TECHNIQUES

THE USE OF PLUMAGE FEATURES RESULTING FROM A PARTIAL POST-JUVENILE MOULT IN AGE DETERMINATION OF SOUTHERN AFRICAN PASSERINES

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Little information is currently published on age determination of southern African birds based on plumage features after the post-juvenile moult. Underhill's (1994a) review of papers on ageing and sexing published in *Safring News* does not contain any articles that used this aspect though two papers (Herholdt & Earlé, *Safring News* 16: 99-100 and Barnard & Dowsett, *Safring News* 20: 69-70) mention partial post-juvenile moults in Anteater Chats and Forest Canaries respectively. However, information on features resulting from a partial post-juvenile moult (such as given on pp.13-14) is essential if we are to produce the much needed (Underhill 1993, 1994a, 1994b) 'comprehensive guide on ageing of southern African passerines'.

Most young passerine birds in the world undergo a partial post-juvenile moult in the course of their first year of life, during which only the 'body feathers' are replaced, but not the remiges or rectrices. During a partial post-juvenile moult, many species replace a number of coverts in the wing proximal to the body, while the outer coverts are retained from the juvenile plumage. In many cases the new feathers are different in colour, shape, length and/or structure and this creates a (sometimes striking) contrast between the inner series of new feathers and the outer series of old coverts. This feather contrast is most easily detected in the greater upperwing coverts if an inner series of feathers has been renewed while an outer series is retained from the juvenile plumage (see Figures 1 & 3), but it can also occur between renewed median coverts and old greater coverts, new inner coverts (median or greater) and old distal coverts (carpal or primary), or within the alula feathers. Obviously, juvenile birds that renew all coverts in the wing during a complete moult cannot be distinguished from adults any more on the plumage contrast criterion.

In Europe, such contrast features in the wing resulting from a partial post-juvenile moult are currently the most widely used plumage criteria for the age determination of passerines (Svensson 1992; Jenni & Winkler 1994). For many species, extensive documentation on the extent of the post-juvenile moult has been published (see reviews in Ginn & Melville 1983; Svensson 1992; Jenni & Winkler 1994), sometimes accompanied by magnificent colour illustrations (Karlsson *et al.* 1985, 1986a, 1986b; Jenni & Winkler 1994). In the northern hemisphere, the feather contrast criterion can normally be used for the ageing of first year birds from the post-juvenile moult during late summer onwards till the first complete post-breeding moult almost one year later, except in species where a new contrast resulting from a partial pre-breeding moult may complicate matters.

In order to use feather contrasts from the post-juvenile moult correctly, it is essential that the moult cycles of the species involved are known. Moult in southern African birds is incompletely documented (Craig 1983), but it can be assumed that – except for some larks, bulbuls, starlings, sunbirds, Ploceidae and several species of Estrildidae which undergo a complete post-juvenile moult – most southern African passerine birds undergo only a partial post-juvenile moult. Compared to Europe, the situation is further complicated in the tropics and subtropics, because some

species have a longer breeding season (some breed almost throughout the year), and moulting is not always restricted to a well defined period. Many species also undergo a partial pre-breeding moult in southern Africa, which further restricts the time-span that plumage features from the post-juvenile moult are indicative of the bird's age.

During regular ringing activities in south-eastern Botswana from 1991-1995, notes on the extent of post-juvenile moult and any resulting clear wing covert contrast were routinely taken. Several species did qualify for the use of the feather contrast method as a criterion of age determination during the first year of life (Table 1). In the Whitethroated Robin, Cape Robin, Fiscal Flycatcher, Olive Thrush, Kurrichane Thrush and Crimson-breasted Shrike, the juvenile greater upperwing coverts have a pale (brownish) tip, and they contrast sharply with the renewed inner feathers which are more brightly coloured and uniform. In the male Shorttoed Rock Thrush, the new inner greater upperwing coverts are grey while the juvenile outer series is rusty brown. In the Black Flycatcher, Forktailed Drongo, Pied Barbet, Crested Barbet, Tit-babbler and Chinspot Batis, there is clear contrast between the jet-black (or more bright blue-grey) new greater upperwing coverts and the paler, rather brownish (or more slaty) old outer coverts.

Age determination in Marico Flycatchers is somewhat more tricky: there is a contrast between old (juvenile) greater upperwing coverts which have a triangular pale brown spot near the tip and new coverts which have a small pale edge to the tip of the feather. In the Barred Warbler, the old coverts have a thin pale edge while the new have a larger triangular spot.

However, during the breeding season, several adult Marico Flycatchers (>1 year old based on recaptures) still showed contrast between two series of pale edged feathers which were

Figure 1. Conspicuous contrast in wing coverts: male Steelblue Widowfinch *Vidua chalybeata*. Partial moult from female-type non-breeding plumage to male breeding plumage. Outer greater wing covert old, 2–5 new, 6–8 old, 9 new, inner old; inner two secondaries (S5–S6) new, outer tertial (S7) old, middle tertial (S8) new, inner tertial (S9) old. These differences result from pre-breeding moult and **cannot** be used for ageing.

Figure 2. Example of notable contrast in the wing coverts of a partially moulted first year Sabota Lark *Mirafra sabota*. Three outer greater wing coverts retained from juvenile plumage (much shorter and with less prominent pale edges), inner 6 new; inner secondary (S6) and outer tertial (S7) new; median coverts new; smaller two alula feathers new, larger one old.

in a different stage of wear and bleaching. This presumably resulted from a partial pre-breeding moult. A good contrast between old and renewed greater upperwing coverts occasionally occurs in first year Masked Weavers (Herremans 1994), but most birds develop a striking contrast during the partial pre-breeding moult, which renders the criterion very unreliable for ageing. Diederik and Klaas's Cuckoos were also caught with sharp contrast between old outer greater upperwing coverts and new inner coverts, but this could also have resulted from a partial pre-breeding moult.

Palearctic larks undergo a complete post-juvenile moult, including remiges and rectrices (Svensson 1992), but several southern African

Table 1. Some passerine and near passerine birds caught in southeastern Botswana in which age determination was based on plumage features resulting from a partial post-juvenile moult. Names follow Maclean (1993).

Species		Number of retained juvenile outer-greater wing coverts (*)
Pied Barbet	*Tricholaema leucomelas*	9(mc), 9, 7,6, 4, 1, 0, 0 (pc)
Crested Barbet	*Trachyphonus vaillantii*	9, 6, 5, 3
Sabota Lark	*Mirafra sabota*	3
Forktailed Drongo	*Dicrurus adsimilis*	3
Kurrichane Thrush	*Turdus libonyana*	4, 1
Olive Thrush	*Turdus olivaceus*	5, 5
Shorttoed Rock Thrush	*Monticola brevipes*	7, 4, 3
Cape Robin	*Cossypha caffra*	4
Whitethroated Robin	*Cossypha humeralis*	3, 3, 3, 3, 2, 2, 2, 2, 1
Whitebrowed Robin	*Erythropygia leucophrys*	9(mc), 7, 6, 5, 4, 2, 2, 1, 1, 0 (pc)
Titbabbler	*Parisoma subcaeruleum*	6, 2, 2, 1, 1, 1, 0, 0 (pc)
Longbilled Crombec	*Sylvietta rufescens*	5
Burntnecked Eremomela	*Eremomela usticollis*	2, 2
Barred Warbler	*Calamonastes fasciolatus*	9, 8, 5
Rattling Cisticola	*Cisticola chiniana*	5, 4
Black Flycatcher	*Melaenornis pammelaina*	7, 5
Marico Flycatcher	*Melaenornis mariquensis*	7, 2, 1, 0 (pc)
Fiscal Flycatcher	*Sigelus silens*	7, 5
Chinspot Batis	*Batis molitor*	5, 3, 2, 0, 0, 0 (pc)
Crimsonbreasted Shrike	*Laniarius atrococcineus*	7, 6, 5, 5, 4, 2, 1, 1, 1
Masked Weaver	*Ploceus velatus*	3, 2, 1
Blackcheeked Waxbill	*Estrilda erythronotos*	7, 5, 5, 4, 4, 4, 2, 1, 0, 0 (pc)
Yelloweyed Canary	*Serinus mozambicus*	6, 5, 3, 3, 2, 2, 1

(*) passerines have 10 greater upperwing coverts, but only the larger outer 9 are considered here.
0 (pc): all greater wing coverts new, but contrasting with old primary coverts.
9 (mc): all greater wing coverts old, but contrasting with new median coverts.

larks appear to have only a partial post-juvenile moult (Willoughby 1971; Craig 1983). A juvenile Sabota Lark was caught in January 1995 with the three outer primaries eccentrically moulted and nearly full-grown, while two inner secondaries had also been replaced. There was also a clear contrast in the greater upperwing coverts: three outer coverts were retained from the juvenile plumage while the inner six were new and differed in size, shape and colour (Figure 2).

There is certainly a wide range of species in southern Africa, particularly among the Paridae, Turdidae, Sylviidae, Muscicapidae, Motacillidae, Laniidae and Malaconotidae and Fringillidae, in which plumage features resulting from a partial post-juvenile moult can easily and reliably be used for the identification of first year birds. Ringers can contribute substantially to our knowledge of the extent of the post-juvenile moult and the reliability of the resulting criteria for ageing. As in the northern hemisphere (see reviews in Ginn & Melville 1983; Jenni & Winkler 1994), it is very likely that the extent of post-juvenile moult varies further according to geographical region, sex, year (*viz.* rainfall and food-supply), brood (early or late) and possibly also habitat as well as more complex and subtle aspects (including 'quality' and dominance). It is particularly at this level of detail that ringers can provide invaluable information.

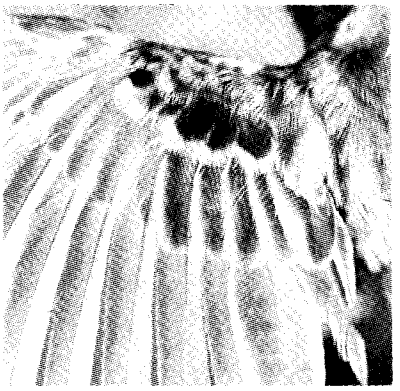

Figure 3. Contrast in the wing coverts of a partially moulted first year Yelloweyed Canary. Outer five greater wing coverts retained from juvenile plumage (shorter, worn, paler with less conspicuous fringes), inner five renewed. Outer tertial (S7) new.

At species level, substantial information on the extent of the post-juvenile moult and its usefulness for age determination can easily be obtained from museum specimens (see Svensson 1992) and such a review is long overdue for (southern) African birds.

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