

## SHORT COMMUNICATION

### THE RELATION OF *NYMPHICUS* TO THE CACATUINAE

Early classifications (Salvadori 1891; Peters 1937) of the Psittaciformes placed the Cockatiel *Nymphicus hollandicus* with the cockatoos (Cacatuinae), but some recent authors (Verheyen 1956; Brereton and Immelmann 1962; Brereton 1963) have suggested that it is only distantly related to them and ought to be classified elsewhere. However, Forshaw (1969) kept it close to the cockatoos.

This note reviews the evidence for considering the Cockatiel to be more closely related to the cockatoos than to other parrots, and comments on the characters that have led other workers to consider that it belongs elsewhere.

In external appearance the Cockatiel differs strikingly from all the cockatoos (genera *Probosciger*, *Calyptorhynchus*, *Callocephalon*, *Eolophus* and *Cacatua*); it is considerably smaller, and has a long graduated tail of narrow feathers. Its plumage is predominantly grey, with white upper wingcoverts, yellow cheeks, orange earcoverts, and an elongated crest of narrow yellow and grey feathers. Although this plumage pattern is peculiar, it is more similar to some cockatoos than to any other parrot. *Cacatua galerita* and *C. sulphurea* have yellow on the cheeks, and some subspecies of *C. sulphurea* have the earcoverts a deeper yellow, more orange, than the rest of the head. These two species also have yellow in the crest feathers. *Callocephalon fimbriatum* is predominantly grey in colour.

Except for most cockatoos and the Cockatiel, *Eunymphicus cornutus* is the only parrot to have a prominent crest, and there is little else about this species to suggest that it is related to the Cockatiel. No cockatoo has white patches on the wingcoverts resembling those of the Cockatiel, although these feathers are white like most of the plumage in most *Cacatua* species. However, no other Old World parrot has white patches on the wingcoverts, and the red and light green patches found in such genera as *Aprosmictus* and *Alisterus* are probably not homologous, because they result from the acquisition of particular pigments, not from the loss of all pigment.

Female and juvenile Cockatiels have the body feathers, remiges and rectrices narrowly barred with dull cream. Dichromatism of this kind is only found in parrots among the cockatoos (in the genera *Calyptorhynchus* and *Callocephalon*, and juveniles of a few subspecies of *Probosciger aterrimus*).

The Cockatiel moults its primaries in the same sequence as the cockatoos that have been investigated and some other parrots, but differently from some groups that have been suggested as close relatives of the Cockatiel. Besides *Nymphicus* and the Cacatuinae, the genera *Strigops*, *Nestor*, *Micropsitta* and *Psittarchas* are known to moult the sixth primary first, after which moult proceeds in both directions, whereas the following groups of parrots start from a variable centre between the fifth and eighth primaries: Loriinae, *Loriculus*, *Psittacus*, *Aprosmictus*, *Polytelis* and the Platycercinae (Stresmann 1966; pers. obs.).

Thompson (1899) showed that the Cockatiel, most cockatoos and the Budgerigar *Melopsittacus undulatus* differ from other parrots in having the zygomatic processes of the skull joined anteriorly to the orbital rings formed by the fused lachrymal and post-orbital processes. Examination of skulls in the collection of the British Museum (Natural History) fully confirms this (see Fig. 1 for examples).

Brereton and Immelmann quoted Thompson to the effect that *Nymphicus* shares a number of different characters of the skull with *Melopsittacus*, *Platycercus* and *Cacatua* (= *Eolophus*) *roseicapilla*. The characters shared with the last two are a partly closed (crescentic) auditory meatus and the presence of a fossa at the base of the zygomatic process. Brereton (1963) separated *Nymphicus* from the cockatoos without mentioning these characters shared with *C. roseicapilla*, although he discussed the characters it shares with the Platycercinae. In his Table 5 the characters of *Cacatua* are listed as open (rounded) auditory meatus, and fossa at base of zygomatic process absent or little developed ('stage 1'); this is misleading because *C. roseicapilla* differs from the other species of *Cacatua* in these characters (supporting other evidence for the allocation of *roseicapilla* to a monotypic genus *Eolophus* within the Cacatuinae; Holyoak 1970). These differences are shown in Figure 1.

In many cockatoos and *Nymphicus* both sexes generally incubate the eggs, but in other parrots that have been investigated only the female normally incubates (Forshaw 1969).

Brereton and Immelmann (1962) and Brereton (1963) emphasized that *Nymphicus* differs from the cockatoos in head-scratching by lifting the foot over a lowered wing (indirectly), whereas the cockatoos

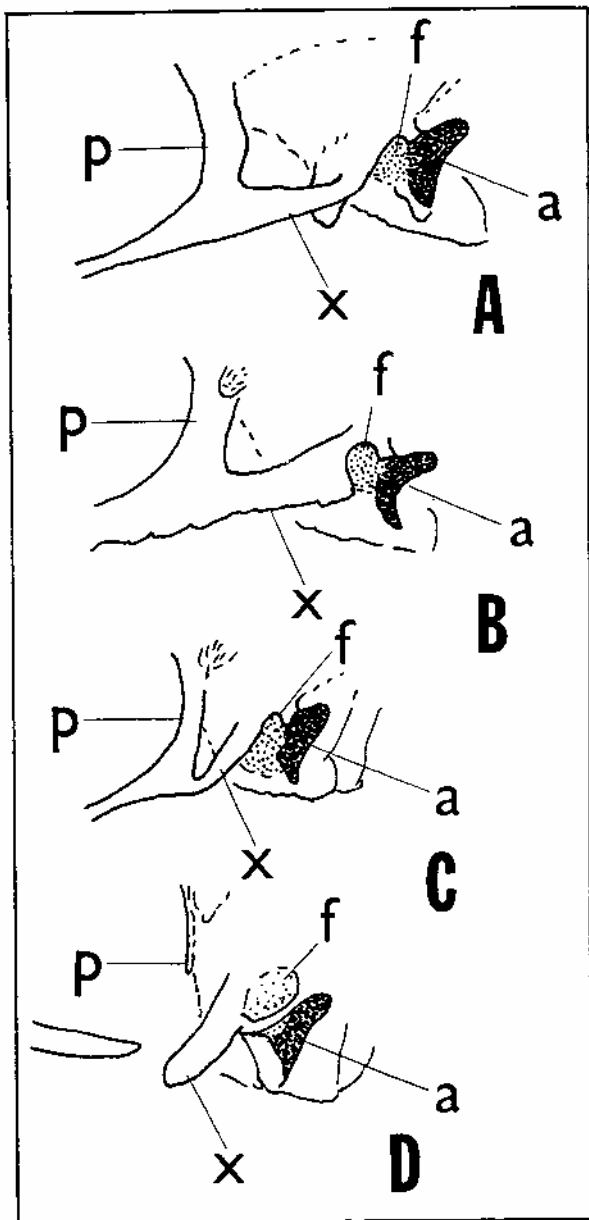


Figure 1. Sketches to show characters of the auditory region of the skull in A *Cacatua leadbeateri*, B *Eolophus roseicapilla*, C *Nymphicus hollandicus*, D *Platycercus venustus*; p post-orbital process, x zygomatic process, f fossa at base of zygomatic process, a auditory meatus.

lift the foot directly to the head. However, it is mentioned in the first of these papers that *Cacatua rosei-*

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*capilla* sometimes makes weak movements towards scratching indirectly. There is evidence that the method of head-scratching used by parrots may differ between closely related genera (e.g. *Aprosmictus* and *Alisterus*; Brereton and Immelmann 1962), and evidence of a broad correlation of the scratching method with the usual angle at which the body is held (pers. obs.). Thus, the Cacatuinae, Loriinae and *Loriculus*, with most of the New World parrots, tend to perch upright for much of the time and scratch their heads directly; on the other hand the Platycercinae, *Melopsittacus* and a few genera of terrestrial New World parrots tend to walk on the ground with the body nearly horizontal, and these scratch their heads indirectly. Observations on captive Cockatiels and eleven species of cockatoo at the London Zoo showed that the cockatoos usually perch and walk in a more upright manner than the Cockatiel. Hence, the method of head-scratching is probably not a very reliable character on which to judge the affinities of the Cockatiel.

There is little reason to suspect that the similarities between *Nymphicus* and the Cacatuinae are the result of convergence. In its feeding ecology and general behaviour *Nymphicus* is more similar to such platycercine parrots as *Psephorus* spp than to the cockatoos (Forshaw 1969), so that convergence towards various Platycercinae is to be expected.

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