

Afrotropical Bird Biology

Journal of the Natural History of African Birds

Vol 4

Plumage maturation, ageing and moult of the Southern Pied Babbler *Turdoides bicolor*

Ursula Bryson¹  and Dane M. Pajmans²

¹ Research Associate, The FitzPatrick Institute of African Ornithology, University of Cape Town, South Africa
Becker-Gundahl-Str. 8, 81479 Munich, Germany.

email: ursula@thomas-bryson.de

² 22 Elizabeth Street, Hobart, Tasmania, 7000, Australia.

email: d.pajmans@gmail.com

Abstract

Bird ringing allows close contact with different species and allows one to observe details that are impossible to see when viewed from a distance. In this study, we offer indicators for determining the age of Southern Pied Babblers *Turdoides bicolor*, specifically changes in plumage and the colour of the eye, bill, and gape. We reveal the developmental progression from juvenile to adult-like characteristics, typically occurring within 4–6 months. Additionally, we present moult data gathered from 24 individuals in Namibia, shedding light on the replacement of feathers and timing of complete moult events from this region. Understanding these age-related changes provides valuable insights into this species' life history and ecology.

Keywords: bird ringing, age determination, Namibia, moult patterns, plumage development, life history.

Introduction

Rainfall in the arid regions of southern Africa, and in similar habitats elsewhere in the world, influences food availability and is a well-known stimulus for bird breeding (Lloyd 1999). However, rainfall in arid regions is highly erratic and unpredictable, and as such, there exists tremendous variability in where, when, and how much rain an area receives (Lloyd 1999, Dean et al. 2009). Birds in these areas usually exhibit a degree of flexibility regarding their breeding. They may breed opportunistically at any time of the year when favourable conditions are present after enough rainfall (Dean et al. 2009, Mashao et al. 2015). Due to the spatiotemporal variability of rainfall in arid regions, the breeding season typically stretches over several months. Such an extended breeding season often results in a mixture of individuals of different ages and stages of plumage development in a given area. It is essential for scientists and bird ringers to determine a bird's age as precisely as possible, e.g., for identification, studies of moult strategies, and recruitment to name a few, and an understanding of plumage development and ageing criteria is sorely needed for many species in southern Africa.

Most passerines become sexually mature towards the end of their first year of life when they begin to tune into the annual cycle of the adults. Birds less than one year of age are generally considered to be immature. Certain features like residual juvenile feathers, clearly visible gape flanges, eye colour, and the colour of the palate and mouth lining, among others, all give clues about the age of an (almost) adult-looking bird. In this note, we indicate, with photographic evidence, the changes that occur in Southern Pied Babblers *Turdoides bicolor* during their first year. We also present the results of moult recorded in 24 Southern Pied Babblers during our research. Biometric data for the same 24 individuals were published in Pajmans and Bryson (2023). Unless specified otherwise, the authors took all the photographs in Namibia.

Juveniles (nestlings and fledglings)

Plumage

The first (juvenile) plumage is dull brown above and slightly paler ash-brown below (Figures 1a and b; Fry 2000). Typical of juvenile plumage, these feathers are characterised by their soft and 'fluffy' texture. Some

primaries show buffy tips (Figures 1b). In common with other passerines, the juvenile rectrices are sharply pointed (Figures 2a and b) compared to the rounded ones of adults (Figure 6).

Bare parts

The gape flange of a nestling and recently fledged juvenile is bright orange-yellow, the eyes are dark brown, the bill has a dark horn colour, and the colour of the mouth

lining is bright orange (Figures 1a and b, 3, and 4; Fry 2000). The colour of the eyes, bill, gape, and mouth lining changes during the first year, mainly in the first months after fledging, i.e., during the partial post-juvenile moult. The eye colour starts to change from dark brown to muddy olive-brown over the next few months. By the time the adult-like plumage is attained, it has a yellowish tinge (Figure 5). The bill gets darker from the tip towards its base, and the colour of the mouth lining becomes progressively darker until it is all black in the adults. The gape flange initially changes from bright yellow to a pale pinkish-white colour, and then it gets progressively darker before reaching the full black state of adults (Figure 5).



a



b

Figure 1a) Nestling of 11 days with dark eyes, yellow gape flange, and some feathers on the head still growing (© Amanda Ridley).
b) A recently fledged Southern Pied Babbler with a short tail, pale yellowish gape flange, and pale tips to the primaries (February 2010, © Alex Thomson).



a



b

Figure 2. First-year Southern Pied Babbler in post-juvenile moult (Omaruru, Namibia, December 2021). a) Front view of the ash-brown plumage with white patches of adult plumage appearing on the cheeks, the flanks, the legs, and as a faint supercilium; note the buff fringes on the chest and the pointed rectrices ([ML398747071](#), © Graham Gerdeman). b) The plain, dark brown mantle, wing, and tail ([ML403928611](#), © Michael Todd).



Figure 3. The orange mouth lining of a begging juvenile (© Alex Thomson).



Figure 4. Adult feeding a begging young bird. Note the difference in the colour of the eyes and gape flanges of the young and the adult (© Alex Thomson).



Figure 5. Close-up of an immature Southern Pied Babbler with pale pink gape flange, black bill and olive-yellowish eye (April 2015, [ML614976004](#)).

Adults

Plumage

As the name implies, adult Southern Pied Babblers show two plumage colours: white and black. The head, body, the upperwings' lesser and median coverts, the greater coverts of the inner secondaries, the underwing coverts, and axillaries are white. In stark contrast, the remiges, alula, rectrices, and the greater coverts of the primaries and distal secondaries are black or dark brown (paler when worn) (Figure 6; Fry 2000).

Bare parts

Adults in their black-and-white plumage have a pitch-black bill, gape, and mouth lining, and the eyes are orange in varying tones, from yellowish-orange to red-dish-orange (Figure 7). It is unknown if the occasional marbling of the eye is a sign of (young) age.

Comparison of first-year and adult birds

Comparisons of the head features and dorsal colouration of a first-year bird in advanced partial post-juvenile moult and an adult bird are presented in Figures 8 and 9.

Moult

Post-juvenile moult

The post-juvenile moult is the first significant event in the bird's first year. Juvenile babblers commence with a partial post-juvenile moult of the contour feathers within 3–4 weeks of leaving the nest, but the darker brown wing and tail feathers remain (Figures 2a and b). We noted fresh buff-fringed feathers on the upper chest of an immature, a feature that has, to our knowledge, not been described yet (Figure 2a). The post-juvenile moult culminates in the 'immature' plumage after 4–6 months. Fry (2000) incorrectly states that this is when full adult plumage is attained, but the results of our study show this is far too early. Although the plumage resembles that of adults, it is of inferior quality.

As in most passerines, Southern Pied Babblers usually retain the juvenile remiges and rectrices for about a year or slightly longer, until they undergo their first complete moult (Zacharias et al. 1994, Jenni and Winkler 2020). Reports of primary moult during the post-juvenile moult (Tyler 2002) are highly improbable.



Figure 6. Adult Southern Pied Babbler. The moult of the primaries, secondaries, and tail can be discerned by abrasion and differences in the colour and length of the individual feathers (March 2015, [ML614989305](#)). Compare the rounded rectrices of an adult with the pointed ones of a juvenile in Figure 2.



Figure 7. Adult Southern Pied Babbler with black palate and mouth lining (March 2016, [ML614989401](#)).

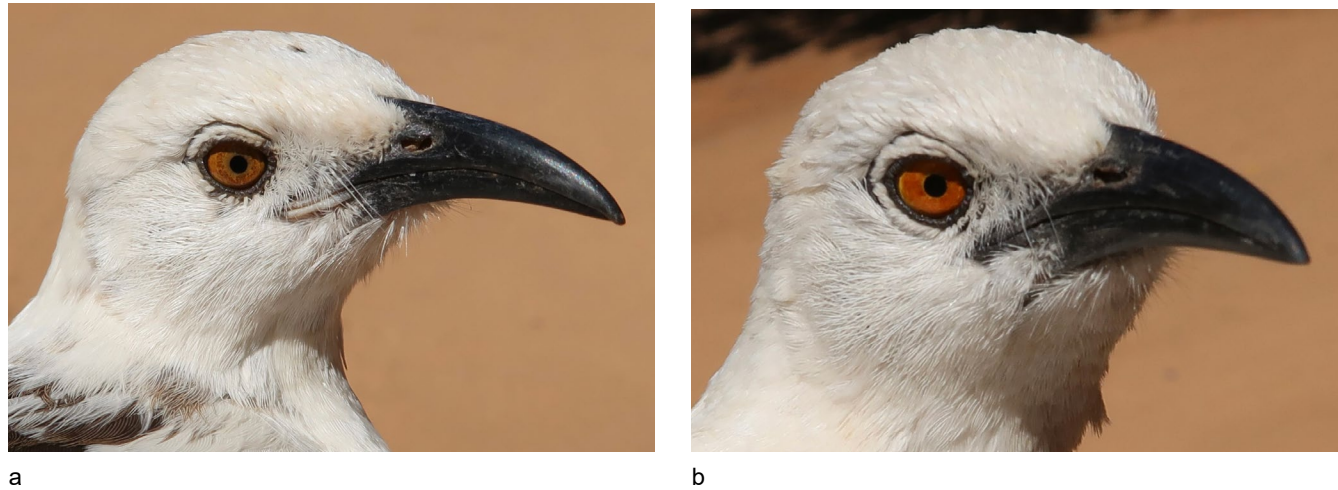


Figure 8. Comparing the features on the head of a first-year and an adult Southern Pied Babbler. a) A first-year individual in body moult from dark brown into white plumage, marbled eye, and well-defined, light-coloured gape flange ([ML614990215](#)). b) An all-white adult with plain dark orange eyes and a black gape. Both individuals were of the same group (December 2020, [ML614990263](#)).



a



b

Figure 9. Plumage comparisons. a) The rump and back of a first-year Southern Pied Babbler with some dark, juvenile feathers ([ML614990220](#)), and b) the plain white rump and back of an adult bird (December 2020, [ML614990266](#)).

Adult post-breeding moult

Moult records for adult Southern Pied Babblers are scarce. One individual in the Kalahari was moulting in February (presumably a complete post-breeding moult) (Liversidge1968). In our sample of 24 adult Southern Pied Babblers, primary moult started mid-December and progressed into April (Figure 10). However, we have not been able to collect comprehensive data after April. A non-moulting individual was recorded in June, but the moult duration is beyond our knowledge.

The moult of two species of *Turdoides* in India was thoroughly described by Zacharias et al. (1994), who accurately documented the moult sequence of the different groups of feathers. The meticulously taken field notes showed conformity with the general patterns of wing moult progress in passerine birds described by Stresemann and Stresemann (1966), namely that the primary moult starts with the innermost primary (P1, descending), two primaries are growing at the same time, and the coverts are replaced at about the same time as the corresponding primaries. Our observations confirm this pattern. All birds in our sample followed this most common descendent moult strategy of passerines without exception. In Figure 11, the wing of an individual at the start of its first primary moult, which takes place at the end of the first year, is shown. Some dark juvenile contour feathers, mainly on

the back, are retained up to this point (and a few more until the following complete moult).

Another rarely described moult feature was also observed in this study. The reduced outermost primary (P10) is replaced out of the serial sequence, i.e., it is shed and starts growing before the old P9 is replaced (Figure 12).

Similar species

Distinguishing first-year Bare-cheeked Babbler *Turdoides gym-nogenys* from first-year Southern Pied Babblers

First-year Southern Pied Babblers and Bare-cheeked Babblers *Turdoides gym-nogenys* can easily be distinguished by the pale whitish-yellow eyes of Bare-cheeked Babblers (dark in Southern Pied Babblers) and the bare, black skin around the eye (feathered in Southern Pied Babblers) (Figure 13).

Anomalous feathers

Inspection of Macaulay Library images of Southern Pied Babblers shows not only numerous depictions of adult-looking Southern Pied Babblers with residual dark feathers on the body but also numerous images of birds with anomalous white flight feathers.

Month	n	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	t	h	b	Moult Score
Jul 0															
Aug 0															0
Sep 0															1
Oct 0															
Nov 7		0	0	0	0	0	0	0	0	0	0	0%	0%	0%	2
Dec 3		1	1	0	0	0	0	0	0	0	0	0%	0%	0%	3
Jan 4		4	3	2	2	1	0	0	0	0	0				4
Feb 2		5	5	4	4	2	2	0	0	0	0	100%	50%	100%	5
Mar 6		4	4	4	4	3	2	1	0	0	0	50%	0%	50%	
Apr 1		5	5	5	5	5	4	0	0	0	0				
May 0															
Jun 1		0	0	0	0	0	0	0	0	0	0	100%	0%	0%	

Figure 10. Extent of primary feather moult (P1 to P10) on adult Southern Pied Babblers from Namibia. Values are average moult scores of each primary for the number (n) of birds per month sampled. The colour gradient is shown on the side. The occurrence of moult of tail (t), head (h), and body (b) are expressed as a percentage of birds assessed showing signs of moult. No data were collected for the cells marked in grey..



Figure 11. Southern Pied Babblers follow the typical passerine moult sequence. Starting from the innermost primary (P1), two primaries are typically replaced at a time and in a descending manner (proximal to distal) (December 2020, [ML614990733](#)).



Figure 12. The outermost primary P10 is being replaced before P9 is shed (March 2015, [ML614989304](#)).



a



b

Figure 13. Comparison of a) immature Southern Pied (April 2015, [ML614976002](#)) and b) Bare-cheeked Babbler (February 2004, [ML619169174](#)).



Figure 14. Anomalous white feathers are quite common. a) Growing white secondary and covert (Namibia, January 2018; [ML614989512](#)). b) Two white rectrices, and white coverts (Limpopo Province, South Africa, July 2023, [ML596984231](#), © Daniel Engelbrecht).

Acknowledgements

We are grateful to Graham Gerdemann, Amanda Ridley, Alex Thompson, Michael Todd, and Daniel Engelbrecht for photos and to Janine Dunlop from the Niven Library in the FitzPatrick Institute of African Ornithology at the University of Cape Town for her support. Thank you!

References

Dean WRJ, Barnard P, Anderson MD. 2009. When to stay, when to go: trade-offs for southern African arid-zone birds in times of drought. *South African Journal of Science* 105(1/2): 24–28.

Fry CH. 2000. Southern Pied Babbler. *Turdoides bicolor* (Jardine). In: Fry CH, Keith S, Urban EK (eds). *The Birds of Africa*. Vol. 6. London: Academic Press. pp. 52–53.

Jenni L, Winkler R. 2020. *The Biology of Molt in Birds*. London: Helm.

Liversidge R. 1968. Bird weights. *Ostrich* 39: 223–227.

Lloyd, P. 1999. Rainfall as a breeding stimulus and clutch size determinant in South African arid-zone birds. *Ibis* 141: 637–643.

Mashao M, Engelbrecht D, de Swardt D. 2015. Desktop ecology: Sabota Lark *Calendulauda sabota*. *Ornithological Observations* 6: 84–91.

Pajmans DM, Bryson U. 2023. A comparison of measurements of passerine species and subspecies in Namibia. *Afrotropical Bird Biology* 3: 1–69.

Stresemann E, Stresemann V. 1966 Die Mauser der Vögel. *Journal für Ornithologie* 107. Sonderheft.

Zacharias V, Mathew D, Jayashree K. 1994. Moults in babblers (*Turdoides* spp.). *Journal of Bombay Natural History Society* 91: 381–385.

Tyler SJ. 2002. Observations on the breeding biology, biometrics and food of Pied Babblers *Turdoides bicolor* in southeast Botswana. *Ostrich* 73: 171–172.

Afrotropical Bird Biology (ABB) is a free, open-access, online journal for articles that describe aspects of the natural and cultural history of birds in the Afrotropical region, including its offshore islands. These include, but are not restricted to, identification features, sounds, distribution and demography, movements, habitats, diseases and parasites, general habits, foraging and food, breeding, interactions with humans, human cultural beliefs and practices as they pertain to birds, moult and biometrics of birds. ABB publishes original contributions focused on presenting information about the natural history of Afrotropical birds. This includes short communications (<2 500 words, including references) and data papers. All contributions will be reviewed by at least one editor and external, independent referees may also be employed at the discretion of the editors.

All papers are published under the [Attribution–NonCommercial CC BY–NC license](https://creativecommons.org/licenses/by-nc/4.0/).

<https://journals.uct.ac.za/index.php/ABB>