At the conclusion of a monograph, recently published by Prof. Owen, of England, on the "Aye-Aye," this eminent naturalist takes occasion to express his views in regard to that most interesting question of the day, namely, "*The Origin of Species*," and the following notice and critique of the opinions thus and there put forth, is derived from the pages of Silliman's journal.

Those who have joined in the issue involved in this question — the origin of species — may be arranged in one of two classes; 1st, comprising those who maintain that the present condition of the animal and vegetable kingdom was reached by a series of "progressive creations;" each species being created and suddenly introduced upon the surface of the earth, and the first-formed individuals having the same specific characters as all the successors; 2d, those who deny the preceding view, and assert that all animals and plants are the result of "progressive development," "deviation," or "transmutation" of species, the first created forms being of the simplest kind, or at all events of a simpler kind than those of the present day, and in the course of time transformed into them. How the changes from simple to complex forms were effected, or how specific characters were modified, has been very differently explained. Lamarck says by a "*besoin*," Darwin by "natural selection" and "the struggle for existence," and Owen "by the ordained potentiality of second causes," and by transmutation "under law."

We do not propose to enter into a discussion of these different theories, but, before citing Prof. Owen's views, we will merely remark that, if the progressive-creation hypothesis is adopted, we should be glad to see a better answer than has yet been made to the question, How, and in what condition did the first forms make their appearance? When a mammal was created, did the oxygen, hydrogen, nitrogen, and carbon

of the air, and the lime, soda, phosphorus, potash, water, etc., from the earth, come together, and on the instant combine into a completely formed horse, lion, elephant, or other animal? If this question is answered in the affirmative, it will be easily seen that the answer is entirely opposed by the observed analogies of nature. In the practical study of the history of the earth and the changes which it has undergone, of the development of individual animals and plants, the "order of nature" points in one direction, namely, to the process of differentiation. The one-celled plant and the tree, the polyp and man, and all organic forms intermediate between these extremes, pass from the homogeneous to the heterogeneous, from the nucleated cell, or even from what is more simple still, from plasma to the adult individual consisting of organs more or less complex, according to the position in the series. We nowhere see plants or animals reach maturity in any other way than by development or growth.

At the same time, we must not lose sight of the fact that what is true of the successive stages of individual organisms may not necessarily prove true with regard to the history of the races; that while, from the earliest embryonic condition of each individual to the last there is a connected series of observed changes or differentiations, and no break in the organic continuity, there are no observations whatever to prove a like organic continuity in the races. In the absence of such direct proof, we have no other alternative than to look to the analogies of nature and the geological record. The direction in which the former point is obvious; the testimony of the latter is thus far negative, but is it complete enough to be a safe guide?

In view of the difficulties met with, in explaining the first introduction of living forms, Agassiz has put forth the hypothesis of the creation of eggs. "I then would ask, is it probable that the circumstances under which animals and plants originated for the first time can be much simpler, or even as simple as the conditions necessary for their reproduction only, after they have been once created? Preliminary then to their first appearance, conditions necessary for their growth must have been provided for; for, if, as I believe, they were created as eggs, the conditions must have been conformable to those in which the living representatives first introduced now reproduce themselves. If it were observed that they originated in a more advanced stage of life, the difficulty would be still greater, as a moment's consideration cannot fail to show, especially if it is remembered how complicated the structure of some of the animals was, who are known to have been among the first inhabitants of our globe."— *Contrib. Nat. Hist. of U. States*, i. 12.

This hypothesis would answer very well for spawning fishes and reptiles, whose eggs may be trusted to the effects of physical agents. But does it help us with regard to viviparous reptiles and mammals? To take the case of the mammals, what "conditions conformable to those in which the living representatives first introduced now reproduce themselves" would answer the purpose for the development of the young, except a uterus, or something analogous to a uterus, and for its nourishment after birth, except a mammary gland, or something analogous to one? And how could there be a uterus or a mammary gland without organs of nourishment, locomotion, etc.; in other words, before creating the egg, it would be necessary to create some kind of

an organism for the egg to live in. If such organism offered the same conditions with those of the individuals now living, why create the egg at all? Rather than this, it would seem to be a simpler matter to create the whole animal capable of producing eggs to begin with. If it be asserted that the conditions were not the same, this assertion would seem to be equivalent to the admission of variation, inasmuch as the first egg would be capable of being developed under different circumstances from the later ones.

How Prof. Owen meets this difficulty with regard to the first introduction of species may be inferred from the following quoted passages:

"But the conception of the origin of species by a continuously operative secondary cause or law is one thing; the knowledge of the nature and mode of operation of that law is another thing. One physiologist may accept, another refute or reject, a transmutational or natural-selective hypothesis, and both may equally hold the idea of the successive coming-in of species by law."

"What I have termed the 'derivative hypothesis' of organisms, for example, holds that there are coming into being, by aggregation of organic atoms, at all times and in all places, under the simplest unicellular condition, with differences of character as many as are the various circumstances, conditions, and combinations of the causes educing them, — one form appearing in mud at the bottom of the ocean, another in the pond or the heath, a third in the sawdust of the cellar, a fourth on the surface of the mountain rock, etc., but all by the combination and arrangement of organic atoms through forces and conditions acting according to predetermined law. The disposition to vary in form and structure, according to the variation of surrounding conditions, is greatest in these first formed beings; and from them, or such as them, are and have been derived all other and higher forms of organisms on this planet. And thus it is that we now find, energizing in fair proportions, every grade of organization from man to the monad." . . . .

"Now the foregoing hypothesis is at present based on so narrow and, as regards the origin of life, so uncertain a foundation of ascertained facts, that it can be regarded only as a kind of vantage-ground, artificially raised to expand the view of the outlooker for the road to truth, and perhaps as supporting sign-posts directing where that road may most likely be fallen in with." . . . .

"And herein is one main distinction between it (origin of species by natural selection) and the 'derivative hypothesis' which maintains that single-celled organisms, so diversified as to be relegated to distinct orders and classes of *Protozoa*, are now, as heretofore, in course of creation or formation, by the ordained potentiality of second causes; with innate capacities of variation and development, giving rise in a long course of generations to such differentiated beings as may be distinguished by the term 'plant' and 'animal'; from which all higher animals and plants have, through like influences, ascended and are being ascensively derived. This, as the naturalist knows, is mere hypothesis, at present destitute of proof. But it is more consistent with the phenomena of life about us, with the ever-recurring appearance of mould and monads, and with the coexistence, at the present time, of all grades of life rising therefrom up to man, than is the notion of the origin of life which is propounded in Mr. Darwin's book, 'On the Origin of Species by Natural Selection.'" . . . . .

"That organic species are the result of still operating powers and influences is probable from the great paleontological fact of the succession of such so-called species from their first appearance in the oldest fossiliferous strata; it is more probable from the kind and degree of similitude between the species that succeeds and the species that disappears never to return as such; the similitude being in the main of a nature expressed by the terms of 'progressive departure from a general to a special type.' Creation by law is suggested by the many instances of retention of structures in Paleozoic species, which are embryonal and transitory in later species of the same order or class; and the suggestion acquires force by considering the analogies which the transitory embryonal stages in the higher species bear to the mature forms of the lower species. Every new instance of structures which does not obviously and without straining, receive a teleological explanation, especially the great series of anatomical facts expressed by the 'law of vegetative or irrelative repetition,'—all congenital varieties, deformities, monstrosities—opposes itself to the hypothesis of the origin of species by a primary or immediate and never repeated act of adaptive construction."

If we correctly understand Prof. Owen's views, as expressed in the above paragraphs, he inclines to, in fact adopts, though cautiously, the hypothesis of the origin of species by "transmutation" or "deviation;" these transmutations being in no accordance with a pre-arranged plan, but carried out under the influence of second causes. The first organisms were unicellular, brought into existence by spontaneous generation "under law," and, by a slow and orderly transmutation, ascensively differentiated into the highest vegetable and animal organisms. For the precise mode of bringing about the individual changes, he offers no conjecture, whatever.

We leave it for the advocates of progressive creation to answer these views, and will conclude with expressing the belief, that there is no just ground for taking, and that we arrive at no reasonable theory which takes, a position intermediate between the two extremes. We must either assume, on the one hand, that living organisms commenced their existence fully formed, and by processes not in accordance with the usual order of nature, as it is revealed to human minds, or, on the other hand, that each species become such by progressive development or transmutation; that, as in the individual so in the aggregate of races, the simple forms were not only the precursors, but the progenitors of the complex ones, and that thus the order of Nature, as commonly manifest in her works, was maintained.

the frequency with which this notion is revived,— ever returning upon us with hydra-headed tenacity of life, and presenting itself under a new form as soon as the preceding one has been exploded and set aside,— that it has a certain fascination for the human mind. This arises, perhaps, from the desire to explain the secret of our own existence,— to have some simple and easy solution of the fact that we live.

"I confess that there seems to me to be a repulsive poverty in this material explanation that is contradicted by the intellectual grandeur of the universe; the resources of the Deity cannot be so meagre that, in order to create a human being endowed with reason, he must change a monkey into a man. This is, however, merely a personal opinion, and has no weight as an argument; nor am I so uncandid as to assume that another may not hold an opinion diametrically opposed to mine in a spirit quite as reverential as my own. But I nevertheless insist, that this theory is opposed to the processes of Nature, as far as we have been able to apprehend them; that it is contradicted by the facts of Embryology and Paleontology, the former showing us forms of development as distinct and persistent for each group as are the fossil types of each period revealed to us by the latter; and that the experiments upon domesticated animals and cultivated plants, on which its adherents base their views, are entirely foreign to the matter in hand, since the varieties thus brought about by the fostering care of man are of an entirely different character from those observed among wild species. And while their positive evidence is inapplicable, their negative evidence is equally unsatisfactory, since, however long and frequent the breaks in the geological series may be in which they would fain bury their transition types, there are many points in the succession where the connection is perfectly distinct and unbroken, and it is just at these points that new organic groups are introduced without any intermediate forms to link them with the preceding ones."

PHYSIOLOGICAL DIFFERENCES BETWEEN TYPICAL RACES OF MEN.

In a paper on the above subject, recently read to the British Ethnological Society, Mr. Robert Dunn maintained that the genus *homo* was distinctly defined, on the ground that in man's moral and religious attributes the inferior animals do not participate, and it was this that constituted the difference between him and them. The barrier was thus, he considered, impassable between man and the chimpanzee and gorilla; and that wherever man, with his erect attitude and with his articulate voice, is found, his claims to our common humanity must be immediately acknowledged, however debased the type may be. His conviction was that there was proof of a general unity exhibited in all the races of the great family of man, inasmuch that they were all endowed with the same intellectual faculties and mental activities, however much they may vary in degree. It had, he thought, been fairly argued that all the races of the human family form but one species, from the physiological fact that they are all capable of fruitful union. Believing the brain to be the material organ of the mind, the author considered the study of the cerebral organization and development in the various typical races as one of the most effectual means of better understanding and elucidating the psychological differences which characterize them. This subject, however, was one that yet required

to be worked out; and ethnic psychology was still a desideratum. The author then reviewed what had been done by anatomists and ethnologists, and pointed out that the lower savage races, such as the Sandwich islanders, made progress in the early part of their education, and were so far as apt and quick as the children of civilized Europeans; but at this point they stopped, and seemed incapable of acquiring the higher branches of knowledge. The Sandwich islanders have excellent memories, and learn by rote with wonderful rapidity, but will not exercise the thinking faculties; they receive simple ideas, but not complex ones. In like manner, it was found practically that negro children could not be educated with white children. In all these cases, as well as in the minor ones continually occurring amongst ourselves, of inability to understand subjects and reasonings of a certain order, the true explanation is that the cognate faculties have not reached a complexity equal to the complexity of the relations to be perceived; as moreover it is not only so with purely intellectual cognitions, but it is the same with *moral* cognitions. In the Australian language there are no words answering to justice, sin, guilt. Amongst many of the lower races of man, acts of generosity or mercy are utterly incomprehensible; that is to say, the most complex relations of human action in its social bearings are not cognizable. This the author thought was in accordance with what *à priori* might have been expected to have resulted from organic differences in the instruments of the higher psychical activities — or, in other words, in the nervous apparatus of perceptive and intellectual consciousness. The leading characters of the various races of mankind were simply representatives of particular stages in the development of the highest Caucasian type. The negro exhibits permanently the imperfect brow, projecting lower jaw, and slender bent limbs of a Caucasian child some considerable time before the period of its birth. The aboriginal American represents the same child nearer birth; the Mongolian the same child newly born.

ZOOLOGICAL SUMMARY.

Brains of Man and Animals. — Facts developed in a paper on the anatomy of the chimpanzee, read before the British Association, 1863, by Dr. Emberton, strongly corroborated the position heretofore taken by Prof. Huxley and other comparative anatomists, that the brain of the chimpanzee differs only in degree — that is, in the smaller size and extent of its parts — from that of man; and that, with this difference, essentially the same structures, without any exception, exist in both brains.

Dr. Crawford maintained in a subsequent paper that the consideration of the material structure of the brain was of far less value than a consideration of its working or living action, and that probably there exist subtle differences between the brain of man and those of the lower animals that anatomy has not, and probably never will, detect.

Thus the brain of the wolf is anatomically the same as that of the dog, one being an untamable glutton, the other the friend and companion of man. The Australian savages tame the young of the wild dogs, and use them in the chase, whereas the young of the wolf are not capable of complete or useful domestication. Again, the hog, with its low organized brain, is equal in intelligence to the most anthro-