NATURE

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CHARLES DARWIN

VERY few, even among those who have taken the keenest interest in the progress of the revolution in natural knowledge set afoot by the publication of the "Origin of Species"; and who have watched, not without astonishment, the rapid and complete change which has been effected both inside and outside the boundaries of the scientific world in the attitude of men's minds towards the doctrines which are expounded in that great work, can have been prepared for the extraordinary manifestation of affectionate regard for the man, and of profound reverence for the philosopher, which followed the announcement, on Thursday last, of the death of Mr Darwin.

Not only in these islands, where so many have felt the fascination of personal contact with an intellect which had no superior, and with a character which was even nobler than the intellect; but, in all parts of the civilised world, it would seem that those whose business it is to feel the pulse of nations and to know what interests the masses of mankind, were well aware that thousands of their readers would think the world the poorer for Darwin's death, and would dwell with eager interest upon every incident of his history. In France, in Germany, in Austro-Hungary, in Italy, in the United States, writers of all shades of opinion, for once unanimous, have paid a willing tribute to the worth of our great countryman, ignored in life by the official representatives of the kingdom, but laid in death among his peers in Westminster Abbey by the will of the intelligence of the nation.

It is not for us to allude to the sacred sorrows of the bereaved home at Down; but it is no secret that, outside that domestic group, there are many to whom Mr Darwin's death is a wholly irreparable loss. And this not merely because of his wonderfully genial, simple, and generous nature; his cheerful and animated conversation, and the infinite variety and accuracy of his information; but because the more one knew of him, the more he seemed the incorporated ideal of a man of science. Acute as were his reasoning powers, vast as was his knowledge, marvellous as was his tenacious industry, under physical difficulties which would have converted nine men out of ten into aimless invalids; it was not these qualities, great as they were, which impressed those who were admitted to his intimacy with involuntary veneration, but a certain intense and almost passionate honesty by which all his thoughts and actions were irradiated, as by a central fire.

It was this rarest and greatest of endowments which kept his vivid imagination and great speculative powers within due bounds; which compelled him to undertake the prodigious labours of original investigation and of reading, upon which his published works are based; which made him accept criticisms and suggestions from any body and every body, not only without impatience, but with expressions of gratitude sometimes almost comically in excess of their value; which led him to allow neither himself nor others to be deceived by phrases, and to spare neither time nor pains in order to obtain clear and distinct ideas upon every topic with which he occupied himself.

One could not converse with Darwin without being reminded of Socrates. There was the same desire to find some one wiser than himself; the same belief in the sovereignty of reason; the same ready humour; the same sympathetic interest in all the ways and works of men. But instead of turning away from the problems of nature as hopelessly insoluble, our modern philosopher devoted his whole life to attacking them in the spirit of Heraclitus and of Democritus, with results which are as the substance of which their speculations were anticipatory shadows.

The due appreciation or even enumeration of these results is neither practicable nor desirable at this moment. There is a time for all things — a time for glorying in our ever-extending conquests over the realm of nature, and a time for mourning over the heroes who have led us to victory.

None have fought better, and none have been more fortunate than Charles Darwin. He found a great truth, trodden under foot, reviled by bigots, and ridiculed by all the world; he lived long enough to see it, chiefly by his own efforts, irrefragably established in science, inseparably incorporated with the common thoughts of men, and only hated and feared by those who would revile, but dare not. What shall a man desire more than this? Once more the image of Socrates rises unbidden, and the noble peroration of the "Apology" rings in our ears as if it were Charles Darwin's farewell:—

"The hour of departure has arrived, and we go our ways — I to die and you to live. Which is the better, God only knows." T.H. HUXLEY

Fisher, Haldane and Wright. Two points were made clear. First, the continuous variation studied by the biometricians could be explained by alternative alleles at many loci, each by itself having a small effect on the phenotype. Second, even rather small differences in fitness between genotypes are sufficient to determine the direction of evolutionary change, despite mutation being mainly in an opposition direction.

The work of the population geneticists prepared the way for the 'modern synthesis' of evolutionary biology, developed in the period 1930–1950 by a group including Dobzhansky, Ford, Julian Huxley, Mayr, Muller, Rensch, Simpson and Stebbins. It is hard in a few sentences to describe what these men did. In effect, they showed that the 'neo-Darwinian' mechanism — natural selection in Mendelian populations — was sufficient to explain the evolutionary process as it could be observed in nature. Dobzhansky, Ford and others measured genetic variability and natural selection in wild populations. Mayr and Rensch (for animals) and Stebbins (for plants) studied geographical variation within and between species, and discussed how new species might arise. Simpson aruged that the fossil record could best be understood in Darwinian terms. Most research in evolutionary biology since that time has been carried out in the framework of the modern synthesis. Particular efforts have been made in areas which, at least at first sight, seem to be difficult to explain in terms of natural selection, for example, the evolution of social behaviour and of sex and breeding systems.

Since 1950, developments in molecular biology have had a growing influence on the theory of evolution. The 'central dogma' of molecular biology, according to which information can pass from nucleic acid to protein, but not from protein to nucleic acid, provides a molecular explanation for Weismann's principle, thus leaving natural selection as the only agent of adaptation. Important as this is, however, two additional points should be made. First, even if 'reverse translation' of amino acid sequences into base sequences were possible, this would not provide a general mechanism for Lamarckian inheritance, because most developmental adaptations do not involve the production of new protein sequences. Second, there are good reasons why, even if living organisms have arisen independently many times in the universe, Lamarckian processes should play a minor role in their evolution. Most 'acquired characters' are non-adaptive — they are the results of age, injury and disease. Therefore, a hereditary mechanism which transmitted such characters to offspring would work against the evolution of adaptation. Hence the one-way flow of information from nucleic acid to protein may have been a necessary feature of an hereditary mechanism able to support evolution. In physics, the second law of thermo-dynamics asserts that entropy will increase in a closed physical system. In biology, Weismann's principle, together with the principle of natural selection, makes possible the maintenance,