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MOULT IN CAPTIVE REGENT HONEYEATERS *Xanthomyza phrygia*

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INTRODUCTION

The Regent Honeyeater *Xanthomyza phrygia* is an endangered species that has caused great concern in recent years due to its sharp decline in abundance (Menkhorst *et al.* 1999). Although a number of studies have been conducted on the biology and behaviour of this species (Franklin *et al.* 1989; Webster and Menkhorst 1992; Oliver 2000), there is very little data available describing its moult (Higgins *et al.* 2001). In most species with seasonal movements, moult typically precedes movements (Ginn and Melville 1983). Therefore, the moulting patterns of this species may be of particular interest, as knowledge on the timing of moult may indirectly aid in understanding the timing of the birds' seasonal movements. In this study, the sequence of post-breeding moult in captive adult and immature Regent Honeyeaters is documented. It was also determined when moult was completed, and whether immature birds moulted on a similar timescale to adults.

METHODS

Feather replacement and condition were recorded for ten captive bred Regent Honeyeaters at Taronga Zoo, Sydney, between 12 March and 9 August 2002, in order to assess moult. The birds had fledged between 1995 and 2001 and were all parent-reared at the zoo. The study birds consisted of equal numbers of males and females, with six out of the ten birds being adults, whilst four were immature birds less than one year old. Four immature birds and four adult birds originated from parental stock from the Capertee Valley, New South Wales, while the two remaining adult birds were bred from a parent of Capertee Valley origin and a parent from the Chiltern area of north-eastern Victoria. The age of each primary, secondary, tertial and rectrix feather was scored according to Ginn and Melville (1983) and Lowe (1989), on a scale of 0 (old feather) to 5 (fully grown new feather).

RESULTS

Moult recording began on 12 March 2002. At this stage, five of the birds (three adults and two juveniles) had completed moult while three adults and two immature birds were still replacing feathers at this time. Active moult in the adult birds was evident until 9 April 2002, with all individuals undergoing a complete moult. All immature birds showed an interrupted moult, with moulting activity continuing until 2 April 2002. No active moult was recorded between 9 April and 9 August 2002 (completion date of the study).

At the commencement of recording all adult birds had fully replaced tertials and rectrices, suggesting that the replacement of these feathers is concluded prior to the completion of primary and secondary moult. The later stages of progression of primary and secondary moult were recorded in three adults. Based on the recordings, it was evident that replacement of primary feathers was progressing outwards, while replacement of secondary feathers was progressing inwards.

Active moult or presence of new primary or secondary feathers was not present in any of the immature birds. On 12 March 2002, three birds had completely replaced tertials. The fourth bird had completed moult of tertials on the left wing, yet on the right wing only the second tertial was replaced. Moult of rectrices was present in three of the birds, with one bird replacing the inner four tail feathers, while the remaining two birds had replaced only the inner two rectrices, suggesting that these feathers were moulted in a 'centrifugal' pattern. The immature male, that demonstrated the most progressed moult of the four birds, was the first of the four birds to hatch (4 September 2001) and the last to arrest moult. The remaining three sibling females all hatched on the same date (18 October 2001) and were at a similar stage of moult with one lagging slightly behind. At the completion of the study (9 August 2002), moult had not recommenced.

DISCUSSION

Moulting of primary feathers, secondary feathers and rectrices in Regent Honeyeaters appears to follow the 'basic sequence', which is common amongst Australian honeyeaters (Dow 1973; Paton 1982a; Franklin *et al.* 1999). Replacement of tertials was completed for adult birds prior to the beginning of this study. From the moult of the immature birds though, it appears that the middle tertial may be the initial tertiary feather replaced. Unfortunately, as the study began late during the moulting period, it was not possible to record when moult commenced or its total duration.

Active moult continued until early April in some individuals, with half of the birds still moulting during early March. This finding concurs with previous estimates of moult completion in this species (Higgins *et al.* 2001). A similar timing in the completion of moult has been found in the New Holland Honeyeater *Phylidonyris novaehollandiae* (Ford 1980; Paton 1982a). The timing of moult completion has particular importance in the Regent Honeyeater due to the lack of knowledge on the movements of this species once they leave recognized breeding areas (Cooke and Munro 2000). The finding that Regent Honeyeaters are still moulting in March and early April might suggest that this species does not move large distances prior to this time, due to the high-energy requirements of moult. This is consistent with observations in the Capertee Valley, New South Wales, which is a recognized breeding area for this species. Here the birds move only a small distance into

surrounding rocky escarpment areas after initially disappearing from immediate breeding areas and prior to leaving the region (Geering 2001).

All immature birds in this study underwent a partial moult, despite having access to abundant food. It is possible that the interruption of moult in immature captive Regent Honeyeaters is controlled endogenously, as seasonal trends in other variables such as body condition and food consumption, have demonstrated evidence of endogenous control in this species (Munro and McFadden 2005). Moult was ceased at various stages amongst the four individuals. There is currently very little data on interruption of moult in immature Regent Honeyeaters (Higgins *et al.* 2001). This may be because moult is arrested during March and April, which is at a time when wild birds have already left the key breeding areas (Cooke and Munro 2000). Hence, immature birds would not be observed for months after the moult has been arrested, by which time the replaced feathers may appear worn.

Incomplete moult of immature birds has been recorded in other Australian honeyeater species, including the New Holland Honeyeater (Paton 1982b) and the Helmeted Honeyeater *Lichenostomus melanops cassidix* (Franklin *et al.* 1999). Franklin *et al.* (1999) found that the time of hatching has a large influence on the moult in first-year Helmeted Honeyeaters, with those hatching later in the season either deferring or arresting moult. Three of the immature birds in this study hatched on the same date and were at a similar stage of moult when it was arrested, whilst the remaining bird hatched over a month earlier and was further into moult before arresting it. This may indicate that hatching date may also influence the progress of moult in immature Regent Honeyeaters. The hatching dates of the captive immature birds are similar to those of wild birds (Ley and Williams 1994), implying that wild immature birds may reach a similar stage of feather replacement.

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