

mules, or the number present in particular cases, but it appears to me interesting to consider how far the theory will hold good when examined from this more physical point of view.

For the sake of argument, I assume that gemmules on an average contain one million structural molecules of albumen and molecularly combined water. Variations in number, composition, and arrangement would then admit of an almost infinite variety of characters. On this supposition it would require a thousand gemmules to be massed together into a sphere, in order to form a speck just distinctly visible with our highest and best magnifying powers. By calculation I find that a single mammalian spermatozoa might contain so many of such gemmules, that, if one were lost, destroyed, or fully developed in each second, they would not be completely exhausted until after the period of one month. Hence, since probably a number are concerned in producing perfect fertilisation, we can readily understand why the influence of the male parent may be very marked, even after having been, as regards particular characters, apparently dormant for many years.

In a similar manner I calculate that the germinal vesicle of a mammalian ovum might contain enough gemmules for one to be destroyed, lost, or fully developed in each second, and yet the entire number not be exhausted until after a period of seventeen years, and the entire ovum might contain enough to last at the same rate for no less than 5,600 years.

These calculations are made on the supposition that the entire mass is composed of gemmules. Of this there is little probability; but still, even if a considerable portion of the ovum consists of completely formed material and of mere nutritive matter, it might yet contain a sufficient number of gemmules to explain all the facts contemplated by the theory of pangenesis. The presence of any considerable amount of such passive matter in spermatozoa would, however, be a serious difficulty in the way of the theory, unless indeed very many spermatozoa are invariably concerned in producing fertilisation.

Taking everything into consideration, it does not appear to me that any serious objection can be raised against pangenesis when examined from a purely physical point of view, as far as relates to the inheritance of a very complex variety of characters by the first generation, though there would have been many serious difficulties to contend with, if the ultimate atoms of matter had been very much larger than is indicated by the properties of gases.

When we come to apply similar reasonings to the second or following generations, we are compelled, along with Darwin, to conclude that gemmules have the power of producing other gemmules more or less closely resembling themselves, and of being collected together in the sexual elements, since otherwise the number that could be transmitted in a dormant state for several generations would be far too small to meet the requirements of the case.

#### Conclusion.

In my remarks I have made no endeavour to conceal our present ignorance of many very important questions connected with my subject. Want of the requisite data necessarily imparts a speculative character to many of my conclusions; but perhaps there is no more fruitful source of knowledge than to see and feel how little is accurately known, and how much remains to be learned.

#### THE TUFTED DEER OF CHINA

AMONG the many most valuable additions which Mr. R. Swinhoe has made to our knowledge of Chinese zoology, there are none more important than his discoveries in the deer-tribe. The Water Deer of Shanghai (*Hydropotes inermis*), first described in 1870, is one of

the most interesting of these. It is of small size, without horns of any kind, and with long canine teeth present in the males only. In outward appearance it in these respects closely resembles the Musk Deer. Its colour is light chestnut, and the hairy coat is harsh. It is called the *Ke* and the *Chang* by the Chinese. Sir Victor Brooke has demonstrated that its skull differs in important points from that of *Moschus*.

Still more recently, in 1874, Mr. Swinhoe has described another small deer from the mountains near Ningpo, of much the same size as *Hydropotes*; it also resembles that genus in being hornless and possessing large canine tusks in the males. Mr. Swinhoe, in the "Proceedings" of the Zoological Society (1874, p. 452), writes as follows:—"My friend and correspondent, Mr. A. Michie, wrote me a letter dated Shanghai, December 19, 1873, as follows:—"I send another note to overtake the mail, to tell you I have just found a new deer from the Ningpo country. It is a dark iron-grey or pepper-and-salt colour, like some Scotch terriers, with white tips to its ears, square-built (that is, straight back and pointed hip), with very short tail. On its forehead is a thick black mane, like the bristles of a boar. . . . It has the lachrymal sinus, but not so large as the Muntjac; in size the beast about equals the Muntjac." An excellent figure accompanies this description. It was drawn from a skin sent by Mr. Michie to Mr. Swinhoe, who has named the animal *Lophotragus nichianus*.

A living example of this species, the first ever brought to this country, has just reached the Zoological Gardens in Regent's Park. From this male specimen it can be seen that the drawing above referred to, made from the flat skin, excellently represents the figure of the animal, and is truthful in that it shows the canine teeth and the absence of horns. In the living specimen there is a pair of hair-covered tuberosities on the frontal regions, at the postero-lateral angles of the hairy head-tuft, but, as in the Giraffes, these have no horns upon them. Comparing this condition with that of *Elaphodus cephalophus*, also from China, described by M. A. Milne-Edwards, the intimate relation of *Lophotragus* to the Muntjacs (*Cervulus*) is evident; the series of gradual antler-reduction being in the following order:—*Cervulus*, *Elaphodus*, *Lophotragus*. Whether *Hydropotes*, or *Moschus*, or both are extremes of this series, remains to be proved; and it must be mentioned that it is not perfectly certain, though highly probable, that the above-described individual specimen of *Lophotragus* exhibits its highest degree of antler-development.

#### NOTES

SOME weeks since it was stated that the collection of fishes made by Mr. Francis Day, Inspector-General of Indian Fisheries, would be deposited in the New Indian Museum at South Kensington. It was offered to and accepted by the Secretary of State for India, but it was subsequently considered that neither the expense of bottles in which to exhibit them, nor of spirit for their preservation, could be rightly debited to the resources of India. Mr. Wood, the well-known artist, very liberally proposed, in exchange for the type collection, numbering about 1,200 species, to increase Mr. Day's plates in his work, the "Fishes of India," from 160 to 190, or to 1,140 figures. The Director of the Indian Museum in Calcutta hearing of this arrangement, proposed to the trustees that he should secure it at once on these terms, and we understand that he has been instructed to do so. It will doubtless render the Museum in Calcutta the most complete in Indian fishes in the world; but whether this collection finding a place in the British Museum might not have proved more beneficial to science we leave for the decision of our readers.

MR. WILLETT has just issued a report on the Sub-Wealden boring, stating that the bore-hole has been widened and lined to