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Ageing and Moult Variations in Mistletoebirds

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Three age classes of Mistletoebirds *Dicaeum hirundinaceum* are defined and data are presented which allow most Mistletoebirds to be separated by plumage characteristics into one of these age classes. Most (30 of 44 = 68%) male Mistletoebirds shed the tertial flight feathers and the greater, median and lesser coverts of the wing during post-juvenile moult. The remaining birds showed a variety of moult patterns.

Methods

Mistletoebirds are seasonally plentiful at Cowiebank (26°58′S., 153°04′E.), some 11 km east of Beerburrum, south-eastern Queensland (Liddy 1982), and 254 birds were handled a total of 303 times during the eight years to July 1983 while carrying out banding* activities. These notes are based on descriptions of these birds and the following definitions of age classes are used:

Juvenile: from fledging until completion of the post-juvenile moult.

Immature: from completion of the post-juvenile moult until completion of the first full (meaning post-nuptial) moult.

Adult: after completion of the first full moult.

There is a marked difference in the colour of the juvenile and immature feathers of the upper wing of most immature male Mistletoebirds and the age of each feather is readily determined. The ages of the feather tracts of the upper wing were recorded for 44 immature male Mistletoebirds at Cowiebank between October 1977 and July 1983. Some birds carried a mixture of juvenile and immature feathers in some tracts, and the ages of individual feathers in these tracts were recorded. Both wings were examined and the ages of individual feathers of each wing were recorded if there were differences between the wings. Feather nomenclature follows Snow (1967) except the greater coverts are divided into "secondary coverts" (the outer two-thirds of the greater covers) and "tertial coverts" (the inner third of the greater coverts).

* Bands used were provided by the Australian Bird-banding Scheme, Division of Wildlife and Rangelands Research, CSIRO.

Results

Adult

The sexually dimorphic plumages of adult mistletoebirds are amply described and illustrated in recent standard publications (e.g. Macdonald 1973; Slater 1974; and Pizzey 1980). The female illustrated in Slater (1974) shows a scarlet base to the lower mandible, indicating a juvenile bird, but the scarlet undertail coverts are much too dark for a juvenile. The female illustrated in Macdonald (1973) is far paler than any bird handled at Cowiebank.

Juvenile

The juvenile plumage is acquired in the nest and is retained until the post-juvenile moult. The juvenile plumage of both sexes resembles that of the adult female, except that both mandibles, oral flange and the interior of the mouth are orange coloured.

The post-juvenile moult is characterized by active moult of the body and some coverts of the wing and tail. This moult evidently commences very soon after fledging and Mistletoebirds have not been handled at Cowiebank prior to the commencement of this moult. Birds can be sexed as soon as the first immature feathers appear and it was possible to sex all juveniles handled at Cowiebank.

Slater (1974) stated that immature (meaning juvenile) birds lack the pink (meaning pale scarlet) undertail coverts of the adult female. All juvenile birds handled at Cowiebank had pale scarlet undertail coverts.

The colours of the mouth parts change during and after the post-juvenile moult. The tip of the upper mandible changes first, to horn colour, and the whole mandible changes likewise; the

lower mandible changes colour more slowly. The upper mandible and tip of the lower mandible slowly darken to horn-grey. The base of the lower mandible changes from orange of fleshy-pink and later to creamy-grey. The orange colours of the interior of the mouth fade and change successively through mixtures of orange and pink, to pink with orange tinges, and then to pink.

Immature

At completion of the post-juvenile moult, immatures of each sex superficially resemble the adults ,although most immatures can be readily separated from adults when examined in the hand (Table 1). The claim by Heumann (1926) that the "gorgeous red and pure steel-blue comes only after several years of moult" is without foundation; these colours are attained during the post-juvenile moult.

During the post-juvenile moult, most Mistletoebirds shed the tertial flight feathers, and the greater, median and lesser coverts of the upper wing, but there is appreciable variation in the patterns of moult of the wing feathers (Table 2). Juvenile feathers of the upper wing are grey-brown in colour. For males these are replaced during the post-juvenile moult by the much darker immature feathers which appear to be identical to adult feathers. These are blackish-brown on the larger, inner vane and semi-glossy blue-black on the smaller, outer vane of the larger flight feathers, and are mostly glossy blue-black for the smaller wing feathers. On completion of this moult, the wings of most male Mistletoebirds thus display a markedly contrasting pattern of grey-brown juvenile feathers and glossy blue-black immature feathers, and most immature male Mistletoebirds are readily recognised upon in-hand examination.

There is much less contrast between the colours of juvenile and immature wing weathers of females. The grey-brown juvenile coverts are replaced by semi-glossy blue-grey feathers, and the smaller, outer vanes of the immature larger flight feathers are bluish-grey. Most immature females can thus be recognised by the differences in the colours of tracts of grey-brown juvenile and bluish-grey immature feathers of the upper wing.

During immaturity and early adulthood, the top mandible and tip of the lower mandible of males gradually darkens to dark grey and then to black, while the colour of the base of the lower mandible darkens from creamy-grey to dark grey. The interior of the mouth gradually darkens from pink to blackish-pink. The base of the lower mandible of females remains creamy-grey, and the interior of the mouth remains pink, throughout adulthood. The upper mandible

TABLE 1

Plumage sequences of aged Male and Female Mistletoebirds at Cowiebank

	Male			Female		
	Juvenile	Immature	Adult	Juvenile	Immature	Adult
Mandibles	Orange	Grey	Black	Orange	Horn-grey	Dark horn-grey
Interior of mouth	Orange	Pink	Blackish-pink	Orange	Pink	Pink
Upper parts	Grey-brown	Glossy blue-black	Glossy blue-black	Grey-brown	Grey-brown	Grey-brown
Throat and Upper breast	Off-white	Scarlet	Scarlet	Off-white	Off-white	Off-white
Upper wing	Grey-brown	Variable mixture of grey-brown and glossy blue-black feathers	Glossy blue-black coverts and blue black flight feathers	Grey-brown	Variable mixture of grey-brown and blue-grey feathers	Semi-glossy blue-grey coverts and bluish-grey flight feathers
Under tail coverts	Pale scarlet	Scarlet	Scarlet	Pale scarlet	Darker pale scarlet	Darker pale scarlet

and tip of the lower mandible of females darkens to the dark horn-grey of adults.

The typical plumages of Mistletoebirds of the three age groups of each sex are summarized in Table 1.

About one quarter of females handled at Cowiebank displayed a faint but distinctive dark crimson or maroon tinge to the upper-tail coverts, and some birds also had a similar tinge to the greater coverts. This maroon tinge occurs in both adult and immature birds and is thus not age related.

One male Mistletoebird handled in July 1980 showed immature feathers for all tracts of feathers of the upper wing but had the interior of the mouth coloured orange-pink. This last seems a reliable indicator of immaturity in Mistletoebirds. This bird evidently had moulted all of the upper wing feathers during the post-juvenile moult. Such birds are recognisable as immatures only while they retain the orange colouration of the interior of the mouth. It is possible that some birds handled at Cowiebank were immatures which had moulted all feathers of the upper wing and had lost the orange colouration of the mouth; such birds would not be recognised as immatures and would be classified as adults.

The ages of the wing feathers of the 44 immature males are summarized in Table 2, which considers only those birds which had completed the post-juvenile moult. Completion of this moult was assumed if all flight feathers were present and fully grown, and if body moult or moult of the upper wing or undertail coverts could not be found.

Table 2 is arranged to show generally increasing proportions of immature feathers from top to bottom, but the relative positions of several groups are arbitrary. The ages of individual feathers in some tracts are shown for both wings where these differed.

Group F of Table 2 contains 30 (68%) of the 44 immature Mistletoebirds examined. This group shows the normal post-juvenile moult of the birds, with the tertial flight feathers, and the secondary, tertial, median and lesser coverts moulted.

The birds of Groups G to L moulted additional feathers. These additional feathers appear to be added in a set sequence, viz. alula (two

TABLE 2

Ages of wing feathers of immature male Mistletoebirds at Cowiebank, south-eastern Queensland

Plumage group	Numbers of birds	Primaries	Secondaries	Tertials	Primary coverts	Secondary coverts	Tertial coverts	Alula	Median coverts	Lesser coverts
A	1	J	J	J	J	J*	I	J	I	I
B	1	J	J	J	I**	I	I	J	I	I
C	2	J	J	I	J	Outer J Inner I	I	J	Outer J Inner I	I
D	1	J	J	I	J	Outer J Inner I	I	I	I	I
E	3	J	J	7J, 8I, 9J	J	I	I	J	I	I
F	30	J	J	I	J	I	I	J	I	I
G	2	J	J	I	J	I	I	I	I	I
H	1	J	R. 1-4J, 5I, 6J L. 1-6J	I	J	I	I	I	I	I
J	1	J	R. 1I, 2-4J, 5-6I L. 1I, 2-4J, 5-6I	I	J	I	I	I	I	I
K	1	J	I	I	J	I	I	I	I	I
L	1	I	I	I	J	I	I	I	I	I

J = juvenile feather/s I = immature feather/s R = right wing L = left wing.
* All feathers juvenile except immature first covert on left wing
** All feathers immature except juvenile third covert on right wing

birds of Group G), then portion of the secondary flight feathers (two birds of Groups H and J), then all secondary flight feathers (bird of Group K3). The single bird of Group L had moulted all upper wing feathers and was discussed previously.

Some immature Mistletoebirds retain juvenile feathers normally shed during the post-juvenile moult. There does not appear to be any sequential pattern involved for the additional tracts retained. Thus the three birds of Group E retained tertial feathers 7 and 9, while the two birds of Group C retained part of the secondary coverts and part of the median coverts. The single bird of Group A replaced only the median, lesser and tertial coverts during the moult.

Finally, two birds retained some feathers normally shed during the post-juvenile moult and simultaneously shed other feathers normally retained (see Table 2). Thus the bird of Group D shed the feathers of the alula but retained feathers of the inner half of the secondary coverts. The bird of Group B shed the primary coverts but retained the tertials.

Discussion

Male Mistletoebirds thus show considerable variation in the degree of the moult of the upper wing feathers during the post-juvenile moult. It is assumed that these variations are largely due to the time of the year at which the birds fledged, but there are no data to support this. It is possible that the degree of moult of the wing feathers is also influenced by the types and abundance of food available to the bird at the nestling and fledgling stages.

The post-juvenile moult of female Mistletoebirds appears to follow patterns similar to those shown by the males, but there is insufficient contrast between juvenile and immature feathers of females to allow individual feathers to be reliably aged. Other species of birds handled in significant numbers at Cowiebank do not have juvenile and immature feathers of markedly contrasting colours which would allow individual feathers of the upper wing to be aged. It is thus not known if other species present at Cowiebank show variations in the extent of the post-juvenile moult of the wing feathers similar to that shown by the male Mistletoebird.

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