THE DIAL

VOL. XI. JULY, 1890. No. 123.

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CHARLES DARWIN'S JOURNAL.*

"After having been twice driven back by heavy south-western gales, Her Majesty's ship *Beagle*, a ten-gun brig, under the command of Captain Fitz-Roy, R.N., sailed from Devonport on the 27th of December, 1831. The object of the expedition was to complete the survey of Patagonia and Terra del Fuego, commenced under Captain King in 1826 to 1830—to survey the shores of Chili, Peru, and of some islands in the Pacific—and to carry a chain of chronometrical measurements round the World."

Thus simply begins the record of the most momentous of all voyages ever made in the interests of scientific discovery—momentous, not because of the successful accomplishment of its primary objects, but because of one of those fortunate combinations of "the man and the moment" which, according to Matthew Arnold, are the essential conditions of all creative achievement. Captain Fitz-Roy desired a naturalist to accompany the expedition, and offered to share his own quarters without expense, though without salary. Charles Darwin, a young man of twenty-two, preparing for the ministry, but with a strong leaning toward scientific pursuits, accepted the invitation; and it was his observations and the record and use he made of them that have rendered the voyage famous for all time.

The route lay by the Cape de Verd Islands across the Atlantic to the coast of Brazil, southward to the Straits of Magellan, and up the western side of the South American continent as far north as Callao. It then struck westward across the Pacific Ocean by the Galapagos Archipelago, Tahati, New Zealand, Sydney, and Tasmania, turning round into the Indian Ocean by way of Keeling Islands and the Mauritius to the Cape of Good Hope, and then by St. Helena and Ascension Island to the coast of Brazil again, in order to complete the chronometrical measurement of the world; thence homeward across the Atlantic to England. The "environment" had included nearly every aspect of Nature, and the man, Charles Darwin, proved equal to the opportunity. The "Journal of Researches into the Natural History and Geology of the Countries visited during the Voyage round the World of H. M. S. Beagle," published two years after his return, at once gave him a leading place among naturalists, for it was recognized as a model of acute and painstaking investigation, under circumstances favorable beyond precedent. Fifty years have passed, and in some respects the book has even greater interest to-day than on its first publication. Not only have we now for the first time an edition with illustrations, most of them sketched on the spot with Darwin's book by the artist's side, but we are also better able to comprehend its far-reaching import, since we trace here the earliest germs of the ideas that afterwards made Darwin the foremost leader of English thought in his day. Here we find the first records of those eager and discriminating observations, of those tentative suggestions, which later generalizations and amplifications fertilized into the novel and original works on "Coral Reefs" and "Volcanic Islands," or into those epoch-making books, "The Origin of Species," "The Descent of Man," and "Variation under Domestication."

Most modern scientists are specialists in one department only, but Charles Darwin was a naturalist according to the original sense of the word—one working in every department of nature. His first labors were given to work-

* JOURNAL OF RESEARCHES into the Natural History and Geology of the Countries visited during the Voyage round the World of H. M. S. Beagle. By Charles Darwin, M.A., F.R.S. New York: D. Appleton & Co.

ing up the geological and zoölogical results of his voyage in various papers for the Geological and Zoölogical Societies, most of which were afterwards incorporated into larger works, as "Structure and Distribution of Coral Reefs" (1842); "Volcanic Islands" (1844); and "Geological Observations in South America" (1846). Dr. Geikie, in speaking of these publications, says:

"Never before in the history of science had geological problems been attacked by an actual observer over so vast a space of the earth's surface, with more acuteness and patience, or discussed with more breadth of view. There is something almost ludicrous in the contrast between his method of treatment of volcanic phenomena and that of his professor at Edinburgh only six short years before."

In respect to coral islands, the revolution in accepted theories was even greater. Darwin's observations of these wonderful formations in the Pacific and Indian Oceans led him to discard all previous theories as inadequate for their explanation, and to offer a new one at once so grand and so simple as to excite the wonder and the admiration of geologists everywhere. He noted that throughout enormous areas in these oceans, every single island was of coral formation; that these were uniformly low, being raised to no greater height than the waves can throw up fragments and the winds pile up sand; that below the surface there are lofty submarine mountains, with sides steeper even than those of the most abrupt volcanic cones; that the coral-builders can live at no great depth below the surface; that the islands extend in lines parallel to the generally prevailing strike of the high islands and great coast-lines of the oceans in which they occur. None of the former theories served to account for these carefully-investigated features, while all received simple explanation in the new one offered, namely, that coral formations, whether atolls, barrier reefs, or fringing reefs, were the upward growth of reef-building corals around islands slowly sinking into the sea. Later researches have tended to indicate that the history of coral reefs may be more varied and complicated than Darwin supposed, but the work is still counted among geological classics.

But the most interesting pages of the "Journal," to the reader of to-day, are those in which we find the premonitions of his most characteristic doctrine,—the transmutation of species by natural selection and the survival of the fittest. We see him collecting and classifying the phenomena of plant and animal life in the Galapagos or in Australia. In these islands he found that almost the entire range of animal and plant life was peculiar to itself. Australia, a great island lying in complete isolation, was seen to be some ages behind continental regions of like climate and soil; the Galapagos seemed to be but rudimentary parts of the great body of the globe. Even the natives were among the lowest in the scale of human beings. Organism responded to environment, and diversities appeared as a consequence of temperature, mountain barriers, or glacial action, inducing migration. In proportion to opportunities of migration was the greatest variety of life. The greater the isolation of the island, the fewer animals, and these more specialized in type.

These and other such observations impressed upon him the need of some explanation of the geographical distribution of organic forms. If animals were created suddenly, each ought to be found, after its kind, indiscriminately inhabiting islands and continents; but he found life on continental islands and life on mainland varying according to the time and distance of their separation. If specific centres of creation were the method, each species would be best fitted for its own environment, and could not exist in any other; but, in fact, both animals and plants were found flourishing far away from their native home, under totally different physical conditions, and sometimes with decided advantage from the change. Science, accepting the teaching of Lamarck and others, had already recognized the importance of environment, and of the increased use and disuse of organs, as factors in animal development; but these did not explain the lagging pace of some regions as compared with others in similar latitudes. They had nothing to say to the discovery that animal life of islands in mid-ocean had changed but little from early types, while that on islands longest separated from mainland had changed least. It remained for Darwin to call attention to one important difference in the conditions. Wherever the battle of life had been strongest, there appeared the greatest progress and variety in development. In the ascent of animal life, opposition and antagonism were seen to be most potent factors. The struggle for self-preservation develops strength, agility, or cunning. The weak or poorly-conditioned perish, the strongest and best-favored survive and leave offspring. Mid-ocean islands, being shut out from migrations of fierce animals, were some ways behind their continental neighbors because they had been

able to take life so much more quietly; the Galapagos Islands, five and six hundred miles westward of the South American coast, had not kept pace with that coast because there had been fewer enemies to repulse; Australia had been left behind by Asia because of its comparative freedom from the fierce struggle for existence. Natural Selection, or the survival of the fittest, and Sexual Selection, must be admitted as leading factors in organic evolution.

It is always a happy circumstance for the average mortal when he can by chance catch a glimpse of the birth-moments of great thoughts in the mind of genius. Do we not see such a moment in the closing lines of Darwin's "Journal" while in the Galapagos Archipelago? After describing in detail the remarkable character of the fauna and flora of these ten islands, most of them in sight of each other, and differing neither in the nature of the soil, nor height of the land, nor the climate, nor the general character of the associated beings, he adds:

"It is the circumstance that several of the islands possess their own species of the tortoise, mocking-thrush, finches, and numerous plants, these species having the same general habits, occupying analogous situations, and obviously filling the same place in the natural economy of this archipelago, that strikes me with wonder. . . . The only light which I can throw on this remarkable difference in the inhabitants of the different islands, is, that very strong currents of the sea, running in a westerly and W. N. W. direction, must separate, as far as transportal by the sea is concerned, the southern islands from the northern ones; and between these northern islands a strong N. W. current was observed, which must effectually separate James and Albemarle Islands. As the archipelago is free to a most remarkable degree from gales of wind, neither the birds, insects, nor lighter seeds would be blown from island to island. And lastly, the profound depth of the ocean between the islands, and their apparently recent (in a geological sense) volcanic origin, render it highly unlikely that they were ever united; and this, probably, is a far more important consideration than any other with respect to the geographical distribution of their inhabitants."

Is not this the very germ of the immortal "Origin of Species"? We know how strongly the matter had laid hold of him, by his own words later. "It was evident," he says, "that such facts as these, as well as many others, could only be explained on the supposition that species gradually become modified; and the subject haunted me." Very soon after his return, he opened a note-book for the accumulation of facts bearing on the question, and from that date he continued to gather them, "on a wholesale scale, more especially with respect to domesticated productions, by printed inquiries, by conversation with skilful breeders and gardeners, and by extensive reading." Five years later, he had only progressed so far as to write a brief pencil abstract of thirty-five pages; two years more, and this was enlarged to 230 pages, fairly copied out, but still laid away in his desk while the laborious task of accumulating evidence went on: and it was not until 1859, or twenty-three years after his return to England, that these original theories were made accessible to the public under the title, "The Origin of Species." This is not the place for the story of its reception: nor is it needful to dwell upon the profound revolution wrought by it and its successors in every department of thought,—in religion, philosophy, metaphysics, as well as in science.

As a story of travel simply, as a graceful description of strange scenes and peoples, the present book is a charming one: but in its higher character as the storehouse of material out of which was wrought a work whose impression was at once more wide, more deep, and more immediate, than any other of our age, or perhaps of any age, this "Naturalist's Voyage Round the World" belongs among the noteworthy of the books of all time.

ANNA B. MCMAHAN.

CHESTERFIELD'S LETTERS TO HIS GODSON.*

In summarizing the character of Philip Dormer, Earl of Chesterfield, Lecky the historian speaks of "his delicate but fastidious taste, his low moral principle, his hard, keen, and worldly wisdom": and this, perhaps—with the emphasis on "low moral principle"—fairly expresses the conventional idea of the eighteenth century statesman and wit. It may be said of Lord Chesterfield — and it is a rather uncommon thing to say of one of his countrymen — that his reputation has suffered more from his preaching than from his practice; and we may easily conjecture that had his preaching been intended for the morally sensitive ear of the British public, he would have more carefully observed his own organic maxim—"Le Grand Art, et le plus necessaire de tous, c'est *L'Art de Plaire*."

As a matter of fact, were Lord Chesterfield fairly weighed in the balance with his contemporaries and co-equals, he must lose, to a great extent, the invidious distinction usually bestowed upon him. Certainly, he was no whit

* LETTERS OF PHILIP DORMER, Fourth Earl of Chesterfield, to His Godson and Successor. Edited from the Originals, with a Memoir of Lord Chesterfield, by the Earl of Carnarvon. Illustrated. New York: Macmillan & Co.