Charles Darwin

From a Photograph by O.G. Rejlander

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SCIENTIFIC WORTHIES

III.—CHARLES ROBERT DARWIN

CHARLES ROBERT DARWIN was born at Shrewsbury on Feb. 12, 1809. He is the son of Dr. Robert Waring Darwin, F.R.S., and grandson of Dr. Erasmus Darwin, F.R.S., author of the "Botanic Garden," "Zoonomia," &c.; by the mother's side he is grandson of Josiah Wedgwood, F.R.S., the celebrated manufacturer of pottery. Mr. Darwin was educated at Shrewsbury School under Dr. Butler, afterwards Bishop of Lichfield, and in the winter of 1825 went to Edinburgh University for two years. He there attended to Marine Zoology, and read before the Plinian Society at the close of 1826 two short papers, one on the movement of the ova of Flustra. From Edinburgh Mr. Darwin went to Christ's College, Cambridge, where he took his Bachelor of Arts degree in 1831. In the autumn of 1831, Capt. FitzRoy having offered to give up part of his own cabin to any naturalist who would accompany H.M.S. *Beagle* in her surveying voyage round the world, Mr. Darwin volunteered his services without salary, but on condition that he should have the entire disposal of his collections, all of which he deposited in various public institutions. The *Beagle* sailed from England Dec. 27, 1831, and returned Oct. 22, 1836.

Mr. Darwin married his cousin, Emma Wedgwood, in the beginning of 1839, and has lived since 1842 at Down, Beckenham, Kent, of which county he is a magistrate.

The Royal Society awarded to Mr. Darwin, in 1853, the Royal Medal, and in 1864 the Copley Medal. In 1859 the Geological Society awarded him the Wollaston Medal. He is an honorary member of various foreign scientific Societies, and is a Knight of the Prussian Order of Merit.

Since his return from South America in the *Beagle* Mr. Darwin's life has been comparatively uneventful, even for a scientific man; indeed, so far as the public is concerned, the main events in Mr. Darwin's career have been the publication of his works and papers, which have been far more numerous than many are aware of. We give below a list of them.

General Works

Journal of Researches into the Natural History and Geology of the countries visited by H.M.S. *Beagle*, 1845.

On the Origin of Species by means of Natural Selection, 1859.

This was preceded by a sketch, entitled "On the variation of organic beings in a state of nature;" published in the *Journal of the Linnæan Society*, vol. iii. (Zool.), 1859, p. 46.

The Variation of Plants and Animals under Domestication. 2 vols. 1868.

The Descent of Man, and Selection in relation to Sex. 2 vols. 1871.

The Expression of the Emotions in Man and Animals. 1872.

Zoological Works

The Zoology of the voyage of H.M.S. *Beagle*, edited and superintended by C. Darwin, 1840; consisting of five parts.

A monograph of the Cirripedia, Part 1, Lepadidæ; Ray Soc., 1851, pp. 400.

A monograph of the Cirripedia, Part 2, the Balanidæ; Ray Soc., 1854, pp. 684.

A monograph of the Fossil Lepadidæ; Pal. Soc., 1851, pp. 86

A monograph of the Fossil Balanidæ and Verrucidæ; Pal. Soc., 1854, pp. 44.

Observations on the Structure of the genus Sagitta; Ann. Nat. Hist., vol. xiii., 1844.

Brief descriptions of several terrestrial Phanariæ, and of some marine species; Ann. Nat. Hist., vol xiv., 1844, p. 241.

Botanical Works

On the various contrivances by which British and Foreign Orchids are fertilised, 1862.

On the Movements and Habits of Climbing Plants; Journ. Linn. Soc., vol ix., 1865 (Bot.), p. 1.—This Paper has also been published as a separate work.

On the action of Sea-water on the Germination of Seeds; Journ. Linn. Soc., vol. i., 1857 (Bot.), p. 130.

On the Agency of Bees in the Fertilisation of Papilionaceous Flowers; Ann. Nat. Hist., vol. ii., 1858, p. 459.

On the Two Forms or Dimorphic Condition of the species of Primula; Journ. Linn. Soc., vol. vi., 1862 (Bot.), p. 77.

On the Existence of Two Forms and their reciprocal Sexual Relations in the genus Linum; Journ. Linn. Soc., vol. vii., 1863 (Bot.), p. 69.

On the Sexual Relations of the Three Forms of Lythrum; Journ. Linn. Soc., vol. viii., 1864, p. 169.

On the Character and Hybrid-like nature of the illegitimate Offspring of Dimorphic and Trimorphic Plants; Journ. Linn. Soc., vol. x., 1867 (Bot.), p. 393.

On the Specific Difference between *Primula veris* and *P. vulgaris*, and on the Hybrid Nature of the common Oxslip; Journ. Linn. Soc., vol. x., 1867 (Bot.), p. 437.

Notes on the Fertilisation of Orchids; Ann. Nat. Hist., Sept. 1869.

Geological Works

The Structure and Distribution of Coral-reefs, 1842; pp. 214.

Geological Observations on Volcanic Islands, 1844; pp. 175.

Geological Observations on South America, 1846; pp. 279.

On the Connection of the Volcanic Phenomena in South America, &c.; Trans. Geol. Soc., vol. v.; read March, 1838.

On the Distribution of the Erratic Boulders in South America; Trans. Geol. Soc., vol. vi.; read April, 1841.

On the transportal of Erratic Boulders from a lower to a higher level; Journ. Geol. Soc., 1848, p. 315.

Notes on the Ancient Glaciers of Caernarvonshire; Phil. Mag., vol. xxi., 1842, p. 180.

On the Geology of the Falkland Islands; Journ. Geol. Soc., 1846, pp. 267.

On a Remarkable Bar of Sandstone off Pernambuco; Phil. Mag., Oct. 1841, p. 257.

On the Formation of Mould; Trans. Geol. Soc., vol. v., p. 505; read Nov. 1837.

On the Parallel Roads of Glen Roy; Trans. Phil. Soc., 1839, p. 39.

On the Power of Icebergs to make Grooves on a Submarine Surface; Phil. Mag., Aug. 1855.

An account of the Fine Dust which often falls on vessels in the Atlantic Ocean; Proc. Geol. Soc., 1845, p. 26.

Origin of the Saliferous Deposits of Patagonia; Journ. Geol. Soc., vol. ii., 1838, p. 127.

Part Geology ; Admiralty Manual of Scientific Inquiry, 1849. Third ed., 1859.

Two British naturalists, Robert Brown and Charles Darwin, have, more than any others, impressed their influence upon Science in this nineteenth century. Unlike as these men and their works were and are, we may most readily subserve the present purpose in what we are called upon to say of the latter by briefly comparing and contrasting the two.

Robert Brown died sixteen years ago, full of years and scientific honours, and he seems to have finished, several years earlier, all the scientific work that he had undertaken. To the other, Charles Darwin, a fair number of productive years may yet remain, and are earnestly hoped for. Both enjoyed the great advantage of being all their lives long free from any exacting professional duties or cares, and so were able in the main to apply themselves to research without distraction and according to their bent. Both, at the beginning of their career, were attached to expeditions of exploration in the southern hemisphere, where they amassed rich stores of observation and materials, and probably struck out, while in the field, some of the best ideas which they subsequently developed. They worked in different fields and upon different methods ; only in a single instance, so far as we know, have they handled the same topic ; and in this the more penetrating insight of the younger naturalist into an interesting general problem may be appealed to in justification of a comparison which some will deem presumptuous. Be this as it may, there will probably be little dissent from the opinion that the characteristic trait common to the two is an unrivalled scientific sagacity. In this these two naturalists seem to us, each in his way, pre-eminent. There is a characteristic likeness, too—underlying much difference—in their admirable manner of dealing with facts closely, and at first hand, without the interposition of the formal laws, vague ideal conceptions, or "glittering generalities" which some philosophical naturalists make large use of.

A likeness may also be discerned in the way in which the works or contributions of predecessors and contemporaries are referred to. The brief historical summaries prefixed to many of Mr. Brown's papers are models of judicial conscientiousness. And Mr. Darwin's evident delight at discovering that someone else has "said his good things before him," or has been on the verge of uttering them, seemingly equals that of making the discovery himself. It reminds one of Goethe's insisting that his views in Morphology must have been held before him and must be somewhere on record, so obviously just and natural did they appear to him.

Considering the quiet and retired lives led by both these men, and the prominent place they are likely to occupy in the history of Science, the contrast between them as to contemporary and popular fame is very remarkable. While Mr. Brown was looked up to with the greatest reverence by all the learned botanists, he was scarcely heard of by anyone else ; and out of botany he was unknown to Science except as the discoverer of the Brownian motion of minute particles, which discovery was promulgated in a privately printed pamphlet that few have ever seen. Although Mr. Darwin had been for twenty years well and widely known for his "Naturalist's Journal," his works on "Coral Islands," on "Volcanic Islands," and especially for his researches on the Barnacles, it was not till about fifteen years ago that his name became popularly famous. Ever since no scientific name has been so widely spoken. Many others have had hypotheses or systems named after them, but no one else that we know of a department of bibliography. The nature of his latest researches accounts for most of the difference, but not for all. The Origin of Species is a fascinating topic, having interests and connections with every branch of Science, natural and moral. The investigation of recondite affinities is very dry and special ; its questions, processes, and results alike—although in part generally presentable in the shape of Morphology—are mainly, like the higher mathematics, unintelligible except to those who make them a subject of serious study. They are especially so when presented in Mr. Brown's manner. Perhaps no naturalist ever recorded the results of his investigations in fewer words and with greater precision than Robert Brown : certainly no one ever took more pains to state nothing beyond the precise point in question. Indeed we have sometimes fancied that he preferred to enwrap rather than to explain his meaning ; to put it into such a form that, unless you follow Solomon's injunction and dig for the wisdom as for hid treasure, you may hardly apprehend it until you have found it all out for yourself, when you will have the satisfaction of perceiving that Mr. Brown not only knew all about it, but put it upon record long before. Very different from this is the way in which Mr. Darwin takes his readers into his confidence, freely displays to them the sources of his information, and the working of his mind, and even shares with them all his doubts and misgivings, while in a clear and full exposition he sets forth the reasons which have guided him to his conclusions. These you may hesitate or decline to adopt, but you feel sure that they have been presented with perfect fairness ; and if you think of arguments against them you may be confident that they have all been duly considered before.

The sagacity which characterises these two naturalists is seen in their success in finding decisive instances, and their sure insight into the meaning of things. As an instance of the latter on Mr. Darwin's part, and a justification of our venture to compare him with the *facile princeps botanicorum*, we will, in conclusion, allude to the single instance in which they took the same subject in hand. In his papers on the organs and modes of fecundation in Orchideæ and Asclepiadeæ, Mr. Brown refers more than once to C. K. Sprengel's almost forgotten work, shows how the structure of the flowers in these orders largely requires the agency of insects for their fecundation, and is aware that "in Asclepiadeæ . . . the insect so readily passes from one corolla to another that it not unfrequently visits every flower of the umbel." He must also have contemplated the transport of pollen from plant to plant by wind and insects ; yet we know from another source that he looked upon Sprengel's ideas as fantastic. Instead of taking the single forward step which now seems so obvious, he even hazarded the conjecture that the insect-forms of some Orchideous flowers are intended to deter rather than to attract insects. And so the explanation of

all these and other extraordinary structures, as well as of the arrangement of blossoms in general, and even the very meaning and need of sexual propagation, were left to be supplied by Mr. Darwin. The aphorism "Nature abhors a vacuum" is a characteristic specimen of the Science of the Middle Ages. The aphorism "Nature abhors close fertilisation," and the demonstration of the principle, belong to our age, and to Mr. Darwin. To have originated this, and also the principle of Natural Selection—the truthfulness and importance of which are evident the moment it is apprehended—and to have applied these principles to the system of nature in such a manner as to make, within a dozen years, a deeper impression upon natural history than has been made since Linnæus, is ample title for one man's fame.

There is no need of our giving any account or of estimating the importance of such works as the "Origin of Species by means of Natural Selection," the "Variation of Animals and Plants under Domestication," the "Descent of Man, and Selection in relation to Sex," and the "Expression of the Emotions in Man and Animals,"—a series to which we may hope other volumes may in due time be added. We would rather, if space permitted, attempt an analysis of the less known but not less masterly, subsidiary essays, upon the various arrangements for ensuring cross-fertilisation in flowers, for the climbing of plants and the like. These, as we have heard, may before long be reprinted in a volume, and supplemented by some long-pending but still unfinished investigations upon the action of Dionæa and Drosera—a capital subject for Mr. Darwin's handling.

Apropos to these papers, which furnish excellent illustrations of it, let us recognise Darwin's great service to Natural Science in bringing back to it Teleology: so that, instead of Morphology *versus* Teleology, we shall have Morphology wedded to Teleology. In many, no doubt, Evolutionary Teleology comes in such a questionable shape, as to seem shorn of all its goodness; but they will think better of it in time, when their ideas become adjusted, and they see what an impetus the new doctrines have given to investigation. They are much mistaken who suppose that Darwinism is only of speculative importance and perhaps transient interest. In its working applications it has proved to be a new power, eminently practical and fruitful.

And here, again, we are bound to note a striking contrast to Mr. Brown, greatly as we revere his memory. He did far less work than was justly to be expected from him. Mr. Darwin not only points out the road, but labours upon it indefatigably and unceasingly. A most commendable *noblesse oblige* assures us that he will go on while strength (would we could add health) remains. The vast amount of such work he has already accomplished might overtax the powers of the strongest. That it could have been done at all under constant infirm health is most wonderful.

ASA GRAY

THE AUSTRALIAN MUSEUM

THE authorities of the British Museum may congratulate themselves on their not being the only governing body which is considered to be on an antiquated and improvable foundation, which calls for a radical and speedy change. In Australia the same cry has been raised before the Parliament of the Colony, with respect to the Museum at Sydney. There the biological collection seems to be much in need of improvement, of a greater spirit of enterprise in its management, and of a more liberal view being taken by its authorities of the rapid advances which are adding day by day to the importance of the subject which it so materially assists in teaching.

We may reasonably ask, what is given as the cause of this want of energy and progressive spirit in the colonial institution? Curiously enough it is the same as that which is being urged by all scientific men in this country against our national collection, which has found its most powerful expression in the Report of the Royal Commission on Scientific Instruction and Advancement of Science, noticed by us a short time ago (NATURE, vol. ix. p. 397), namely, that it is in the hands of a body of irresponsible trustees with a distributed authority, instead of under the management of a paid superintendent, who alone is accountable for all that is done.

It is the so-called "conservative spirit" of the authorities against which so much evidence of inefficiency is becoming so prominent. Science—and Natural Science especially—has been making such rapid progress of late years, that the mechanism by which it has to be taught, the elaborate nature of which is only fully understood by those who are actual workers within its confines, has not a sufficient inherent "go" to do the work expected of it. Just as by means of manual labour it was possible to thrash the cereal products of this country with profit in former times, whilst in the present day foreign competition makes the much more speedy steam apparatus absolutely essential; so when libraries of ancient manuscripts and the beautiful artistic remains of bygone days were the subjects which formed the most important topics for the consideration of the museum government, the bodies of trustees worked very well. The task they had on hand, being stamped with the name of fine art, was rather a pleasure than a labour; and the members of the board derived a *prestige*, and other advantages, from being able to follow their wonted tastes without any feeling of incompetency, or any scruples as to the general acceptance of their decision.

The biological element in our national collection has, however, introduced a different state of things. Those who can afford, from their pecuniary advantages, to spend their time and energies in unremunerative committees, are not the class who dirty their hands with the preliminary training necessary for a zoological or a botanical education. Neither of these subjects were whipped into them at Eton or at Harrow; they were too old to begin them, except perhaps in a very amateur manner, at Oxford or at Cambridge; and consequently when they find themselves appointed to any authoritative post in after life they set to the work with the antipathy they have always felt against "stinks."

How can a body so constituted be expected to forward the progress of Natural Science? The subject is a modern one. It is in need of hard organising work being done by experienced men who take a true interest in the object to be attained. Such men must be paid, not by paltry salaries no better than that of a banker's clerk; for