

But aid came too late, and in a few minutes later he expired, involving in his own fate those innocent sufferers.

TRANSMUTATION OF SPECIES.

IN the year 1748—ten years after the death of its learned author—a book was published at Amsterdam, under the title, *Telliamed*, or Discoveries of an Indian Philosopher with a French Missionary. It had been written by a Frenchman, whose real name was De Maillet, and was dedicated to the author of some imaginary voyages to the sun and moon. The book is in a pleasant style, and discusses several questions of interest in natural history in a manner not a little original and ingenious. The title *Telliamed* is a mere anagram of the author's name, and certainly the Indian philosopher and the French missionary have very little to do with the subject treated of; but the argument and the book are not much the worse for their anomalies.

Benoît de Maillet was born in 1656 at St. Mihiel on the Meuse, in France, and is described to have passed the first thirty-six years of his life in the country in complete idleness. No doubt during this time the speculative tendency of his mind was nourished, and his powers of observation quickened. The first we hear of his public life is that he was sent to Egypt in 1692, as Consul-General of France, and he evidently applied himself with energy and intelligence to acquire the knowledge needed in so important a post. Ten years afterwards he was appointed ambassador to Abyssinia, but declining to accept an honour which at that time must have involved great risk and hardship, he obtained permission to exchange it for the consulship at Leghorn. After remaining some years in this and in other important occupations, he retired from public life, and, residing at Marseilles, found leisure to prepare and publish a collection of interesting documents concerning Egypt and its inhabitants. His health gave way while pursuing researches and preparing material for other works on physical geography, but he lived to an advanced age, and left behind him the unpublished speculations which were afterwards given to the world under the curious title we have already quoted.

De Maillet, adopting the Neptunian hypothesis, and putting forth the opinion that the earth originally existed as a chaotic mass of mixed earth and water, reduced after a time by evaporation to the division and separation of land from water, which we now know to exist, was inclined to account for this by the theory that the earth is gradually approaching the sun—that it has always been doing so—and will continue to creep nearer and nearer, till its final destruction by conflagration on the last day. With this theory he mixes up another, arguing that as the whole earth was originally covered with water, all animals of every kind must have been originally derived from aqueous parentage. In illustration and support of this view, he men-

tions as familiarly known, the existence of mermen and mermaids, and other fabulous monsters of antiquity; and associates them with flying fishes, and other real animals, as exhibiting singular analogies with birds and quadrupeds.

Bearing in mind these analogies, our author proceeds to insist that the gradual increase of land, owing to the evaporation of the water that at one time covered the earth, could not but be accompanied by a corresponding modification of the animal inhabitants. The animals dwelling in deep water would have to accustom themselves to shallower water. The original tenants of the shallow water would be reduced to adapt themselves, first to absolute shoals and mud banks, and soon to land altogether dry, which never received the wash of the tidal wave; and in order to obtain this adaptation, and retain habits so different from those with which they were created, they must have been endowed with considerable elasticity and adaptability. Thus he considers permanent varieties might be secured, and one species be in the course of time transmuted into another.

The following extract from *Telliamed* will give some idea both of the author's views and his style in reference to this curious subject:

It may happen, as, indeed, we know it often does happen, that winged or flying fishes, chasing their prey, or being pursued in the sea, carried away by the eager desire either for food or to escape from death, or being, perhaps, impelled by storm-waves, have fallen into swamps or grass, whence they were unable to escape, and that in this state they have acquired a greater capacity for flying. Their fins, no longer bathed in the sea, split and separated in consequence of the drying. Finding in the reedy marshes and swamps sufficient food to sustain them, the rays of their fins separating from each other, would become prolonged and clothed with feathers, or, to speak more correctly, the membranes by which they had before been connected would become metamorphosed. The feathers thus formed would grow, the skin would become covered with down of the colour of the original skin, and the down would grow. The small ventral fins of a fish would become the feet of a bird; the beak and the neck of some birds would lengthen and of others shorten, and so on, for the rest of the body. But a general conformity would exist with the original structure, and this may always be easily recognised.

Take, for example, the fowls large and small, even those of India, whether crested or not, even those of which the plumage goes the reverse way (from the tail to the head), and you may find similar animals in the sea both scaled and not scaled. All the parrots, whose plumage is so peculiar, and the rarest and most strangely marked birds, resemble fishes, painted like them, in black, brown, grey, yellow, green, red, violet, gold and azure; and this precisely in those parts where the plumage of the same birds is so strangely diversified.*

Strange and little founded in natural history knowledge as this argument may seem, it is not wanting in a kind of picturesque ingenuity. The idea clearly is, that an animal placed in new and unexpected conditions which do not

* *Telliamed*, tom. ii. p. 166, ed. 1755.

quite destroy life, adapts its organs, so far as they are adaptable, to the altered circumstances. If there is food at hand, and enemies are not present, the animal will have time to develop any peculiarities favourable to the new conditions that have hitherto lain dormant; and if the change has affected a race, the next generation will be not unlikely to have some individuals modified in a yet more favourable way. We may thus ultimately obtain a permanent variety, which is to all intents and purposes a species. If you are content to take the exposition of M. de Maillet as an illustration pointing to the direction in which a change in the proportions and organs of animals may extend and become permanent, it seems to be absurd and impossible.

The idea of the derivation of one so-called species from another, the two being unlike in what are regarded as essential characters, is necessarily fundamental with all naturalists who are not inclined to admit that new species have been abruptly introduced from time to time upon the earth, to fill up acknowledged gaps in creation, or to take the place of others which have either died out from actual exhaustion and old age, or which are to be driven out by the new arrival.

What is generally understood by a species, is a group of animals or plants having certain peculiarities of structure in common, and from which other like animals or plants are naturally derived. When two individuals, a male and female belonging to two different groups, can be induced to breed together, the result is considered a *hybrid*, and two such hybrids, if male and female, will rarely breed together and produce young. The horse and the ass producing the mule afford an illustration too obvious to require more than mere mention.

But it must not be forgotten that in many animals, such as dogs, horses, pigeons, and others that are domesticated, there is enormous difference between different breeds or varieties, sometimes amounting to more than the difference between some of the groups we call species. Thus there arises a very important question: What is the essential difference between a species and one of those varieties which, having assumed a certain structure in successive generations, always transmits such structure? This kind of variety is called permanent, to distinguish it from that which is modified in each successive generation. What, then, is the difference between a species and a permanent variety.

If we assume that there is an essential difference, we must suppose that in each case there is some unknown but defined limit beyond which no further change can occur. As difference of size, shape, and colour; difference of bone, muscle, and nerve; difference of habit, instinct, and intelligence; all certainly do occur in the case of permanent varieties, it is very difficult, if not impossible, to say what other differences may not be produced if sufficient time be allowed. If, on the other hand, there be no limit to variety,

there can be no such thing as essential difference between species, and one may be derived from another.

But, supposing this possible, in a few simple cases can the law be assumed as general? In other words, if a wolf may originally have been the parent of the whole race of dogs, must we conclude, as De Maillet did, that the merman, if there ever was one, was the original founder of the human race, and the flying-fish the commencement of bird life? Such a monstrous conclusion would require a powerful chain of argument to induce any of us to believe it.

Here, then, step in the naturalists, who are unable to believe that species have been introduced by successive isolated acts of creation, since this notion involves a want of continuity and harmony in the great system of nature. They endeavour to illustrate and explain in what way the divergence from an original form, the gradual production of an improved form, or in some cases the reduction to a lower form of organisation, has taken place.

De Maillet's idea was indeed vague enough, but not without a fair amount of ingenuity. Lamarck, one of the most celebrated naturalists of modern times, followed out the idea and ripened it into a system and theory. Another theory was put forward, a few years ago, in England, in a very popular book, *Vestiges of the Natural History of Creation*; and very lately one of our most ingenious and most sound geologists (Mr. Charles Darwin), who is also an excellent naturalist, has advanced a modification of it which is worthy of all consideration.

Lamarck's view of the cause of passage of one species into another was as follows. He considered that the production of a new organ in an animal frame is the result of some new want, and that to satisfy this want a new movement was introduced, and an attempt made by the animal to supply the want. Thus an intelligent and strong-willed slug, originally without tentacula or feelers, would tend to push forward the head in advance of the body, until by this effort some approach was made to the existence of such organs. Now, since all peculiarities of structure are transmitted by parents to their offspring, the young of such snail would have rudimentary feelers which it could develop by similar means into more complete examples.

Such is, in a few words, the Lamarckian doctrine of the transmutation of species by gradual derivation and the improvement of individuals. By an exertion of the will, constantly operating, portions of nervous and other animal fluids are supposed to be determined towards particular parts of the body, and the result is the production of an organ such as circumstances require.

In the *Vestiges*, the author supposes that new species are the occasional offspring of others long since established—a view not without attraction when placed in the light prepared for it by the author, and with all his illustrations around it, but hardly bearing interpretation into the every-day language of ordinary existence.

Mr. Darwin's view is based on a sound knowledge of natural history, not only of recent animals, but of those who have lived in former times; and whose remains, more or less perfect, handed down for our examination, prove the existence of large and complete groups now altogether lost—of many links connecting groups now apparently without any mutual relations—and even of some, the presence of which seems to give additional complication to a problem already almost beyond human power to unravel.

The method by which nature has acted, according to Mr. Darwin, is by a natural selection of animals and organs best fitted to struggle against all competitors in the great battle everywhere fighting for food and existence. We see throughout nature a marvellous and exquisite adaptation of each part of all living beings to every other part; and yet, at the same time, there is in all, the utmost sensitiveness to change, and tendency to individual variation. No sooner is existence rendered more or less difficult in any given area, than every inhabitant of the district struggles to escape or take advantage of it. If any have already an organisation adapting them to benefit by it, they will immediately do so, and drive out others; and this struggle goes on as well from the high rate at which all organic beings tend to increase, as from the inevitable and invariable tendency to change. As also there is in every race a struggle to increase and become dominant, so is there also a system of checks keeping it in its proper place.

Variations being incessant, may be either different, advantageous, or injurious. The first would manifestly not be affected by any principle of natural selection, but such selection comes into play for the preservation of the favourable and the rejection and consequent destruction of the unfavourable.

As man, in domesticating animals and plants, and taking advantage of natural power of change for his own purposes, has in so many cases produced a great result in a moderate time, what may not nature throughout all time?

Man can act only on external and visible characters, nature cares nothing for appearances, except in so far as they may be useful to any being. She can act on every internal organ, on every shade of constitutional difference, on the whole machinery of life. Man selects only for his own good, nature only for that of the being which she tends. Under nature the slightest difference of structure or constitution may well turn the nicely balanced scale in the struggle for life, and so be preserved. It may be said that natural selection is daily and hourly scrutinising throughout the world every variation, even the slightest, rejecting that which is bad, preserving and adding up all that is good, silently and insensibly working whenever and wherever opportunity offers at the improvement of each being in relation to its conditions of life.*

Natural selection entails extinction, and then explains the very important part that extinction

of species has acted in the world's history. It also leads inevitably to divergence of character. It is a great and most useful power in nature's hands: or rather, perhaps, it is the simple method of nature in accomplishing all that is required for continuing the great cycle of existence.

The view that seems to be advocated by Professor Owen, in opposition to that of natural selection as illustrated by Mr. Darwin, seems hardly more natural and involves quite as many difficulties. It is not easy to give it in simple language, as it is derived from observations in an obscure and only recently studied department of natural history, and is illustrated by animals little known to the general reader. We believe that he holds the doctrine that changes of surrounding influences, the operation of some intermittent law at long intervals, and other natural causes, may produce a divergence from an original form, and terminate in the formation of a new type. It is certain, however, that he does not bind himself even to this hypothesis: rather suggesting it as less objectionable than as in itself sufficient.

The work commenced by De Maillet is still, then, incomplete, and the mystery of creation has yet to be solved. Whether, indeed, we are much nearer the real solution than when our author wrote, and whether the ideas expressed more definitely are really more clear, is not altogether certain. One thing, however, seems certain: that the fit way to investigate them as so many problems, is to question nature closely, to experiment with nature as far as she grants opportunity, and always to accept fairly and openly the conclusions derived from such investigations. We may not by these means advance very rapidly, but we shall advance surely; and there will be no fear of any check occurring, to interfere with the progress of our labour.

THE JAMAICA REVIVALS.

IN these days, who hears—or more than hears—of poor Jamaica, once the fairy land of fruits and spice and princes made of sugar? The romance of the grand Western gold diggings where the wheel of fortune ran in its easy groove, has perished. Where are the nabob merchants who were wont to settle their mutual balances by the barrow-load of Spanish gold? Alas! the picture drawn of the present miserable condition of Jamaica, by that clever and penetrating observer, Anthony Trollope, is only too true. All we now hear of it, is through a few short sentences, trite as a telegram, formally quoting its meteorological variations, the market price of its imported supplies, and the depreciated value of its dwindling productions. Of its political condition we learn little beyond the frequent fact of its legislature being in a state of noisy confusion; while the members of its executive are as often at variance with one another. Of the actual position of its complex classes and their

* Darwin on the Origin of Species, pp. 83, 84.