

THE GEOGRAPHICAL DISTRIBUTION OF ANIMALS.

Mr. Alfred Russell Wallace shares with Mr. Darwin the honor of developing the natural selection theory in its present form. He conceived his theory of the origin of species, as he himself says, "before I had the least notion of the scope and nature of Mr. Darwin's labors," and he reached his conclusions simultaneously. He differs, however, from Mr. Darwin in the very important item of the derivation of man, holding that the doctrine of natural selection is not sufficient to explain the transition from the anthropoid ape to man, and that it requires the co-operating agency of some higher cause.

The field of labor of Mr. Wallace, while differing from that of Mr. Darwin, is scarcely of less importance. While the latter naturalist has spent his life studying the hidden characteristics of animal life, and so evolving a history of all living beings *ab initio*, Mr. Wallace has chiefly devoted himself to the investigation of the external part of animal existence; and by dint of personal labor of great magnitude, he has rendered to Science services of inestimable value. It is not our purpose here to enter into Mr. Wallace's biography as a scientist, any further than is necessary to estimate the foundation upon which his latest and greatest work has been reared. From an early period of his life he has been an indefatigable explorer. In the primeval forests of the Amazon and the islands of the Malayan Archipelago, he has spent years; his collections of specimens of birds and insects are remarkably large, and thus his knowledge is not that of the closet naturalist, but has been gained directly from the study of Nature herself. The geographical distribution of animals has been the subject of his researches for several years past, and the results thereof are embodied in the voluminous work which he has lately published. To understand the basis of the investigation, we may briefly follow the author through his introductory summary of his subject: "It is a fact," he says, "within the experience of most persons, that the various species of most animals are not uniformly disposed over the surface of the country." If we wish to find certain birds, or insects even, in our own vicinity, we search for them in particular places; then, as we travel, we constantly meet new species, and lose sight of old ones; and if we progress far enough, we shall find the creatures peculiar to our own district replaced by an entirely new set. We have thus witnessed a double change. First, in our own neighborhood, animals appeared or disappeared according as the soil, vegetation, etc., suited them, or the reverse. But as we got further away, we began to find (second) that localities, very similar to those we had left, were inhabited by a somewhat different set of species, and this difference increased with distance, notwithstanding that almost identical external conditions might be often met with. The first class of changes is that of stations; the second that of habitats. One is a local, the other a geographical phenomenon. The whole area over which a particular animal is found may consist of any number of stations, but rarely of more than one habitat. Again, of the new animals we meet in our travels, some are very much like those we leave at home, others are totally dissimilar. The first series are examples of what are termed representative species, the second of distinct groups or types of animals. The one represents a recent comparative modification and an origin in or near the locality where it occurs; the other is the result of very ancient changes, both organic and inorganic.

It has commonly been believed that the manner in which the various kinds of animals are dispersed over the globe is almost wholly due to diversities of climate and of vegetation. Thus the arctic regions are characterized by white bears, reindcer, walruses, etc., and the tropics by elephants, peacocks, etc.; but it has been found that this explanation is altogether insufficient, and it is now known that countries exceedingly similar in climate and all physical features may yet have very distinct animal populations. Thus the equatorial parts of Africa and South America are similar in climate, and both are covered by luxuriant forests; yet the apes, leopards, and elephants of the one are replaced by prehensile-tailed monkeys, jaguars, and tapirs in the other. Again, if we examine closely the distribution of animals in any extensive region, we find that different, though closely allied, species are often found on opposite sides of any considerable barrier to their migration. Mountain ranges, rivers, arms of the sea, and changes of climate and of vegetation form effective barriers, and the limits of the great forests strictly determine in most parts of the world the range of many species.

Naturalists now believe that, by some slow process of development or transmutation, all animals have been produced from those which preceded them. This modification takes place very slowly, and the changes appear to have accompanied, and perhaps appear to have depended on, changes of climate, vegetation, etc. "If we keep in view these facts," says our author, "that the minor features of the earth are everywhere slowly changing. that the forms and structure

JANUARY 20, 1877.

and habits of all living things are also slowly changing: while the great features of the earth, the continents and oceans and loftiest mountain ranges, only change after very long intervals and with extreme slowness: we must see that the present distribution of animals upon the several parts of the earth's surface is the final product of all these wonderful revolutions in organic and inorganic nature." Hence the study of animals may reveal to us which are the oldest and most permanent features of the earth's surface, and which the newest; and may show us the existence of continents, now sunk beneath the ocean, which have left no record save the animal and vegetable productions, which have migrated to distant lands.

Mr. Wallace's work is too extended to admit of its complete review within the limits here at our disposal; but the foregoing will convey a general idea of his theory, and prepare the reader for other articles, wherein we shall consider the salient features of the facts and arguments presented.
