

**SOME REMARKS ON THE PATAGIAL FAN OF THE
THREE BRITISH BREEDING PETRELS.**

BY

GREGORY M. MATHEWS.

(Plates 5 and 6).

IN the Report of the "Voyage of H.M.S. Challenger," part XI., 1882, Forbes mentioned wing ossicles in certain of the Tubinares and gave drawings of the patagial fan of some half a dozen species. He mentioned that Meckel first, and then Reinhardt, noticed the bone.

I have been investigating the wings of the British-breeding species of Petrels, after a conversation with Major Allan Brooks in April, 1935.

In the Manx Shearwater (*Puffinus p. puffinus*) there is a decided bone, the moklosteon, caused no doubt by the ossification of a tendon or its slip, which seems to be of great advantage to birds with the gliding flight of Puffinoid-Petrels and Albatroses.

On the humeral process there is an ossicle seated on the upper surface; this ossicle is connected, by a plank of almost solid fibrous tissue, to the moklosteon, thus forming a bar.

When the wing is extended the *patagialis longus* reaches from the head of the humerus to the wrist, and beyond the wrist are the flight feathers. A strut coming from the elbow and extending to the anterior border of the patagial fan, would strengthen this part of the flying apparatus just where strength would be of advantage. When the wing is folded up the moklosteon fits above the wing bones. It seems, then, that the moklosteon is much more important than a wing ossicle. This is confirmed by examination of the wing of other gliding-birds.

In the wing of the Storm-Petrel (*Hydrobates pelagicus*) we find the patagial fan of quite a different construction, no spreader bone is needed as the bird flaps its wings and seldom glides; a tendon *humeroproc carpi* from the humeral process to the wrist seems to take the place of the moklosteon.

In the Fulmar (*Fulmarus glacialis*) there is no evidence of either ossicle or spreader. The humeral process is well developed in the chick, and the tendon arises from it and joins the muscles without any ossifying.

In no species of the Fulmarine Petrels do we find any indication of the spreader.

Here, then, we have the three breeding British Petrels each with a different patagial fan.

Can it be that the moklosteon is of taxonomic value? It certainly obtains in gliding birds.

I am obliged to Mr. R. Kemp for doing all the anatomical work from dried skins, kindly sent by Mr. R. M. Lockley.

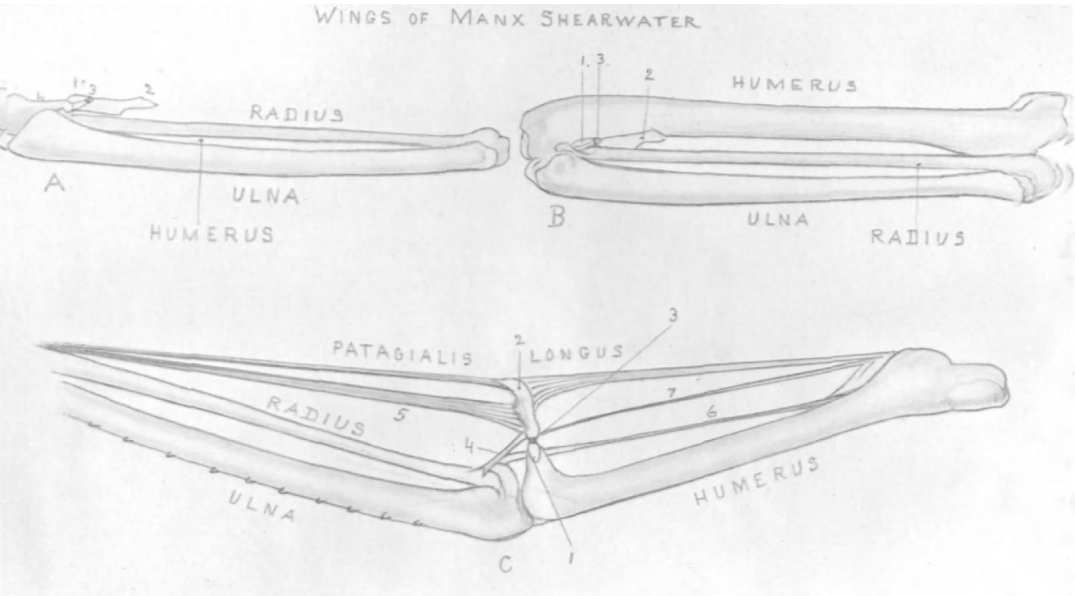
In the Pterodromine (or Bulweriine) Petrels "the twin tendons of origin of the superficial belly of *extensor metacarpi radialis longior*" join the humeral process, without the ossicle, to the moklosteon.

In the Fulmarine Petrels these twin tendons join the *tensor patagii brevis* to the humeral process without either ossicle or moklosteon.

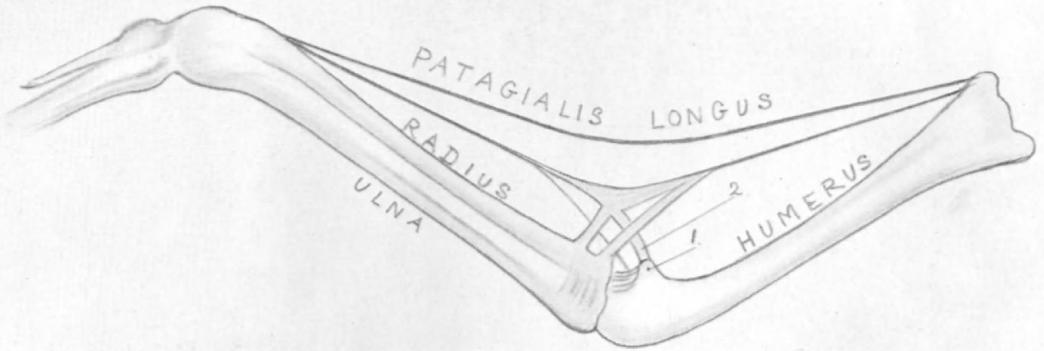
In the Puffinine Petrels (Shearwaters), and in the Diomedeidæ the moklosteon is joined to the ossicle seated on the humeral process, by a plank of ossified tendon, called the sanosteon.

The *os obex* is made up of moklosteon, sanosteon and ossicle.

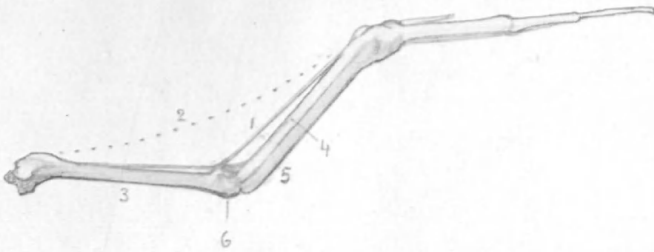
The Diving Petrels, Prions and the Storm-Petrels resemble the Fulmarine Petrels, in having no wing ossicles in the patagial fan. That is to say the families Pelecanoideidæ and Thalassidromidæ, resemble the sub-families Pachyptilinæ and Fulmarinæ in having no moklosteon, while the family Diomedeidæ and the sub-families Bulweriinæ and Procellariinæ have this bone.



- A. Side of wing tilted to show how the spreader and ossicle do not lie in the same plane as the humerus and radius.
 1. Ossicle. 2. Spreader. 3. Cartilage joining ossicle and spreader. 4. Process of humerus.
- B. Side of wing. The ossicle lies on the humeral process, but not on the end face of the process. 1. Ossicle
 2. Spreader. 3. Cartilage.
- C. Left wing extended. 1. Ossicle. 2. Spreader. 3. Cartilage. 4. Tendon spreader to radius. 5. Strongest tendon
 spreader to radius. 6. Tendon Humeral head to radius and throws a slip to spreader. 7. Tendon spreader to
 humerus.



LEFT WING OF FULMAR CHICK



RIGHT WING OF STORM-PETREL

Left wing of Fulmar Chick.

1. Process of humerus. 2. Tendon of brevis.
Showing the brevis tendon arrangement.
Process of humerus present but no ossicle
or spreader bone.

Right wing of Storm-Petrel.

1. Extensor muscle, Humeroproc carpi.
2. Patagium. 3. Humerus. 4. Radius.
5. Ulna. 6. Process of humerus.