The Story of the Evolution of Life

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(Continued from last issue)

The Galapagos Islands again, amplify the foregoing testimony. These isles lie in the Pacific about 600 miles from the West Coast of South America. They also are of volcanic origin and rise from great depths. While pondering over the problems presented by the animals of these isles, Darwin detected cogent proofs of the truth of evolution. As he stated in his "Origin": "The naturalist, looking at the inhabitants of these islands in the Pacific, distant several hundred miles from the continent, feels that he is standing on American land. Why should this be so? Why should the species which are supposed to have been created in the Galapagos Archipelago, and nowhere else, bear so plainly the stamp of affinity to those created in America? There is nothing in the conditions of life, in the geological nature of the islands, in their height or climate, or in the proportions in which the several classes are associated together, which closely resembles the conditions of the South American Coast; in fact there is a considerable dissimilarity in all these respects. On the other hand, there is a considerable degree of resemblance in the volcanic nature of the soil, in the climate, height, and size of the islands, between the Galapagos and Cape de Verde Archipelagoes; but what an entire and absolute difference in their inhabitants! The inhabitants of the Cape de Verde Islands are related to those of Africa, like those of the Galapagos to America. Facts such as these admit of no sort of explanation on the ordinary view of independent creation; whereas on the view here maintained, it is obvious that the Galapagos Island would be likely to receive colonists from America, and the Cape de Verde Islands from Africa; such colonists would be liable to modification—the principle of inheritance still betraying their original birthplace."

The organisms of St. Helena and the Sandwich Islands tell the same story. In fact there is no island, isthmus or peninsular which fails to provide its quota of evidence in favour of the doctrine of descent. Owing in large measure to their isolation, oceanic islands contain a considerable proportion of peculiar forms, and when we turn to the British Isles which were recently, geologically speaking, united to the European Continent, we meet over 14,000 species of plants and animals common to our Isles and to the Continent, while we find only 200 species peculiar to the British area, even when floral and faunal organisms are classed as peculiar, which various naturalists regard as mere local varieties, and these facts become more striking when we remember that 1,000 islands are embraced by Great Britain and Ireland.

Vast indeed is the contrast between our isles and the solitary volcanic island of St. Helena where almost all the animals and about half the plants are peculiar, while in the British group only 1/80 of the animals and 1/30 of the plants are peculiar. Then again Britain is still well furnished with reptiles and mammals, organisms unknown in oceanic isles. There exists no example of any sea-girt isle further than 300 miles from a continent which contains a single species of indigenous mammal with the exception of bats which were able to fly over the ocean. Once more, the spawn of amphibia become sterilized in sea water and in consequence newts, toads, and frogs are absent from oceanic isles, and curiously enough there occur in some sea islands, as Professor Romanes pointed out "certain peculiar species of plants the seeds of which are provided with numerous tiny hooks, obviously and beautifully adapted—like those of the seeds of allied plants elsewhere—to catch the wool or hair of moving quadrupeds, and so to further their own dissemination. But . . . there are no quadrupeds in the islands to meet these beautiful adaptations on the part of the plants." The plain deduction is, that these plants are descended from ancestors which lived in surroundings where mammals dwelt, and they still retain the organs they originally utilised to assist them in securing their reproduction.

Having advanced a tiny percentage of the available facts, the question arises as to the principle or principles which elucidate the facts. Multiplex are causes which produce variation, and we must now consider one of the leading factors in determining the triumph of some variations and overthrow of others. Darwin realised that a much greater number of plants and animals are born into the world than can conceivable survive, and that a never ceasing struggle for supremacy takes place. All living things strive to secure possession of food, air, water, and the other necessaries of existence. Now, the problem to be solved was what decided the success of one, and the failure of so many others. Obviously those organisms which were best fitted to their surroundings seemed likely to prove the winners in life's race. It therefore follows that some are selected for survival, while the remainder perish, and it is equally true that those living forms which have varied in a manner favourable to their survival transmit these valuable variations to their offspring, and as the selective agency is in constant operation, generation after generation, then in course of time, plants and animals become more harmoniously adapted to their environment than their ancestors. Nature favours those best fitted to their surroundings because, other things equal, those best conforming to the demands of their habitat live longer lives, and produce a larger number of offspring, than those less adapted to meet the requirements of their environment. Again as time goes on, organisms tend to develop more useful variations, and the earlier variations, so serviceable in their day against less efficiently equipped competitors, in turn succumb to the more fully advantaged rivals with whom they are now driven to struggle. For, much as plant and animal breeders select choice specimens from which to perpetuate their floral and faunal stocks, so the sum total of encircling phenomena which we term Nature, gives preference to those that prove themselves most adaptable to the requirements of life.

Some may surmise that, as the struggle for existence has continued from the dawn of life onwards, then, organisms should by this time have become so harmoniously adapted to their surroundings, that no future advance is possible. This view would contain much truth were it not for the fact that natural surroundings themselves are never stationary. Geographical, climatic, and countless other changes of a physical character, reinforced by the ceaseless modifications set up in the world of life itself, by the wanderings of plants and animals from place to place, render any cessation of the selective processes of Nature entirely improbable. Consequently, the gradual but unceasing fluctuations of the environment evolve alterations to which organic forms are constantly driven to accomodate themselves.

The foregoing contention is in reality an unvarnished statement of obvious truth. Yet, apart from a few thinkers who dimly realised it, no one until the period of Darwin and Wallace adequately grasped its profound significance as a factor in the lives of organic things. The female cod was known to lay millions of eggs one or two only of which ever reached maturity. Of the countless seeds of certain plants very few were reproduced. And even in the case of the elephant, one of the slowest of breeders, Darwin noted that the progeny of a single pair, were they all permitted to procreate themselves to the full stage of adult life, then a population of 19 million elephants would be produced at the end of 750 years. And in the vegetable kingdom it is estimated that if an annual plant set two seeds only per season, and most plants produce hundreds and thousands, were the yearly seeds then, a mere couple, if these and their descendants all reached maturity, in twenty years there would be 11,000,000 plants descended from a single ancestor. But viewing the world as a whole, not one in a thousand seeds or young survives. Therefore the ordeal through which organisms pass must be indeed severe.

In successful emergence in life's conflict thousands of factors co-operate. The cunning, the strong, the shrinking, even the social organisms, derive advantages from their various qualities. Nature dispassionately picks out for survival those that best respond to her demands. As already intimated, advantageous variations are always transmitted through heredity to offspring, and we need not consider whether the effects of use and disuse are hereditary. It is beyond all doubt that inborn variations, however caused, are always transmitted from parents to offspring, and this is sufficient for the working of the selective principle. But although no one disputes that an acorn invariably produces an oak, a cow a calf, a woman a child, and a duck's egg a duckling; that a Japanese child is never procreated by two European parents of a German through the reproductive processes of a male and a female Turk, yet, the offspring begotten are never exactly like the parents producing them. Except in the case of identical twins, out of the hundreds of million of human creatures dwelling on the earth's surface, no two are precisely alike, in form and feature. It may be imagined that human beings differ more from one another than lower forms of life. Yet the shepherd distinguishes the many sheep that makes up his flock by their differences. No two chicks hatched from eggs laid by the same hen are alike; no two leaves or blades of grass are exactly identical, and so on throughout the entire realm of living Nature. And slight variations which seem nothing to us are to Nature important things. The slightest departure from the averago may possess priceless value in the battle of life or may, on the other hand, help to throw an organism into the rear in the struggle. Thus far we are on scarcely debateable ground, for these facts which ought to be truisms, need only be stated to command unprejudiced assent.

We are mainly concerned in progressive evolution with the variations which contribute to the preservation and perpetuation of the race. And it is well to bear in mind that variations of permanent value must necessarily be prolonged beyond the life of the individual displaying them. For it is a biological axiom that however serviceable the possession of certain qualities may be in the individual existence of an organism, if that organism is unfitted to beget a sufficient number of suitable offspring, that organism must give place to others whose procreative capacities are more complete. Plants and animals of all orders make heavy sacrifices in the interests of their species. At the period of reproduction many of the lower organisms die in giving birth to descendents. The entire life of an annual plant is devoted to the development and ripening of its seeds. Instinct and reason unite in the higher animals to impel the parents to bestow the most painstaking and affectionate care in the rearing and protection of their young. The general law permeating Nature insists that where the instincts of the individual co-operate with the interests of the species, survival is in ampler measure secured.

It is erroneous to assume that evolution always takes the form of progressive change. Although, when we survey the past and present phenomena of life, progress is usually evident, yet there remain innumerable instances in which organisms having attained a high level of development have elapsed into inferior modes of life. Degeneration is prevalent among parasites which plainly betray in their structure the witnesses of their former more exalted position in life. Various parasites still retain as functionless vestiges the relics of earlier functional limbs, eyes, and other organs. Their form of adaption has assumed the meaner mode of living at a nobler creature's expense. In such circumstances, not merely would selection cease to act in strengthening structures essential to animals