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SIZE DIFFERENCES IN MALE AND FEMALE 'GREEN' SATIN BOWERBIRDS *Ptilonorhynchus violaceus*

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Satin Bowerbirds were trapped, measured and surgically sexed. Sexing criteria were established using tarsus length and wing length. Males are considered to have a tarsus length greater than 57.5 mm and a wing length greater than 161 mm. Females had a tarsus length less than 58.0 mm and a wing length less than 162 mm.

INTRODUCTION

The sex of male Satin Bowerbirds *Ptilonorhynchus violaceus* can be readily identified at around seven years of age and at four years plus under closer scrutiny (Disney 1970; Vellenga 1970, 1980; Schodde 1976). Difficulties are encountered when attempting to sex adult females and birds of both sexes less than four years old, as all birds in these groups have a similar green colour. Vellenga (1980) documented slight plumage and soft part colour changes but these characteristics may be difficult to use without experience. Readers' Digest (1976) makes reference to 'young males, slightly larger than females' and Gilliard (1969) describes significant overlap in the measurement of wing length, tail length, exposed culmen and tarsus length.

As part of a study into the sex composition of groups of overwintering Satin Bowerbirds in the grounds of Healesville Sanctuary, Victoria, it was necessary to establish a quick and reliable technique for sexing birds less than four years of age. To this end birds were trapped, endoscoped and measured to determine whether birds could be reliably sexed using morphometrics.

METHODS

Between June and August 1989, and during July and August 1990, Satin Bowerbirds of random ages and sexes were trapped in the grounds of Healesville Sanctuary. The birds were captured using a raptor drop trap consisting of two swinging walls held apart by a perch that collapses and springs the two walls together entrapping the bird. Apples, bananas, oranges and peaches were used as enticement.

Trapping was conducted once or twice a week, usually at midday. As time for processing was limited we imposed a limit of two birds a day. Following removal from the trap, the birds were transported to the veterinary surgery where I measured head-bill length, wing length, tail length, tarsus with

foot length and weight using techniques described in the Australian Bird Banders Manual (Lowe 1989).They were sexed endoscopically by the resident veterinarian using techniques as described in Harrison and Harrison (1986). All birds were banded with colour bands and numbered metal bands under the Australian Bird and Bat Banding Scheme so that no individual was unwittingly measured twice.

RESULTS

During the study period 18 birds were surgically sexed, three were sexed using plumage characteristics (4th or 5th year males) and one was sexed during a post mortem examination. The sample comprised 13 males and nine females.

Mean morphometric male values exceeded female means for all five measurements, with statistically significant differences demonstrated for wing length, tarsus and foot length, and weight (Table 1). For each measurement there was an overlap between the sexes. Comparing tarsus length, 84.6 per cent (n = 11) of males fell within the range of 59.0–62.9 mm. The remaining 15.4 per cent (n = 2) had measurements of 55.2 mm and 57.7 mm. All females were in the range of 54.6–57.7 mm, but, because two males were also in this range, the parameters do not seperate the sexes with 100 per cent reliability. Similarly, two females had wing lengths that fell into the male range of 162–175 mm.

Given the overlapping ranges of each measurement, the best way of sexing birds by measurements may be to combine two parameters. One hundred percent of birds would be correctly sexed using the criteria that:

a) Males have a tarsus length greater than 57.5 mm and wing length greater than 161 mm.

b) Females have a tarsus length less than 58.0 mm and wing length less than 162 mm.

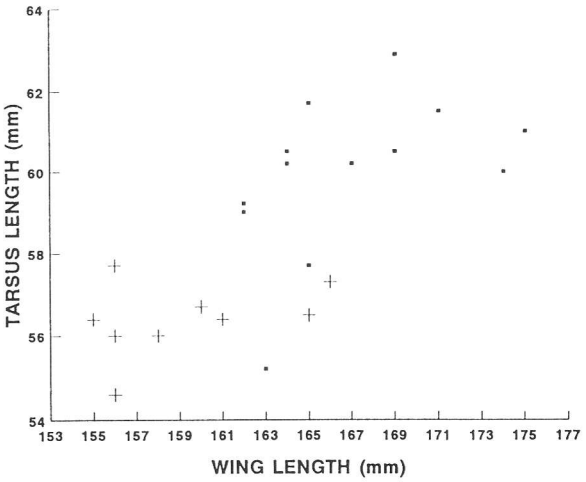

Figure 1. *Size variation in wing length and tarsus with foot length for Satin Bowerbirds. Squares are males, crosses are females.*

However, three birds in the sample presented here would remain unsexed using these criteria.

DISCUSSION

This study has demonstrated that Satin Bowerbirds show size dimorphism and that this dimorphism is due to sex. The sample size was small, preventing statistical separation of the sexes (Roger *et al.* 1986). However, now that it is known that the size dimorphism is due to sex, it would be appropriate to develop sexing criteria by the method of Rogers *et al.* (1986) using a larger sample of birds without the need for independant sexing. This study also demonstrates that morphometric measurements are less reliable when taken individually and where possible multiple measurements are required to give more accurate assessments.

TABLE 1

Measurements of randomly trapped male and female 'green' Satin Bowerbirds. HB — head-bill length; WL — wing length; TL — tail length; TA — tarsus length; WE — weight.

	Male (n = 13)		Female (n = 9)			
Measure	Mean (±sd)	Range	Mean (±sd)	Range	t value	sig
HB (mm)	66.4 (±1.7)	61.8–68.4	65.6 (±1.2)	63.9–67.0	1.1	n/s
TA (mm)	59.9 (±1.9)	55.2–62.9	56.4 (±0.8)	54.6–57.7	5.1	$p < 0.001$
WE (gm)	245.8 (±19.2)	195–280	221.1 (±13.2)	205–235	3.3	$p < 0.01$
WL (mm)	166.9 (±4.3)	162–175	159.2 (±4.1)	155–166	4.2	$p < 0.001$
TL (mm)	123.1 (±6.8)	116–136	117.8 (±4.6)	110–126	1.9	n/s

It is important to note that two of the three most significant sex dependent measurements must be used with caution as they may vary from season to season. Wing length may be influenced by moult. Weight can be influenced by time of day, moult strategy, breeding activity, bird health and seasonal factors as well as sex (Vellenga 1980; Rogers *et al.* 1986).

Casual observations during the project indicated that there may also be behavioural differences between the sexes which might be useful to the bird bander. It appeared that males were more aggressive than females, constantly fluttered in the carrying bag, vocalized more readily and struggled more in the hand, whereas females were generally quieter. Males also showed a more upright posture when approached in the trap, whereas females tended to crouch. I suggest banders quantify these behaviours in future.

This study dealt with the southern form of the Satin Bowerbird, and as such the same measurements may not apply to the northern subspecies. It would be of great interest to determine whether in fact males of the northern subspecies *P. v. minor,* are larger than females using the measurements described here.

ACKNOWLEDGMENTS

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LITERATURE REVIEW

Compiled by D. Purchase.

This section is compiled from journals which are often not available to non-professional ornithologists in Australia. The following criteria are used to select papers for review:

- They relate to species which occur in Australia and its Territories;
- They provide details of techniques and equipment that may be of use in Australia;
- They provide details of studies that may be of general interest to Australian ornithologists.

Journals perused: *Ardea* **80**(3); *Birding in Southern Africa* **45**(3,4), **46**(1); *Living Bird* **11**(1,2), **12**(1,3,4), **13**(3); *N. Amer. Bird Bander* **16**(4) *Ornis Beob.* **89**(3,4), **90**(1,2,3,4); **91**(1,2); *Ornis Fennica* **68**(3); *Ornitolologische Verhandlungen* **25**(2,3); *World Watch* **7**(1).

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The importance of nest building during incubation in Great Crested Grebes *Podiceps cristatus*. Keller, V. (1992). *Ornis Beob.* **89:** 171–176. (The continuous addition of material to the nest during incubation appears to be necessary to prevent egg loss. In German with English summary.)