimera—not to say falsehood—that has ever misled the intellectual world.

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