

“The genus *Aptenodytes* includes the two species which I have examined, *Aptenodytes longirostris* and *Aptenodytes tæniatus*. The last named has been accepted by ornithologists as a type of another genus, *Pygosceles*, but I see no reason on anatomical grounds

“As shown in the Report on the Spheniscidæ, we have in *Eudyptes chrysocome* and *Eudyptes chrysolophus* examples of two birds which, differing much in size and weight as well as in the form and mode of coloration of certain feathers, nevertheless present an almost complete similarity of anatomical structure. I am inclined, moreover, relying upon my own observations, not, however, specially directed to the elucidation of this point, to think that a corresponding similarity of structure obtains in the case of many other birds which, solely on the ground of difference in form and mode of coloration of the tegumentary appendages, are regarded by ornithologists as undoubtedly specifically distinct. The question therefore arises—What is the relative value of tegumentary appendages on the one hand, and of anatomical structure on the other, in the determination of species as distinguished from varieties? To answer this question conclusively is at present impossible, nor shall we arrive at the solution of the problem until our knowledge of the structural details of a number of these so-called species is much more exact than it is at present. But even if we suppose such an anatomical investigation to have been completed, it appears to me exceedingly doubtful whether the question—What constitutes specific distinctness? will ever be solved by the aid of morphology alone. Rather it seems probable that in the last resort the determination of species will rest upon physiological rather than upon morphological grounds, in other words, upon the impossibility of the production of fertile offspring by the sexual union of the members of two undoubtedly distinct species.

“But while I would insist on the necessity of taking into consideration the details of its anatomical structure in attempting to solve the question of the specific distinctness of any given species, I do not deny that in the present state of our knowledge the external appearance of an organism forms a safer foundation for the determination of species than does its anatomical structure. In corroboration of this view I may refer to the case of two of our most common birds, the Thrush (*Turdus musicus*) and the Blackbird (*Turdus merula*). These are undoubtedly distinct species, and have been decided to be such by ornithologists, not upon the physiological ground of the infertility of the offspring resulting from the union of members of the two species, nor upon any structural difference, but solely upon the difference in form and coloration of their feathers. And yet the entire structural anatomy of these two species is, as shown by Macgillivray (History of British Birds, pp. 82 and 128), almost identical. The same remark holds good of other species of birds, and the further question arises—How does it happen that two organisms are so different physiologically and in their external appearance while their anatomical structure is almost identical?

“It would appear at first sight that the influence of external conditions would in the first place influence the external appearance of an animal rather than its internal anatomy, and yet we find that under the influence of exactly similar external conditions in the case of the two species just referred to, their external appearance is quite different and yet their internal anatomy remains the same, this latter similarity being accompanied by specific physiological distinction. It appears to me that there can only be one explanation of these apparently anomalous facts, and that is, that there must be some embryological or physiological connection between the genital glands and the integument. So far as embryological connection is concerned, we know of none except that both the genital glands and the skin are derived from the mesoblast, unless indeed we take into consideration the hitherto inexplicable fact of the pathological occurrence of dermoid cysts in the ovaries. That, however, there is some intimate physiological connection between the genital organs and the skin is shown by the changes which are undergone by the tegumentary appendages at the time of sexual maturity, changes which are more pronounced in the skin than in any other part of the organism, and more especially by the occurrence of these remarkable phenomena included by Darwin within the category of secondary “sexual characters,” such as the occasional assumption by the female of the male plumage, and *vice versa*, in birds, and the observed difference in coloration of the yolk of the egg, associated with a corresponding alteration in the colour of the tegumentary appendages (Darwin, Animals and Plants under Domestication, vol. ii. pp. 252 and 274 London, 1868). All these facts point to the existence of some more intimate connection between the sexual organs and the integument than between the sexual organs and the rest of the organism, and upon this supposition alone, as it seems to me, is it possible to account for the coincidence of variation in the integument with specific physiological distinction at the same time that the latter is unaccompanied by any marked morphological change of other parts of the organism.

“It seems possible on these lines to explain the facts recorded in the monograph on the Spheniscidæ with respect to the similarity of structure of two Penguins (*Eudyptes chrysolophus* and *Eudyptes chrysocome*), which nevertheless on the strength of difference in the form and coloration of their plumage and dermal appendages have without hesitation been regarded by ornithologists as specifically distinct.

“It may thus be true that, after all, tegumentary appendages are of more account in the determination of species than are the details of anatomical structure, the former being correlated with deep seated sexual and specific peculiarities,