

*The Humerus.*

The humerus, like all the bones of the wing in the Penguins, is much flattened from side to side, and differs much in form from that of any other group of birds. The articular surface of the proximal end of the bone is crescentic in form, the horns of the crescent being directed towards the middle line of the body. This surface is separated from the rest of the bone by a horizontal groove which affords attachment to the capsular ligament of the shoulder joint. Immediately below this groove on the outer surface of the bone is a deep depression, into which as well as into the ridge in front of it is inserted the tendon of the pectoralis medius. On the inner side of the bone, below its articular surface and close to the anterior border, is another linear groove which affords insertion to the tendon of the pectoralis major. Below the posterior horn of the crescentic articular surface, but separated from it by a horizontal groove, is a well-marked eminence into which is inserted the tendon common to the subscapularis and supraspinatus. Immediately below this eminence is a deep circular excavation, which corresponds in position to that of the foramen which in the majority of birds permits the passage of air into the interior of the bone. In the Penguins, however, the bones of which are destitute of air-containing cells, this fossa is blind and merely affords attachment to the third head of origin of the triceps muscle. The "great tuberosity" of the bone is but ill defined, and is represented only by the slightly projecting upper extremity of the shaft. Into it are inserted the pectoralis major and the tensor patagii longus.

The posterior border of the humeral shaft affords attachment to the fourth head of origin of the triceps, while to the anterior margin are attached the tendons of the greater pectoral and tensor patagii muscles. The lower end of the anterior margin presents a shallow excavation, from which arises the brachialis internus muscle. The outer surface of the bone is smooth, while the inner surface, close to its lower end, presents two or three oblique grooves which accommodate the blood-vessels of the arterial *rete mirabile*.

The lower end of the humerus is very obliquely truncated from the anterior to the posterior border, and is provided with four distinct articular surfaces. Of these the two larger are quite continuous with one another, and are adapted to the upper extremities of the radius and ulna. The posterior border of the bone is prolonged inferiorly into a pointed angle, which is marked by two deep parallel grooves. Of these the external is the deeper, and in it glides the external or larger of the two sesamoid bones found in this region. The internal is the shallower of the two, and is adapted to receive the internal or smaller of the ulnar sesamoids. The internal and external surfaces of the lower end of the humerus are rough for the attachment of the powerful lateral ligaments of the elbow joint.

The humerus presents no distinctive features of any importance in any species of Penguin. Even in the different genera special characteristics are looked for in vain.