

development of these teeth to be the result of external stimulus or effort, as the development of the tail, or as the atrophy of the *digitus medius* of both hands. I have, on a former occasion, tested the Lamarckian hypothesis of transmutation by the phenomena of the dentition of the male Gorilla¹, and have not yet seen a refutation of my argument. A strong superorbital ridge may project, as an occasional variety, in Man; and may be supposed to exemplify the way in which, on the degeneration-hypothesis, Man might sink into the Ape. But such a fact in no way affects the physiological conclusions against the Lamarckian doctrine of transmutation.

There remains, then, to be seen whether the subsequently propounded hypothesis of 'natural selection' will afford us a better or more intelligible view of the origin of the species called *Chiromys madagascariensis*.

I may remark, on the outset, that this hypothesis differs from Lamarck's in invoking a supernatural commencement of organisms which are held to have been "descended from some one primordial form, into which life was first breathed"². And herein is one main distinction between it 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 long course of generations, to such differentiated beings as may be distinguished by the terms '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.' Applying to the Aye-aye the illustration of his hypothesis, as submitted by Mr. Darwin to the Linnean Society³, it may be admitted that the organization of a Lemur, feeding chiefly on fruits or birds, but sometimes on grubs, is, or might become, slightly plastic, in the sense of being subject to slight congenital variations of structure. We may, also, suppose changes to be in progress in the woods of Madagascar, causing the number of birds to decrease, and the number of insects to increase, especially of those the larvæ of which are xylophagous. The effect of this might be that the Lemur would be driven to try to catch more grubs. His organization being slightly plastic, those individuals with the best hearing, the largest front incisors, and the slenderest middle digit, let the difference be ever so small, would be to that extent favoured, would tend to live longer, and to survive during that time of the year when birds or fruits were scarcest; they

¹ Trans. Zool. Soc. vol. iii. p. 381, and vol. iv. p. 175. See also 'Classification of the Mammalia,' 8vo, 1859, p. 101.

² Darwin, 'On the Origin of Species,' p. 414.

³ Proc. Linn. Soc. August 1858, p. 49.

would also rear more young, which would tend to inherit these slight peculiarities. Were the Lemurs to be reduced to this insect-food, those individuals less plastic than the incipient Aye-aye, or not varying in the same way, would become extinct.

The varieties of condition of the human mind are manifold, and may be exemplified by the fact that there are some with modes and habits of thought which lead them to entertain no more doubt that such causes, in a thousand generations, would produce a marked effect upon the Lemurine dentition and limbs, adapting the form and structure of the *Quadrumanæ* to the catching of wood-boring grubs instead of birds, than that any domesticated quadruped can be improved by selection and careful breeding; whilst to other minds the propounding of such plastic possibilities leaves no sense of any knowledge worth holding as to the origin of the species called *Chiromys madagascariensis*, no help to the conception of such origin which is at all equivalent to so wide a departure from actual experience of facts. We know of no changes in progress in the Island of Madagascar, necessitating a special quest of wood-boring larvæ by small quadrupeds of the Lemurine or Sciurine types of organization. Birds, fruits, and insects abound there in the ordinary proportions; and the different forms of *Lemuridæ* coexist, with their several minor modifications, zoologically expressed by the generic terms *Lichanotus*, *Propithecus*, *Chirogaleus*, *Lemur*, and, we may now confidently add, *Chiromys*.

That organic species are the result of still operating powers and influences is probable, from the great palæontological fact of the succession of such so-called species from their first appearance in the oldest-known fossiliferous strata: it is the 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 palæozoic 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 a higher species bear to the mature forms of lower species. Every new instance of structures which do 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,—oppose themselves to the hypothesis of the origin of a species by a primary or immediate and never-repeated act of adaptive construction.

Such series of facts, with those treated of in my works 'On the Homologies of the Vertebrate Skeleton' and 'On the Nature of Limbs,' appear to me to be the chief grounds in zoological science for the hypothesis of a continuously operative secondary creational law. That this law works by derivation of one species from a previous species, of a new from an old species, is made probable by the demonstrated unity of plan in the Articulate and Vertebrate types of organization, and by the approximations to such unity of type in the molluscos and some lower forms of organized beings.

The phenomena of parthenogenesis have made known unexpected and strange instances of great degrees of difference of form between the self-subsistent independent generative product and the producing organism. But the "derivative hypothesis" is, at present, as I have already admitted, little more than an indication of a route of research by which the mode and way of derivation may be ultimately better understood.

The terms in which the zoologist would express the sum of the observations above recorded on the Aye-aye would be, "that it was related by affinity to the *Quadrumana*, and by analogy to the *Rodentia*." And such terms become intelligible if they mean that the Aye-aye has been derived, in common with other existing *Lemuridæ*, from some pre-existent animal of a more generalized Lemurine type of organization, in departing from which it has gained a character, *e. g.* the dental one, very like that which prevails in the *Rodentia*, without losing the more numerous and essential characters of its inherited Lemurine organization.

The terms in which the anatomist would express the sum of his observations on the structural resemblances traceable from the Aye-aye throughout the *Lemuridæ* would be, that the principle of 'unity of organization' prevailed through such group. And such term would have a more intelligible meaning on the hypothesis that these singularly diversified Lemurs were genetically related by descent from a common ancestral form.

Whilst admitting the general evidence, therefore, in favour of 'creation by law,' I am compelled to acknowledge ignorance of how such secondary causes may have operated in the origin of the *Chiromys*. Darwin seems to be as far from giving a satisfactory explanation of them as Lamarck.

One discerns in the *Lemuridæ*, if we therein include the *Galeopithec*i, such a range of variety in their dentition as suggests the idea of instability of character, or of unusual plasticity, in that part of their organization.

The varieties of the limbs, also, as manifested by the long ankle-bones of *Otolincus* and *Tarsius*, by the reduction of the index to a stump in *Perodicticus*, and by the atrophy of the medius in *Chiromys*, in like manner indicate a tendency to deviate from type in the hands and feet of this *Quadrumanous* family.

Why the forefinger in both fore limbs should have been, as it were, amputated—reduced to a short stump—in one kind of *Stenops*, and why it should be much shorter than usual in others, is not intelligible in reference to any known use or peculiar application of the upper hand in that kind of Slow Lemur.

The purpose of the probe-like middle finger is more readily discerned in the Aye-aye. The function of the large comb-like lower incisors in *Galeopithecus*, and that of the gouge-like strong incisors of *Chiromys*, have received explanation. Some might discern, in the greater length of the middle upper incisor of *Propithecus* and *Tarsius* as compared with that of the lateral incisor, and the reduction of the lower incisors to a single pair, a step in the transition from the Lemurine type of dentition to the extreme modification of that type in *Chiromys*. But all the surmises and guesses as to the condi-

tions of such changes, all the attempts to explain how they were brought about—if they have been brought about—by still operative causes, are inadequate and unsatisfactory.

The real knowledge which we possess of the *Chiromys* is limited to certain particulars of form, structure, habits, relations of structure thereto, likeness and unlikeness to other creatures, and geographical limitation. Far be it from me to imply that zoology may never know more than the nature and relations of the animal as it now exists.

Although one of the greatest intellects has warned us of the futility of our finite endeavours to penetrate the mystery of the beginning of things, the attempts to dissipate that which still enshrouds the origin of species cannot but be fraught with collateral advantages to zoological science.

DESCRIPTION OF THE PLATES.

PLATE I.

Male Aye-aye (*Chiromys madagascariensis*, Cuv.), natural size.

PLATE II.

Female Aye-aye (*Chiromys madagascariensis*, Cuv.), half the natural size: from the animal living in the Gardens of the Zoological Society, October 1862.

PLATE III.

Male Aye-aye, from the specimen transmitted, in spirits, by Dr. Sandwith, C.B., in the attitude of exposing the burrow of its favourite larval food: half the natural size.

PLATE IV.

Front view of the same specimen: half the natural size.

PLATE V.

Back view of the same specimen: half the natural size.

PLATE VI.

View of the head in profile, and of the fore limbs, of the male Aye-aye: natural size.