

LETTER TO THE EDITOR

The Editor
Sir

Rhodes *et al.* (2009) raise some interesting points on possible evolutionary pathway(s) leading to the widespread habit of tree-cavity nesting in New Zealand land birds. However, their analysis may be distorted by a flawed coverage of the systematic extent of tree-cavity nesting (based on an outmoded classification), and by what appears to be an unnecessary, and even unevenly applied, restriction of the discussion to tree cavities. Kiwis (*Apteryx* spp.), for example, are included but often nest in non-tree cavities. The restriction to tree cavities seems arbitrary because the attributes of tree cavities that Rhodes *et al.* (2009) discuss, including microclimatic effects and protection from predation, are also manifested by holes in the ground.

The phylogenetic distribution of cavity nesting presented in their Fig. 1 does not take into account systematic and breeding site information available in the literature well before the paper's submission. For example, the status of moa (*Dinornithiformes*), and the hihi (*Notiomystis cincta*) does have implications for their discussion. Moa are excluded from the list of cavity-nesting taxa despite all moa nest sites ever investigated having been at least sheltered from above and often within what can be considered small caves, i.e. cavities with microclimates varying from the local ambient. As with kiwi, size can preclude occupation of a true "tree cavity", and certainly tree cavities above ground level but the nests were in "cavities" nevertheless. Moa – even giant moa, *Dinornis*, only 2 species (a North I/South I pair) of which have been recognised for some time (Bunce *et al.* 2003) – nested often in small caves (Hartree 1999; Haile *et al.* 2007). The evolution of these behaviours in the 2 families of these very large birds surely has relevance to any general discussion of the evolution of cavity nesting in New Zealand birds.

Further, Rhodes *et al.* (2009) exclude the 2 species of *Aptornis* from the cavity-nesters. That may be so, but their nest locations are completely unknown at present (but not necessarily unknowable in principle) and should be scored as such. Other flightless birds of the same general size, including kiwi and kakapo (*Strigops habroptilus*), nest in cavities.

Of more relevance to the use of tree cavities per se, Rhodes *et al.* (2009) accept the family Notiomystidae for the hihi but continue to place it near the honeyeaters when the authors of the change (Driskell *et al.* 2007) pointed out its relationship, albeit somewhat distant, to the Callaeatidae, which does include cavity nesters (Fig. 1). It would therefore not be an addition of another group, but an additional member of a (wider) group. In addition, the systematic position of the piopios (*Turnagra*)

has been contentious, but there is nothing in what we know about their nest sites or the structure of their nests (Potts 1882; Oliver 1955) that would ally them to either the bowerbirds (*sensu* Olson *et al.* 1983) and nothing anatomically that allies it to the Paradisaeidae (which are a different lineage from the bowerbirds anyway, ref). As Schodde & Mason (1999: 432) point out, "*Turnagra*... is pachycephalid in juvenile plumage, humeral and temporal fossae, naris, and ectethmoid plate *without* lachrymals, *pace* Olson *et al.* (1983) and Christidis *et al.* (1996)" as well as in the presence of a major proximo-caudal femoral foramen, amongst other morphological and behavioural characters (RNH, *unpubl. data*). Again, this affects the between-group/within-group comparisons.

The overall interpretation presented by Rhodes *et al.* (2009) downplays the potential effects of predation in the New Zealand terrestrial ecosystem. However, analysis of modern levels of nest predation, which can take into account only the reduced suite of avian predators and the dominance of mammalian predators (almost unknown in the past), is unlikely to represent the non-impacted evolutionary environment, given the great diminution in numbers as well as in taxa in modern systems over those of even 150 years ago and since human settlement. The authors' statement that "when historic predation levels were likely low compared to some continental habitats..." ignores the fact that the New Zealand pre-human (=evolutionary) avifauna was dominated by avian predators, and there was little or no predation pressure on closed nest sites that would oppose that of birds attacking open nests, even taking into account lizards and bats. Relative frequency is important here, as is the presence of other avian nest predators, such as kaka (Winn & Holdaway 2005), which are usually not factored into any analysis. As discussed above, it was not only small passerines that nested in cavities: taxa ranging in size from moa down, including shore plover (*Thinornis novaeseelandiae*) and South I takahe (*Porphyrio hochstetteri*) (and likely North I takahe (*P. mantelli*) nested "under cover" if not in cavities *sensu stricto*, and this habit surely needs to be taken into account in analysis of the evolution of use of enclosed nesting sites.

Yours, etc.

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