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A NEW METHOD FOR AGEING SOME SPECIES OF MELIPHAGIDAE

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A new method for distinguishing certain species of honeyeaters and chats in first immature plumage is presented. This makes use of the difference between juveniles and adults in the shape of the longest feather of the alula. First immatures with the juvenile longest feather of the alula retained can be distinguished from adults on the basis of this difference in shape.

INTRODUCTION

Passerines can be aged by a number of characteristics. Passerines fledge in juvenile plumage, which is distinguishable from adult plumage in most species (Jenni and Winkler 1994). Juveniles and immatures of many species can be distinguished from adults by one or more of the following characteristics (Palmer 1972; Rogers *et al.* 1986, 1990; Jenni and Winkler 1994): 1) plumage colouration; 2) shape of remiges or rectrices; 3) presence of natal down and structure of body feathers, body plumage often more loosely textured in juvenile; 4) presence of synchronous growth bars or synchronous fault bars in wing or tail, or both; 5) colour of bare parts; 6) extent of pneumatization of skull; 7) puffiness of gape; 8) gonadal development. The latter characteristic generally requires examination by dissection.

Passerines undergo a partial or complete post-juvenile moult within a few weeks or months after fledging (Jenni and Winkler 1994), and attain a plumage referred to as 'first immature' throughout this paper (equivalent to the plumage called 'first basic' in the terminology of Humphrey and Parkes 1959). The extent of post-juvenile moult varies according to the species, sex, time of hatching and environmental conditions (Newton 1966; Keast 1968; Norman 1981; Paton 1982; Rogers *et al.* 1986; Jenni and Winkler 1994). Early-hatched Sardinian Warblers *Sylvia melanocephala* undergo a complete or near complete post-juvenile moult, whereas late-hatched birds do not usually moult the remiges (Gauci and Sultana 1979). Similar results have been found in New Holland Honeyeaters *Phylidonyris novahollandiae* (Paton 1982). Many passerines which undergo a complete post-juvenile moult, such as the House Sparrow *Passer domesticus* and Skylark *Alauda arvensis*, attain an adult-like first basic plumage (Jenni and Winkler 1994). Some passerines which undergo a complete post-juvenile moult, such as the Common Starling *Sturnus vulgaris*, attain first immature plumage which is distinguishable from adult plumage (Williams 1991).

The majority of passerine species undergo a partial post-juvenile moult to adult-like first immature plumage (Pyle *et al.* 1997; Rogers *et al.* 1986, 1990; Jenni and Winkler 1994). First immatures may retain a varying number of juvenile remiges, rectrices, wing-coverts and body feathers (Dow 1973; Paton 1982; Rogers *et al.* 1986, 1990; Pyle 1998). In some species, juveniles are distinct and first immatures with retained juvenile feathers can often be distinguished from adults. For example, Fuscous Honeyeaters *Lichenostomus fuscus* in first immature plumage may retain some or all juvenile primaries (Rogers *et al.* 1986), which are broader and more rounded at the tip compared with adult primaries (pers. obs.). A major problem remains in identifying first immatures which replace all juvenile remiges, rectrices, wing-coverts and body feathers, and so resemble adults. In this article I outline a method for distinguishing adult-like first immatures of a number of species of Meliphagidae. The method relies on differences between juveniles and adults in the shape of the longest feather of the alula (henceforth termed the alula).

METHODS

Whilst preparing plumage accounts on passerines for the Handbook of Australian, New Zealand and Antarctic Birds, I became aware that the alula in juveniles of numerous Australian honeyeaters differed in shape from that in adults. Juvenile skins, identified by their distinct body plumage, were examined from five Australian museums, and the shape of the alula compared with that in adult-like skins. First immatures were identified by one or more of the following characteristics: 1) retained juvenile body feathers, particularly on the hindneck and rump; 2) retained juvenile remiges, rectrices or wing-coverts; 3) information from labels, such as colour of bare parts, extent of pneumatization of skull, or development of gonads. For example, yellow or orange facial skin in Bell Miners indicates immaturity (Clarke and Heathcote 1988), as does brown iris in Yellow-tufted Honeyeater *Lichenostomus melanops* (R. Allen, pers. comm.; pers. obs.).

RESULTS

Figures 1a and 1b illustrate differences in the shape of the alula and outer four primaries between adult and juvenile Bell Miners *Manorina melanophrys*. The juvenile Bell Miner has a broad alula with a distinctly rounded tip, compared with a narrower, pointed alula in the adult. Adult Bell Miners also have more pointed tips to the outer primaries compared with juveniles. A total of 43 species of Meliphagidae examined show this difference in alula shape compared with 15 species examined which do not. Examination of adult-like skins of numerous species of honeyeaters showed that at least some first immatures retained the juvenile alula.

Virtually all first immatures which retained any other juvenile feathers mentioned above also retained the juvenile

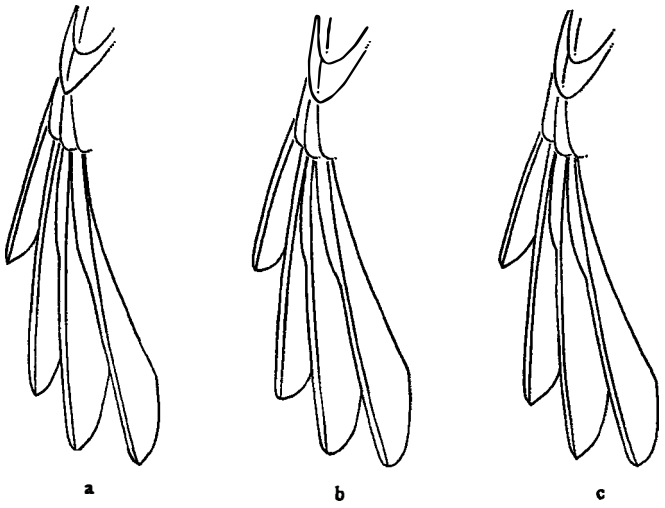

Figure 1. *Diagram showing shape of alula and primaries in Bell Miner* Manorina melanophrys. *a) Adult; b) Juvenile; c) First immature with retained juvenile alula and replaced primaries.*

alula. However, in some specimens interpreted as first immatures, all juvenile feathers were replaced except the alula. It is probable that these birds replace the juvenile alula in the second pre-basic moult, when about one year old. Figure 1c shows a retained juvenile alula, and adult-like outer primaries in an evidently first immature Bell Miner. The difference in shape between the juvenile and adult alula is pronounced in many species of Australian honeyeaters, and readily observed in the bird in the hand. The alula is therefore a potentially valuable ageing character. Of species of Meliphagidae examined, Table 1 outlines those for which juveniles and adults differ in alula shape, as well as those which show no difference in juvenile and adult alula shape. Thus it appears that the difference in alula shape between juveniles and adults applies to some but not all species of the family. No species of *Pardalotus*, *Malurus* or *Petroica* examined thus far, in families apparently related to the Meliphagidae (Sibley and Ahlquist 1985; Christidis and Schodde 1991), show this difference between juveniles and adults.

TABLE 1

Comparison of juvenile and adult alula shapes for species of Meliphagidae so far examined.

Juvenile and adult alula differs	Juvenile and adult alula similar
Red Wattlebird *Anthochaera carunculata*	Spiny-cheeked Honeyeater *Acanthagenys rufogularis*
Little Wattlebird *Anthochaera chrysoptera*	All species of *Melithreptus*
Helmeted Friarbird *Philemon buceroides*	Brown Honeyeater *Lichmera indistincta*
Silver-crowned Friarbird *Philemon argenticeps*	Crescent Honeyeater *Phylidonyris pyrrhoptera*
Noisy Friarbird *Philemon corniculatus*	Tawny-crowned Honeyeater *Phylidonyris melanops*
Little Friarbird *Philemon citreogularis*	Red-headed Honeyeater *Myzomela erythrocephala*
Blue-faced Honeyeater *Entomyzon cyanotis*	Scarlet Honeyeater *Myzomela sanguinolenta*
Bell Miner *Manorina melanophrys*	Brown-backed Honeyeater *Ramsayornis modestus*
Noisy Miner *Manorina melanocephala*	Bar-breasted Honeyeater *Ramsayornis fasciatus*
Yellow-throated Miner *Manorina flavigula*	Black Honeyeater *Certhionyx niger*
Black-eared Miner *Manorina melanotis*	
Lewin's Honeyeater *Meliphaga lewinii*	
White-lined Honeyeater *Meliphaga albilineata*	
Bridled Honeyeater *Lichenostomus frenatus*	
Eungella Honeyeater *Lichenostomus hindwoodi*	
Yellow-faced Honeyeater *Lichenostomus chrysops*	
Singing Honeyeater *Lichenostomus virescens*	
Varied Honeyeater *Lichenostomus versicolor*	
White-gaped Honeyeater *Lichenostomus unicolor*	
Yellow Honeyeater *Lichenostomus flavus*	
White-eared Honeyeater *Lichenostomus leucotis*	
Yellow-throated Honeyeater *Lichenostomus flavicollis*	
Yellow-tufted Honeyeater *Lichenostomus melanops*	
Purple-gaped Honeyeater *Lichenostomus cratitius*	
Grey-headed Honeyeater *Lichenostomus keartlandi*	
Yellow-plumed Honeyeater *Lichenostomus ornatus*	
Grey-fronted Honeyeater *Lichenostomus plumulus*	
Fuscous Honeyeater *Lichenostomus fuscus*	
Yellow-tinted Honeyeater *Lichenostomus flavescens*	
White-plumed Honeyeater *Lichenostomus penicillatus*	
New-Holland Honeyeater *Phylidonyris novaehollandiae*	
White-cheeked Honeyeater *Phylidonyris nigra*	
White-fronted Honeyeater *Phylidonyris albifrons*	
Rufous-banded Honeyeater *Conopophila albogularis*	
Rufous-throated Honeyeater *Conopophila rufogularis*	
Eastern Spinebill *Acanthorhynchus tenuirostris*	
Western Spinebill *Acanthorhynchus superciliosus*	
Pied Honeyeater *Certhionyx variegatus*	
Dusky Honeyeater *Myzomela obscura*	
Crimson Chat *Epthianura tricolor*	
Yellow Chat *Epthianura crocea*	
White-fronted Chat *Epthianura albifrons*	
Gibberbird *Ashbyia lovensis*	

DISCUSSION

This paper records differences in the shape of the juvenile and adult alula in numerous species of Meliphagidae, enabling at least a proportion of first immatures to be distinguished from adults. For these species, it is not known if some individuals replace the alula in the post-juvenile moult. Most species of European passerines do not replace the alula in the post-juvenile moult (Jenni and Winkler 1994). There are exceptions, such as the Lesser Whitethroat *Sylvia curruca* which replaces the two shortest feathers of the alula, and Blue Tits *Parus caerulus*, 70 per cent of which moult all three feathers of the alula in the post-juvenile moult (Jenni and Winkler 1994). Dhondt (1973) found that a lower proportion of late-hatched Great Tits *Parus major* moult the alula compared with early-hatched birds, a proportion that is also greater in males than females (Jenni and Winkler 1994). Capture/recapture studies currently in progress at Weddin Mountains National Park, New South Wales, are aimed at determining the proportion of juveniles replacing the alula in the post-juvenile moult. The use of alula shape as an ageing character for field studies will be discussed in a forthcoming paper.

The functional relevance of these observations is not yet clear. The fact that juveniles of certain species of Meliphagidae have a broader alula compared with adults is unusual as many juvenile non-passerines have narrower feathers compared with adults (Higgins 1999). Craig (1984) indicates that adult Bellbirds *Anthornis melanura* (Meliphagidae) have pointed tips to the outer primaries whereas juveniles have rather rounded tips to these feathers. This observation is consistent with the findings presented above. The morphology of the outer primaries apparently affects wing noises and aggression in certain honeyeater species (Craig 1984), but it is not known if alula shape plays any role. The taxonomic relevance of the observations presented above are not yet clear. No species of *Melithreptus* show a difference in alula shape between juveniles and adults. Within the genus *Myzomela*, the sexually monomorphic Dusky Honeyeater *Myzomela obscura* shows a clear difference between juvenile and adult alula shape, but the sexually dimorphic Red-headed *M. erythrocephala* and Scarlet Honeyeaters *M. sanguinolenta* do not. Further examination of honeyeaters from Australia, New Guinea and Wallacea is required to assess the taxonomic relevance of differences between juvenile and adult feather shapes.

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