

According to Gervais and Alix,¹ the component elements of the tarso-metatarsal bone are recognisable as distinct and separate entities, even to the end of foetal life in the Penguins. These bones therefore unite with one another at a relatively later date in the Spheniscidæ than in the majority of birds. Indications of the original composition of the metatarsal portion of this bone by the union of three elements are distinct enough in the majority of birds by reason of the independence of their lower extremities, but in none, so far as I know, are the *shafts* of the metatarsal bones separated by the well-defined grooves met with in the Penguins. In none, moreover, with perhaps one exception, is the tarso-metatarsus at once so broad and so short as in the Penguins. As shown by Brandt,² the tarso-metatarsus of the Frigate Bird resembles that of the Penguins in its shortness, but differs in being relatively narrower, as also in the fact that while in the Penguins the grooves between the second and third, and third and fourth metatarsal bones are well defined, only one, and that the groove between the third and fourth metatarsals, is clearly pronounced in the genus *Fregata*.

II.—ARTHROLOGY.

The ligaments which connect the various bones of the trunk in the Penguins do not differ from those of other birds.

The modifications in form of the bones of the wing, however, and the slight amount of motion permissible between the different segments of that organ in the Penguins, are accompanied by certain modifications in the form and mode of attachment of the ligaments connecting the separate bones which it may be as well to refer to shortly.

LIGAMENTS OF THE WING.

The shoulder joint is surrounded by a capsular ligament similar to that of other birds.

Connected with the elbow joint there are two strong internal, and a single external lateral ligament. The former are attached above to the inner side of the distal end of the humerus, and below to the proximal ends of the radius and ulna. The external lateral ligament is attached above to the humerus, and below to the upper end of the radius. In addition to these ligaments, the various muscles of the forearm arising from the humerus, which in the Penguins are reduced to tendinous bands, serve in these birds to strengthen this articulation. The capsule of the joint is completed posteriorly by the strong ligaments which attach the sesamoid bones to the upper end of the ulna.

¹ *Ostéologie et Myologie des Manchots*, p. 9.

² *Beiträge zur Kenntniss der Naturgeschichte der Vögel*, in *Mémoires de l'Académie des Sciences*, St. Petersburg, 6th series, 1840, p. 150.