

either useless or even detrimental to the animal, and had hence undergone a process of atrophy, and become converted into non-contractile tendinous bands.

It appears to me, therefore, that, relying on the anatomy of the Penguins, we must conclude that they form the surviving members of a group which had early diverged from the primitive avian stem,¹ but that at the time when the separation took place the members of that stem had so far diverged from the primitive ornithoscelidan form as to be possessed of anterior extremities, which instead of forming organs of terrestrial, had become transformed into organs adapted to aerial progression, in other words, into true wings.

If this view be correct, palæontological research ought in the course of time to disclose the existence of numerous Spheniscidine remains, which may enable us to trace the line of descent of the Penguins of the present day from the original avian stem, and through it the relationship which exists between the modern *Spheniscus* or *Eudyptes*, with their separate metatarsal bones and aborted wings on the one hand, and the majority of modern birds, with their conjoined metatarsal bones and perfect wings on the other.

In view of these observations it seems hopeless to attempt at present to trace the affinities of the Penguins to other genera of existing birds; and although in many respects they appear more nearly to resemble the group of palmipede birds than any other, yet I think it unnecessary, considering the present state of our knowledge of the anatomy of the latter, to found hypothetical conclusions as to the exact affinities of the Penguins upon anatomical data which everyone must acknowledge to be altogether insufficient for the purpose. I shall therefore content myself with remarking, in the words of Gervais and Alix, that "Si, au lieu de se borner à constater les affinités, on veut se placer au point de vue de la recherche d'un type ancestral commun aux Spheniscidés et aux Palmipèdes, on voit que ce type hypothétique ne saurait être arrivé à produire celui des Sphéniscidés qu'après de nombreuses modifications."²

¹ In corroboration of this opinion I subjoin the following :—

"When describing the fossil bones of the large Penguin, *Palæeudyptes antarcticus*, Huxley, in a paper published in last year's volume of our Transactions, I find that I overlooked two very fine specimens that were in the museum.

"They were presented by Mr. Charles Traill, who found them in the white calcareous sandstone which is excavated at Fortification Hill, near Oamaru, in Otago, and which is well known as the Oamaru limestone.

"The bones are beautifully preserved in this matrix, which has been carefully cleared away to allow of the examination.

"They are the left humerus and coracoid of the right side, and belonged, I have no doubt, to the same individual bird as the metacarpal figured in last year's volume (pl. xvii. fig. 3). The humerus is one-sixth of an inch larger than the same bone in the Brighton fossil, and has a more marine appearance. Judging from the proportion of the bones, they must have belonged to a bird that had a stature of from 6 to 7 feet.

"Captain Hutton said he considered the age of the strata containing these bones to be upper Eocene, and that they are therefore among the oldest bird remains known."—Hector, J., *Trans. New Zealand Inst.*, vol. v. p. 438, 1872.

² *Osteologie des Manchots*, p. 44.