

Geographical Distribution of Mammals. By Andrew Murray, F.R.S. (Day and Son, Limited.)

THE geographical distribution of plants and animals, both at this day and in past geological epochs, is a branch of study which has attracted the highest importance since it was perceived what a momentous bearing it has upon the origin and the succession of life upon our globe. If it shall ever be possible for us to arrive at anything like a moderately well-founded opinion as to theory as to the origin, or the necessary conditions for the first appearance, of our own species, it can only be after a searching analysis into this question, and when the species most nearly related to our own, and the relations most necessary for the development and maturation of the human organism, begin to spread over those portions of the earth which we now inhabit. However incomplete in itself our present knowledge on these subjects may be, the amount of information which has been accumulated has rendered it very desirable

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to seek. But we see that so much comparative balance is now needed or used in South America, where the tracks of seals and horses remain marked by the points of which we are engaged in the task of solving them.

We must not let this interesting discovery of the lion lying side by side along the way of the Miocene World with the antelope without inquiring how he had so early generalization. The Remnants of North America enjoyed during the same period as such exemption from grim death. Maps still displays the same portion on which the Caracaras flourished thickly inhabited by horses and man. Map of shows the canal has left intact there also. Map XVII. suggests our dream of the Prehistoric state of the Miocene land. Its Owls were doubtless the prey of their contemporaries both in America and India.

Forty-one chapters, except the first preliminary ones, to which we shall afterwards revert, are occupied with these maps upon the range and local position of the extinct and living mammals. The author's own views on many points are indicated with a vast amount of facts and authorities, which he has disposed in a manner easy of reference, and interesting both to the scientific and general reader. It is not long (see READER, April 1884) since we quoted Mr. Boyd Dunbar as going farther even than Professor Owen's latest opinion that the *Pitheca* was undoubtedly a lion. Mr. Murray shows that the balance of authority has not yet quite tilted the beam. Dr. Gidley in 1866 is still of opinion that Professor Owen was right at all points, and our author's recent study of distribution seems to incline him that way.

The range of the living tiger is certainly more able to that of the doomed animal, than is that of the lion. Superintending this, it has even been doubted whether it is not a single leopard, spotted or instead of a striped one. These processes of the auxiliary bones are present in the skull of the jaguar as well as the lion, but Carter speaks of the *Catus* species retaining the jaguar more than the tiger or lion in the tail and gentle curve of the skull.

A gradual amelioration, that is, an increase in the average temperature of the climate of Europe, has been going on ever since the commencement of the glacial epoch, according to our author, and he instances "that occupying power has gone forth from the *Deukals* and *Remans*," but he forgets that the peoples of the Northern nations must have suffered relatively; and that Remans might even in his own day that the Germans might easily overtake the English if they were as well distributed as the English. Mr. Murray is of opinion that we have not yet reached the close of the glacial epoch, and we therefore predict the return of the change life is likely to pass through during the coming ages. For it is his theory that alteration in climate brings about change in form; and that in a few hundred or thousand years. He alludes to a certain extent the theory of specific centres of creation, and partially, though perhaps rather in appearance than reality, sides with Agassiz in his theory of a multiple origin of species. For while he thinks that species have been developed simultaneously over a large area, he does not admit that nearly similar individuals or pairs could have come into being at different points of the globe. Nor does he think the area in which species, whether fossil or living, are found at all does their original bounds. On the contrary, wherever varieties occur, they are a proof of migration from the original field into one not perhaps materially different in conditions, though possibly widely separated from it geographically. The people of the United States are an instance. Zoology also shows that the original habitat of the Caracaras was in the north. As the glacial ice advanced afterwards they would be squeezed down, undergoing changes which would eventually turn them into what we call new species, and locate them in new habitats altogether. Thus take the geography of the lion —

At the commencement of the cold, the *Metastictus*, or some other *Caracaras*, has been changed into the *Catus* lion, and when still smaller began to retreat to the Cape Horn towards the common lion. At this time life had not returned to Europe, and the specific centre of the new animal was probably in Asia; thence it would spread into Europe and Africa.

The fact that the tiger begins to appear where the lion begins to die out, leads Mr. Murray to deny that this results from the "struggle for life." He adds—

How did the struggle for life ever allow a second species to get to such a head as to need to be driven out? Being driven, the new species was most probably derived from the other. How came the weak one ever to get a footing at all? The hypothesis by which I have attempted to explain the stability of established species, the origin of new species, and the existence of specific centres in special cases in many provinces, explains this.

Through traps a comparison of Maps XII and XIV. — Miocene lion in Africa, or even in Arabia, it would seem that the tiger has proved the strongest, and occupied the country which once belonged, or would in its absence have passed to the lion, who may perhaps be the tiger modified; still, it is remarkable that this animal, though found at the northernmost point of India, has never reached Ceylon, and though found in Sumatra and Java, is not so in Borneo. The absence of all corresponding generalizations, which is an undeniable distinction throughout this book, is perpetuated. Mr. Murray seeking to explain the two cases by the same theory. Sumatra and Java were, no doubt, separated from the mainland by the same geological events as Borneo. Something special must therefore have affected the latter—

I will imagine the island to have sunk so much as to have become an impassable morass, covered with an impenetrable thicket of trees growing in the mud, such as it is to be seen now in some parts of the *Caracaras* (as described by Mr. Earl, it would perhaps explain the absence of large animals. . . . An examination of the mammalian fauna of Borneo, shows that, with very few exceptions, the mammals are either arboreal in their habits, or aquatic, or flying, or in some way or other capable of subsisting in a half-drowned land.

Take another instance of cautious argument—

The admission of the formation of species by hybridization could not do a more satisfactory answer to the question of the origin of the tiger, perhaps, than those who, like Agassiz, do not admit hybridization as a direct instrument in the formation of species, will see in this animal one of those instances which are occasionally, but not often, to be met with, where a species seems to stand exactly midway between animals which are still existing. It does not seem that the descent of the one, and the parent of the other. The kinship of an allied species may be reproduced along with the qualities of the direct progenitors of the species.

And after recognizing the extreme difficulty of conceiving the mode of the origin of marine mammals, he will only say that as the exceptional form should be derived from the normal rather than the reverse, as we should look rather for indications of the descent of the aquatic from the terrestrial; "although if proved for a reason, why one should be considered more normal than the other, I may boldly confess that I have none to give, except the very large one that now the one is more numerous in species than the other." These observations lead the zoologist to "think." At present an undoubted remnant of seals are earlier than in Miocene deposits. Which terrestrial are most capable of bringing up to aquatic habits? The Otter and the Polar Bear. Now "size is an element in determining affinities, which is, I think, scarcely a sufficient reason for regarding the lion with the bear and otter as a stepward would be an anomaly in nature. The auxiliary would not be adapted to the work to be done. Bulk, therefore, may fairly be admitted to go for something in weighty affinities. None but the bear approaches

to ascertain the necessary to ascertain the similar species of emergence which with a depression would have on the borders of every continent. The lion, which we now find in the north which was probably under water at the time of the glacial epoch. The fourth, the lioness whose glacial origin, or remains of the drift or local day, have been remarked. The fifth shows the lioness which are supposed to be now rising and those now sinking. The sixth indicates the positions of the different *Caracaras* Bora. The remaining maps vary in size, but all represent the work of Mr. Murray's proposition. Each group consists of mammals, but is more attached to the description; and the lioness in which the living or extinct species are or have been found are indicated by appropriate bands of different colours. The flood of light which this arrangement throws in a moment upon some important theory is most instructive. Take Map XI. "Places where remains of *Caracaras* have been observed in former times to the Glacial Epoch." Three patches show what we may call the lioness in the centre of North America, another covering the greater part of Central and Northern Europe, and a third in the North-West of India. We are not to suppose that these spots always indicate the exact localities where these animals flourished. On the contrary, the remains have, both in India and America, been preserved in what must have been lakes or the margins of vast Miocene rivers, and the remains to whom these bones belonged may have lived hundreds of miles up the country which we now occupy between the Atlantic and the Indian Ocean. That the habitat of the American species was either below or in the direction of what is now the Atlantic is undoubted. But a reverse question, and one on which much depends, hangs upon the point from which side the *Caracaras*, whose remains are found in such numbers at what was then the bottom of the Nevada lake, descended. Mr. Murray fairly enough concludes from that side on which we still find remains of the same or similar species belonging to the same period, and who probably were the stock out of which the type in question was developed. Now this is the north. The other shore of the Nevada Sea must have communicated with what is now Africa, and in Africa we find no remains of *Caracaras*, but we have ample evidence that previous to the Glacial Epoch the antelope, at least, amongst the *Remans*, had marked Africa for their own.

But let a single, well-determined, and well-protected instance of fossil remains of antelope found in the Northern Hemisphere. We have then represented the singular fact, consistent with the fact that Africa, at least, was the primitive centre of the lion, and that the lion of Remans and *Caracaras* enjoyed an African existence—a sort of *Caracaras* of Asia, into which death came protracted; at least in the genus which they now descend from, but the lioness was the centre on the beauty of the balance of life, whereby the excessive increase of one animal is kept within bounds by the destructive instincts of another; and very generally the lion and the Remans wound up and gave point to the argu-

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the seal." But the seal has a longer pedigree. The bear is a Pilosoma family. Perhaps, therefore, the supposed ancestor was another animal allied to both, such as the Amphiprion. The last of the seal being found in fresh-water lakes, as well as in the sea, leads to much speculation on the original extent of the Arctic Ocean. According to Mr. Murray, Leiba Bakled and the Caspian must have been among the bays, and when they were isolated by an elevation of the land, the former having an outlet, subject to a constant impounding of fresh water from streams and rivers, gradually became fresh. But the process has been spread over so immense a period of time, that the seal remains the same. "Had the change been more rapid, according to my view, we should have had a new species instead of merely the old one."

It has been thought by distinguished naturalists that the Mammoth was an instance of the military invasion of a mammal living in two species. Mr. Murray deprives him of his military epithet ("Mammothian"). His bones may have been found on the shores of the Arctic Sea, and in the Valley of Gennessee, but it does not follow that he really divided the year between summer and winter climates, nor that he was near the coast of which a specimen still remains, and now was here. He was always a circum-polar being, pushed before the glacial ice northward, and clinging to its fringes as it retreated northward.

Elephants existed in the miocene time, but polar elephants were not known until the glacial epoch, and their existence is far from certain being British and capable of adaptation to great differences of climate, I imagine it to have been the very reverse. They came in with the extreme cold, and have gone out with the extreme cold. They did not, "by a miracle of Providence," survive the two epochs.

On the principles of classification pursued in the book we cannot do more than touch. That of Owen is to a great extent followed, but the exceptions are by no means innumerable, and we observe that classes, orders, and families, are more words for Mr. Murray.

Agassiz believes in the existence of all three subdivisions in nature. I do not. I see that organic beings exist in groups, but I see no two groups bearing the same rank, and no two equally well defined. It appears to me, therefore, that the practice of naturalists, of which Agassiz complains, of using the terms class, order, and family, loosely, and often interchangeably or indiscriminately, is quite natural.

The forty-second chapter gives a summary of the way in which the globe has been divided by different authorities into different zoological and botanical regions. In the forty-third, the existing mammalian fauna are divided into four great primary provinces and some minor subdivisions. Illustrated by the maps. In both, the European Asiatic province includes all North America down to the Mexican parallel. This occasion a little confusion when comparing the two maps with the decided statement in the text that "the whole of the American Continent both north and south belongs to one zoological region." The difficulty is one which could not have been got over by any arrangement of colours. The connection of Greenland with Europe and Siberia with the extreme north-west of America has been of such a varying character that a series of maps would be necessary to exhibit the changes of that zoological region alone. Judged by their earlier life (plants and insects), they should go along with Europe; looking to their birds and mammals, to America. The Euro-Asiatic division permissible to the latter being suggested upon the general grounds. The other two regions are the "African-Indian" and the "Australian." With this chapter the book ends, but we must notice the appendix, containing the Classification of Mammals proposed by different authors, and the name of the Insectivora. Then follows a "Synonymical List of Species of Mammals and their Localities." This extends over more than forty quarto pages, and the

works of almost every writer on the subject have been ransacked to complete it. The importance of this compilation will be apparent at once, and in a proof how the greatest industry and most laborious accumulation of details (irresponsible in the same person with all that is involved and comprehensive in speculation. It includes fossil as well as recent species. A second list of nearly the same extent follows of "Mammals of Special Districts." This is the complement of the former. There are a few more tables; and finally, a letter from Mr. Palgrave, dated Cairo, 14th May, 1866, on the zoology and physical characteristics of South Arabia, which, like Mr. Murray, he is inclined to draw for more with Africa than with Asia.

Mr. Murray takes his leave with this sentence:—

"With my views on the submerged Pacific Continent; on the separation of the Indian region from the Antarctic; the division of Australia; the submerged African-Indian Continent; the former junction of Madagascar to Africa; the possible extension of land between South-east Australia and the Cape of Good Hope; the Marine Atlantic, and kindred topics, the reader will have followed me thus far in familiarly."

To give any idea of his views upon all these subjects would clearly be impossible here; but in the preliminary chapters there is contained a new theory of the Origin of Species, and we must gratify the curiosity of our readers with a short account of it. That species are not produced by independent creation, but that, under the operation of a general law, the genus of organisms produce new forms different from themselves, under particular circumstances, has become an axiom with scientific writers. The theory of "natural selection" and the "struggle for life" have been elevated by Mr. Darwin into true causes of the appearance and development of new species. "We have all always considered 'natural selection' as too inadequate a power to effect the results which have to be accounted for. It appears to us as an ingenious and, in certain cases, probably a correct reason for explaining away some of the difficulties which stand in the way of the development hypothesis. At the same time it was supported by Mr. Darwin with such ability, and so great an agglomeration of facts as disposed us to hear upon the desired conclusion in the most attentive manner; that it was clear, however unaccounted might be the results of many thinkers that the 'origin of species' had been really discovered, that with a more comprehensive explanation had been effected of the phenomenon, 'natural selection' would be accepted as the watch-word of those who consider that all phenomena are created by natural law.

The absence of transitional forms was always an objection. No one has been more strongly impressed with this than Mr. Murray. But he considers that he has found an instance in which a transition is going on before our eyes:—

"We have seen a race of man formed under our own eyes, the Anglo or rather the Euro-Asiatic man, in distinct and well marked a race as any other, and yet the same man effected over the whole of the United States without any transition man having ever been observed; and what is still more extraordinary, it has been effected over the whole of the region where it occurs at the same time.

The deduction he makes is that "Nature can produce a new type without our being able to see the marks of transition, and that she can alter a whole race simultaneously without its passing through the phase of development from an individual in whom the entire change was first perfected." Mr. Murray thus sums up the chief differences between his views and those of Mr. Darwin:—

He believes that in all organic beings a certain degree of change is continuously going on; and that, from that various and slow selection, through the struggle for life, new species are being necessarily developed. He makes ample provision for instability; none for stability. I believe that the gates are held

loosely shut, but that they are always ready to be opened to a greater or less extent in a flood of the key, and that that key is contained in the conditions under which species live. It does not matter what the change is, nor in what direction it takes place. It has no relation to adaptation nor teleological purposes, it may be their cause or discount, for their benefit or the reverse; its leading on their organization is a matter of indifference; all that is wanted is a change of some kind or other to cause the post.

The law which, on the other hand, secures the stability of species is Justice. Change of circumstances produces variation. Continued success will keep species unchanged in perpetuity. It is not the desire within, carried by necessity, but the forces without, acting upon large masses of ones, which have covered the diversified surface of our planet with a similarly diversified flora and fauna. This hypothesis is quite in accordance with what we know of the history of species during past geological epochs. When the temperature and climate in every country on the face of the earth were uniform, the number and variety of forms of life would be more numerous also. If our globe was once a ball of incandescent matter, its cooling down was gradual, and the first forms of life would say but little. Special provinces or faunas would scarcely exist. But at the time of the glacial epoch a universal change must have taken place in everything that was exposed to cold. Now there are no remains of any fossil animal to be found in any strata anterior to that epoch. And this is equally true of plants. — It is essential for me to dispose the proposition that entire types existed previous to the glacial epoch. If that be true, my theory would be worthless, and I must give it up. Fully believing that all species have been derived from their predecessors through the generation and natural descent, Mr. Murray infers that the glacial epoch so altered the conditions of life over the greater part of the earth that after that epoch began, the appearance of new species became a comparatively common event. This, however, was not the only cause. The subsidence and elevation of continents also, by compelling the inhabitants to migrate into regions widely separated from their parent country, contributed to the same result. Moreover, "the theory that change in the forms of organic life is the result of alteration in the physical conditions of the earth, requires that some important change should have occurred at the close of the Secondary and commencement of the Tertiary epoch; for at that time there was a great start given to the development of species, and new forms and new types came then into being." This is to be looked for in the gradual transference of dry land from the Southern to the Northern Hemisphere. This leads to the consideration of the "Minoan Atlantic," and the past geography of the globe. The fact of vast geological mutations is demonstrated and confirmed by the most delicate analysis of the knowledge we possess of the Tertiary flora and fauna.

The actual appearance of a new species of the larger animals is nowhere directly explained. When the absence of all transitional forms is insisted upon, we must remember that this remark applies only to the hard parts of the body. Thus Mr. Murray, after dividing mankind into the two great divisions of black and white, admits that each is divisible again into an indefinite of smaller nations. Starting with the Englishman, he asserts that the Chinese could be distinguished from them; and "the tribes next to them on the south spin up incessantly into the red-skinned tribes of middle North America." Then he will have it that "the Englishman is sympathetic with the Samouit and Turcomans of North Eastern Asia, who in their turn pass into the Mongolians on the south." After this, the conclusion is, may that the Englishman is no way of a distinct race from the American aboriginals or even from the Malay. The black race consists of the Papuan, perhaps the Hottent-

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lets, and the bill tribes of India. Are these two races to be accounted different species, or merely tribal varieties? Mr. Murray rather evades a direct answer:—

The difficulty of separating species increases as we ascend the scale of life, and reaches its culminating point in man. It would appear as if the action of the developing power had, in its long course, undergone some change, not to assure but to degenerate, some modification such as we see typified in the actual growth of many men, and his fellow creatures. Its steps were wider apart and more detailed in earlier days, and its ideas, so to speak, simpler and less matured; in age its action has become more precise and more important, and the organisms developed have acquired a higher and higher grade, the steps in advance have been shorter and more frequent. It may be, for example, that had the influence of development, or stratum, in which we are now reared of man, or any of the doubtful species of monkey, been exercised on the highly organized animals, the product would have been some absolutely distinct species. I incline to regard the two races not as the result merely of ordinary generation and variation, but of the action of the law of development through which new species are derived; and I account for the product being something less than what would be reckoned a species in other columns by the high organization of the creature derived therefrom.

Thus he discusses the relative antiquity of the two races, which is the subject, which the offspring! The answer to this question is connected with the alternations of elevation and subsidence he had previously discussed. "While the great continent of the Southern Hemisphere was in its prime and peopled by the black race, the Northern continents were almost wholly unpeopled, and possibly without human inhabitants." The deduction is obvious, though our author hesitates to express it in so many words. Under this reserve must be, we think, concealed some more decided opinion. We will give our own idea of what Mr. Murray wishes to designate.

First, conditions of life ultimately change one species into another; secondly, this change is effected without producing any transitional forms in the common stratum, as so to leave any enduring trace of the operation; thirdly, such changes take place over large areas, and in large numbers of individuals, suddenly and simultaneously, or nearly so; fourthly, in man we have considerable evidence of a change of race going on, but not of a change of species. The European-American is already a different race, but his common structure in no way differs from our own; inter-marriage presents no difficulties, we see no indications of his becoming assimilated of fresh origin or novel formation, and in what we call a variety, which may or may not be less permanent than the original stock. In a lower animal we should have had a new species; in man, we have only this external change. An instance has occurred before, when the black race, through the subsidence of the original Indian Continent, was pushed on to the gradually-rising soil of South America, and thence by a course of geological and climatal mutations up through the continent to Europe and Asia, to meet in the north its own immensely-distant cousin, and drive them to the hill-tops of India or extrude them to the isolated spots of Van Diemen's Land and the Islands of Polynesia.

No far we merely state our author's expressed views, and if we do so to this length, why do we go further? The idea that the developing power is in any way less energetic than formerly rests on no solid foundation. All we can say is, we have never seen it actually at work. If no forms transitional in their common structure between allied species are to be found, and if of some order, and if in the higher scale of beings but one method of descent, it is clear that change in the conditions, and changes in the external possibilities influence of the actual progress of species change having gone on for a short or long period of time,—such a change as since the appearance of the Black Race has been going on in the constitution of man—we

may expect to see suddenly the offspring of some human race changed in a single generation. That is, the children or grand-children of the present American may come into being in the natural way, but with all the characteristics of a New Species, the Successor of Man, as he is of the Age. Such a case instance would no doubt be hailed by Mr. Murray as a proof of his theory. But we by no means so sure that it would not be equally acceptable to Mr. Darwin. The difference between the two seems to us really unessential. Mr. Darwin believes in constant change. Mr. Murray in sudden compressed changes induced by great distal alterations. The view we take is partially that of both. We believe in a constant change of the soft parts, the myology, and above all in the basis of all organized beings. And we agree with Mr. Murray that such change is due to changed conditions of life. It seems to think these changes are not always in the same direction. We feel sure they are; and as he thinks the glacial epoch is still going on, and the temperature of Europe improving, we are somewhat surprised at his idea of the perpetual stability of the condition of European life. These changes, however, make no appreciable—very possibly they make no difference in the common stratum of man, but they are constantly preparing the way for it. When the cumulative power of these changes which may be only in millions in the higher animals, has reached the proper point, or when their influence is exaggerated, as it was, and tried by some great geological or climatal alteration, then we will be obliged "in the twinkling of an eye." Side by side with his cousin and ancestor, the new Being may walk the earth. It does not follow that his faculties or powers would be so decidedly superior to our own as to ensure our speedy extinction. Indeed, on an approximation which we lead to the opposite result. He would be weaker and vulnerable. Were he not at one end and the same time the son, the brother, and the friend of his predecessor, could he maintain his ground? Perhaps, indeed, he might in America, especially as on the hypothesis he would appear in large numbers at once. We see the divisions of such a creature might show decided a difference in structure, as at once to give him his place as a different species from ours. And they would be side by side with ours, without any intermediate or transitional form. But who would suppose that no internal and variable changes in our own race had not preceded this final metamorphosis! It is in this point, therefore, that we insist. Because we can only see variations of condition and apparently insignificant differences, we must not conclude that nothing of more consequence is going on in the laboratory of our frames. For example, if the new being is to have a greatly developed and novel set of six fingers on every hand, we are not to suppose it necessary that the brain of each individual for centuries should show traces of gradual development; or that, because we feel the necessity of being more clever, we should, on the Darwinian theory, gradually become so; or that a sixth projection from our arms should in the course of ages gradually develop into a finger.

The answer to the question whether the results of their research on the action of sodium and potassium salts on the animal economy. Probably the physiological action of sodium and potassium salts on the salts of potassium being somewhat more powerful, and this view had led to the therapeutic employment of these two classes of salts in the same manner under the most varied pathological circumstances. The investigations of these physiologists, however, furnished some very remarkable facts. Salts of potassium injected into the jugular vein of warm-blooded animals are uniformly poisonous to their efforts; death ensued as rapidly as usually follows the use of the compound for the purpose of the solution. One-fifth of a gramme sufficed to kill a rabbit, one gramme of potassium salt to cause the death of a dog. Sodium salts, on the other hand, could be introduced into the circulation without

of species by generation, but providing for no development of any new form. It can also provide for a violation of the law, and at some time, will have upon millions of times distant, substitute a different number following other law, and this new law may be directed without any intermediate after the matter has originally begun to be observed for man, or any number of lower or middle animals. Even this, however, is not quite enough. At last, says Mr. Murray:—

I asked the question whether the Doctor could set the machine that it should go on producing a series of numbers until a certain combination of circumstances should take place, the first which such occurrence could or could take place not being known to him, and that then, and not till then, the alteration of the law should take place. The Doctor said "Certainly. I can give the machine an order to go on producing a series of numbers until the last, and the third last, and the fifth last, or any other combination, shall all be the same figure, or shall be some combination of figures—all three, for example, equal five, or two four and one five, and thus the law last which occurs appears. I cannot tell when that may happen, and do not know whether it may ever happen; but whenever it does happen, be it soon or be it late, the new law will immediately come into operation."

Here is the exact parallel. We shall leave it to make its own impression on the mind of the reader.

We hope Mr. Murray will issue a popular edition of the speculations contained in this volume, whose size and expense place it beyond ordinary reach. For a long time it must continue to be the leading authority on the subjects it treats of. We have only given slight indications of its value. The series is unexampled in scope almost beyond the faculties of one man. Our thoughts are widened by its perusal to an almost immeasurable extent. The picture of the earth swelling and subsiding, its continents now rising in the south, now sinking in the north, its parasites clinging to the surface of dry land, and altering their shape and character as they are driven by the winds over every portion of the globe; the idea that all living things are literally "of one blood," and constantly arrive in the persons of descendants, who may even inhabit a different element, can be appreciated only by the worshippers of Bacon. Truly, they will be their reward. Their position is a well-earned one. Flood, as Carlyle would say, "for a day in the context of eternity," they are the first to perceive the true connexion between the past, the present, and the future. The disappearance of the very continents we tread will be hailed by them as a concrete of the advent of still superior forms of life; and though it be the basis of religion, so much as both our own insignificance and at the same time our individual importance, we doubt if it can do so more effectively than the reflection that one of us can reconstruct these configurations of the solid earth which have long ceased to exist, and compute the history of creation by means of its which we may be ever seen within the compass of a pair of boots.

## SODIUM AND POTASSIUM SALTS.

TWO years since M. Bernard and Granchet communicated to the French Academy the results of their research on the action of sodium and potassium salts on the animal economy. Probably the physiological action of sodium and potassium salts on the salts of potassium being somewhat more powerful, and this view had led to the therapeutic employment of these two classes of salts in the same manner under the most varied pathological circumstances. The investigations of these physiologists, however, furnished some very remarkable facts. Salts of potassium injected into the jugular vein of warm-blooded animals are uniformly poisonous to their efforts; death ensued as rapidly as usually follows the use of the compound for the purpose of the solution. One-fifth of a gramme sufficed to kill a rabbit, one gramme of potassium salt to cause the death of a dog. Sodium salts, on the other hand, could be introduced into the circulation without