

inpleasant consequences of a late supper might have led Mr. Thomson one step further, and suggested to him the probable habitat of the spirit when embodied. How brimful of meaning to Mr. Thomson, then, must be Shakespeare's well-known utterance—"We are such stuff as dreams are made of." The particular merit which he claims for himself as a discoverer is, that he has realised to himself this spirit-world "predicted of old to be in existence," become conscious of himself as a "spirit in the world of spirits," clearly distinct, "in rounded belief," as he puts it, from that other entity, the body; and he declares that any one may make this awful discovery for himself if he only has "faith," shuts himself off from the outer world, and ponders long enough and with sufficient intensity. If our author is really in earnest—and we cannot but think he is—in trying to fathom the mystery of life and of consciousness, we recommend him to approach the subject unprejudicedly from the side of physiology; for so long as a psychologist concerns himself with the phenomena of his "inner consciousness" alone, and neglects the facts of his "outer man," his work is less than half done, and he is as likely to succeed in arriving at the whole truth as Columbus would have been in discovering America, had he contented himself with studying charts and staring longingly across the Atlantic for forty years.

On the Elevation of Mountains by Lateral Pressure; its Cause, and the Amount of it, with a Speculation on the Origin of Volcanic Action. By Rev. O. Fisher, M.A., F.G.S., &c. (From the Trans. of Camb. Phil. Soc. Vol. xi. part iii.)

THIS paper is of considerable interest as bearing upon the question of the internal condition of the earth. Mr. Fisher is of opinion that the elevation of mountain chains and the phenomena of volcanoes can both be accounted for on the hypothesis that the earth is solid. He conceives that "if a sufficient loss of heat has happened since the stratified rocks were formed, to cause a slight diminution in the volume of the earth, then the outer layer will have become too large, and will have had to accommodate itself to the reduced spheroid; and the lateral pressure caused by the resulting failure of support will have given rise to those foldings which have produced mountain ranges;" and an attempt is made by the author to "estimate the lateral pressure which would arise in the outer strata of the earth under such circumstances." Referring to the results obtained by Archdeacon Pratt in India, which seem to show that the density of the earth's crust beneath mountain chains is less than in other places, the author thinks this is only what might have been expected upon the supposition that the elevation of these mountains is due to lateral pressure; for it is evident that the strata would to some extent be supported by the lateral pressure which upheaved them. Here then, he thinks, may be the origin of volcanoes:—"Diminished vertical pressure will enable the interior layers of the crust to pass into a state of fusion, and, "if from an independent cause a partial passage towards the surface is opened for molten rock containing highly heated water, the fluid will convey to a level where the resistance is less the pressure existing at a lower depth, and the force necessary to complete a passage to the surface may be furnished by the pressure of the molten rock and by the steam contained within it." But, although Mr. Fisher believes that the elevation of mountain chains and the phenomena of volcanoes are both of them the result of the same fundamental causes, yet, he thinks, it would certainly be a mistake to regard elevation as the consequence of volcanic action. He does not see how subterranean lakes of molten matter can account for the elongated form which trains of volcanoes like those of the Andes affect; nor how such lakes should have shifted about from one region to another at different geological epochs. His theory, however, offers an explanation of the elongated form

assumed by chains of volcanoes—the shifting of volcanic activity to different regions at successive periods—the spasmodic character of volcanic action, and other volcanic phenomena.

J. G.

LETTERS TO THE EDITOR

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The Placental Classification of Mammals

A REMARK made by Prof. Allen Thomson on this subject in a late number of NATURE induces me again to draw attention to some objections I offered to the placental classification in a review of Prof. Rolleston's "Forms of Animal Life" (NATURE, vol. i., p. 81). If this system fails to satisfy so sound a critic and so accomplished an anatomist as Dr. Thomson, there must be some serious deficiencies in it. No doubt De Blainville did good service in calling attention to the wide distinction of Marsupials and of Monotremes from other mammals; but his names, *Ornithodelphia* and *Didelphia*, are inappropriate, and even misleading, and the skeletal characters of these two groups furnish quite as important, and far more available, means of diagnosis.

It admits of question whether the divisions of the higher mammals, according to the same system, are the most natural, even if the placenta were the best organ by which to define them. It is true, as Prof. Huxley observes, that the singularities which ally the elephant with the Rodentia have been a matter of common remark since the days of Cuvier, but the placental classification requires us to find still more singular ties between the elephant and the Carnivora. On the other hand the Carnivora lead down by the seals to the true Cetacea, a line of connection broken by the placental arrangement; which is equally opposed to the more doubtful analogy of the whales with the Ruminants. And the third order with deciduous zonary placentation, the isolated genus *Hyrax*, whatever may be thought of its relations to Rodentia on the one hand and to Ungulata on the other, has at least more likeness to either than to elephants and cats. Again, the different placentation of Edentata may be held only an additional proof of the looseness of an order held together chiefly by negative characters, but if we break it up, shall we obtain a more natural or convenient arrangement by placing the sloths with the Ruminants, *Manis* with Cetacea and Perissodactyla, and *Orycteropus* with Primates?

No doubt embryological characters are justly regarded as the most important for revealing true affinities between animals. But the tenacity of hereditary transmission, which gives them this value, does not appear to belong to placental structure. The placenta is more a maternal than a foetal organ, especially as to its deciduate or non-deciduate character, and should rather rank with organs like the mamma than with the yolk-sac and the amnion.

There are, moreover, many practical objections to the placental classification. The opportunities of obtaining knowledge on the subject are few, the investigation is not always easy, and it cannot be readily verified by subsequent observers.

But the most important objection to De Blainville's system is, that the perishable nature of the structures on which it is based renders it impossible to apply the criterion to fossil animals. It will probably be long before we shall have any notion of what a Sirenian placenta is like; it is only lately that we have learnt what is the real placentation of so common a creature as the rat, but we shall certainly never have the remotest idea of that of a megatherium, a Zeuglodon, or a Rhytina. So that if it be admitted—and surely no one will deny—that any classification of animals which is to be more than a mere aid to the memory, must include all known forms, recent or fossil, it follows that neither placenta, nor brain, nor any other soft part, can be of more than subordinate value in classification. On the other hand, it may be fairly maintained that there is no group of mammals, and scarcely one of the other Vertebrata, of undisputed importance, which cannot be completely defined by the characters of the skeleton.

It is, I venture to think, rather the authority of such illustrious names as Gegenbaur and Huxley than its own merits which have recommended the placental classification of mammals. If we regard the object of classification to be the setting forth of true genetic relationships, all characters must be included, and among