

The Pectinate Middle Claw in Australian Birds.

By A. M. Morgan.

Segmented claw would be a better name for this organ, as it is, in the real sense of the word, not a comb, that is to say, the segments are set so close together—in many cases in actual apposition—that it could not be of use in separating coarser from finer material. The organ is not a new structure, but is a modification of one already present in the great majority of birds, in the shape of a horny flange on the inner side of the middle toe.

The only Australian birds without this flange are the *Megapodiidae* (Megapode, Mallee Hen, and Brush Turkey), *Xenorhynchus asiaticus* (the Jabiru), *Irediparra gallinacea* (Lotus Bird or Jacana), *Chaetura caudacuta*, *Micropus pacificus* (the Spine-tailed and White-rumped Swifts), and the *Amytornes* (Grass-Wrens). In the two Parrots, *Pezoporus wallicus* and *Geopsittacus occidentalis* (the Ground and Night Parrots), the flange is so narrow as to be practically absent; nor is it a pronounced feature in any of the Parrots. Broadly flanged birds are the *Spheniscidae* (Penguins), *Chlidonias leucopareia* (Whiskered Tern), *Gelochelidon nilotica* (Gull-billed Tern), *Hydroprogne caspia* (Caspian Tern), *Rostratula australis* (Painted Snipe), all the Ducks, all the Kingfishers, *Merops ornatus* (Bee-eater), *Eurystomus orientalis* (Dollar-Bird), *Podargus strigoides* (Frogmouth), *Aegotheles cristata* (Owlet-Nightjar), and *Ninox* (the Brown Owls). Birds with very narrow flanges are all the *Rallidae* (Rails and Crakes), *Pisobiae* (Stints), *Gallinago hardwicki* (Snipe), *Megalornis rubicunda* (Brolga), *Threskiornis molucca* and *Threskiornis spinicollis* (White and Straw-necked Ibis), and all the diurnal birds of prey. *Pandion haliaetus* (Osprey) has a very narrow flange situated near the ridge of the nail. In some birds more than one toe is flanged, but on only one of the birds I have examined, *Oceanites oceanicus* (Wilson Storm-Petrel), are all three toes flanged.

Birds with two toes flanged are all the *Diomedidae* (Albatrosses and Petrels), *Phaethon rubricaudus* (Bosun-Bird), the two Gulls, the two Oyster-catchers, and *Numenius cyanopus* (Sea Curlew). Amongst the Petrels, *Puffinus leucomelas* (White-fronted Shearwater) and *Daption capensis* (Cape Petrel) are very broadly flanged.

When two toes are flanged they are always the middle and inner one. True segmentation occurs in the *Podicipidae* (Grebes). In these birds the nails are much flattened and

broadened, and are without points, the inner border being apparently brought round to become an anterior border forming part of and in continuity with the swimming lobes. This anterior border is finely segmented.

All the *Phalacrocoracidae* (Cormorants), *Sulidae* (Gannets), *Anhinga novae-hollandiae* (Darter), and *Fregatidae* (Frigate-Birds) show well-made pectination, which is absent in *Phaethon rubricaudus* (Bosun-Bird) and *Pelecanus conspicillatus* (Pelican). The absence of pectination in the Pelican is surprising, in view of the close relationship of that bird to the Cormorants.

In the *Fregatidae* the pectinate border is turned upwards. In the *Sulidae* the segmentation is very coarse.

Segmentation is present in two of the specimens of *Mesoscolopax minutus* (Little Whimbrel) in the S.A. Museum, while another is flanged only, as in *Numenius cyanopus* (Sea Curlew) and *Numenius phaeopus* (Whimbrel). *Limosa limosa* (Black-tailed Godwit) is pectinate, whilst *Limosa lapponica* (Bar-tailed Godwit) is not.

The whole family of *Ardeidae* (Hérons, Bitterns, etc.) is markedly pectinate. *Plegadis falcinellus* (Glossy Ibis) has an incompletely segmented toe. The other Ibises, as mentioned above, are flanged only. The White Owls of the genus *Tyto* are all pectinate, whilst the Brown Owls (*Ninox*) show a marked flange, without pectination. The two Nightjars of the genus *Eurostopodus* and *Caprimulgus macrurus* are well segmented. The Frogmouth and Owlet Nightjar are flanged only, but as their relationship to the true Nightjars is remote this is not surprising.

Glareola maldivarum (Oriental Pratincole) is pectinate, but the nearly-related *Stiltia isabella* (Australian Pratincole) is not. Pectination does not occur in any of the Passeriformes (Perching Birds), though practically all of them have moderate flanges.

I think there can be no doubt that pectination is for preening purposes. It is a matter of common observation that although birds preen the greater part of the body with the beak, those parts which cannot be reached by that organ are preened with the feet. The structure occurs only on the inner side of the middle toe, and, as in the great majority of birds, this is the longest, it is obvious that it is in the most advantageous position to be used for preening purposes; also, when more than one toe is flanged it is always the inner toe; that is the next most conveniently placed for preening. The middle toenail of most birds is not straight laterally, there being usually a convexity inwards which has the effect of making the flange or comb more prominent and better suited for its purpose; and, it is

remarkable that in those birds which have no flange the nail is straight.

When we consider that pectination is only a small modification of an organ already present in most birds, its capricious distribution does not seem so surprising, as the flanged nail would be only slightly, if at all, less effective as a preener than the segmented one. The only advantage of pectination would be to make the flange more flexible.

That the condition is not a very ancient one is indicated by the fact that it is not present until the bird is at or near maturity. A young *Sula serrator* (Australian Gannet) in the S.A. Museum shows the flange only, whilst the adult specimens are markedly pectinate. A young *Sula leucogaster* (Brown Gannet) has each middle toenail with a few segments only. A *Tyto alba* (Barn Owl) in the down and another slightly more adult show the flange only, whilst the adult birds are all pectinate. On the other hand, two specimens of *Phalacrocorax varius* (Pied Cormorant) still showing black feathers on the breast are well segmented.
