A STUDY OF THE WILLOW WARBLER IN SOUTH AFRICA

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During the southern summer months of 1974 to 1978, I undertook a study of Willow Warblers *Phylloscopus trochilus* in the Transvaal, South Africa. Most published material on this species in South Africa has been based on museum skins and, consequently, on small samples of specimens collected over a large area and over many years. This field study of wintering Willow Warblers was made to ascertain subspecies ratios, moult sequences and timetables, mensural data and *ortstreue* in a small area of typical habitat in the southern Transvaal.

The study area comprised two one-acre sites situated in the Hekpoort Valley, which lies between the Magaliesberg and Witwatersberg ranges. The first study site (Figure 1 opposite) was on the southern shore of the Hartebeespoort Dam (25 46S, 27 52E) at an altitude of 1 171 m a.s.l and comprised approximately one acre of fairly dense *Acacia caffra* thorn trees. The second study area was located on a farm situated on the Swart River, a tributary of the Magalies River approximately 27 km from the dam at 25 55S; 27 34E and at an altitude of 1 318 m a.s.l. The area of approximately one acre of mainly *Acacia caffra*, *Terminalea sericea* and *Burkea africana* woodland was situated on a rocky hillside bordering cultivated land. Previous observations had shown that both of these localities had reasonably high numbers of Willow Warblers present during the summer months.

Trapping was carried out during October to the end of March using five 4-shelf mistnets placed approximately 20 m apart spread over the one-acre site and placed in the same position at each visit. The visits were irregular but usually consisted of two or three weekends per month at either of the two sites as described above.

The separation of the three subspecies which occur in South Africa is based primarily on the colour of the upper and under parts: the brightness of the olive in the dorsal area, and the amount of yellow present on the ventral surfaces. Briefly, the nominate race *Phylloscopus t.trochilus* is smaller-winged, olive brown above and yellow streaked below. *P.t. acredula* is paler, more yellowish and brighter olive above, the yellow on the breast is reduced, the wings averaging longer than *P.t. trochilus*. *P.t. yakutensis* is longer-winged, grey-brown above with olive on the rump and the edges to unworn remiges and rectrices. Underparts are dull white with greyish breast. A few of the birds handled were the brown and white morph of *P.t. acredula* as described by Williamson (1962) and Ticehurst (1938).

FIGURE 1: TYPICAL SUMMER HABITAT OF WILLOW WARBLERS IN HEKPOORT VALLEY. A VIEW OF THE FIRST STUDY AREA SHOWING *Acacia caffra* WOODLAND.

Care had to be taken when handling birds with any great amount of yellow below as this is a feature of first-year birds - especially of the nominate race. From an examination of the central pair of rectrices which in first-year birds are pointed (adults being rounded) (Drost 1951) and head feathers, which are invariably softer and downier in first-year birds than the freshly-grown firm feathers of the adults, it could be ascertained whether a bird taken before moult was in fact a first-year bird. These birds invariably had worn plumage, some with slight abrasion to remiges and rectrices, others with extreme wear, having broken primaries and tail feathers. There was also a tendency for first-year birds taken during October and November to show prominent skin at the corners of the gape.

Methods used to separate the sexes were based on Williamson (1962). Once the subspecies had been established (see above) the sexing was done using the mensural lengths as published. These are as follows: -

P.t. trochilus	MALES	: Wing 64-70 mm	Tail 47-55 mm
	FEMALES	: Wing 60-66 mm	Tail 42-50 mm
P.t. acredula	MALES	: Wing 64-72 mm	Tail 48-56 mm
	FEMALES	: Wing 62-66 mm	Tail 44-51 mm

Clancey (1950) states that it is impossible to separate the races by mensural data alone, due to the overlap occurring, but it is a useful means of confirming an original decision. For example, if a specimen has been identified as *P.t. acredula* on its plumage, then a wing dimension of 72 mm would confirm not only its race but also its sex.

Measurements were taken as follows: -

- Wings were flattened and straightened along a stopped rule.
- Tails were placed closed over a rule, the end of which was held up against the body below the tail.
- Bills were measured from the joint of upper mandible and skull to the bill tip with dividers.
- The tarsus was measured with dividers from the depression in the angle of the tibio-tarsal joint to the base of the last complete scale before the toes. See Cornwallis and Smith (1960).

Most authors have commented that the worn condition of the skins of birds taken in their winter quarters makes subspecific separation difficult. Contrary to this, I found most adult birds taken before the commencement of moult were in very good plumage and many in fact resembled the birds captured after their moult into breeding dress prior to their northern migration. The colour of the primaries and secondaries, being dark brown with silver grey tips, showed that many birds caught during October and early November had not been subjected to fading or wear whilst migrating and presumably these birds had done a considerable amount of over-flying. Towards the end of November the silver tips were being abraded and the remiges and rectrices were paling. Two adult birds captured during December and just prior to moult commencement were extremely faded, having lost most of the olive edging to the upper body feathers, and the wing and tail feathers had faded to a very pale brown. An unusual feature of both these birds was that each primary and secondary feather had its shadow imprinted on the subsequent feather. When the wing was opened, so that each feather lay on this unfaded area, the wing was in a drooped or distressed position. It must be assumed that these birds had been subjected to a period of extreme exposure during their migration. Specimens of the European Marsh Warbler *Acrocephalus palustris* were captured which also showed this characteristic.

The colours of the soft parts of museum skins are non-existent and one must rely on the description, if present, on the label attached to the specimen. Therefore the soft parts of each bird captured were examined for comparison between the subspecies. The bill in all cases was horn-brown with yellow

flesh at the base of the lower mandible. The tarsus colour varied individually from horn-brown to a yellow-horn, with a brighter yellow-horn anterior tarsal strip. The sole colour showed the greatest colour variation - from dull yellow to bright yellow and from a dull orange to a bright orange. One first-year *P.t. trochilus* female had a sole colour of dull flesh. There was no connection between leg colouration and subspecies; males, females and first-year birds shared the colour ranges and the tarsus and sole colouring were not associated. The eye was dark brown in all cases.

Most observers agree on the wintering range of two of the subspecies; *P.t. trochilus* through East Africa to the Cape; *P.t. acredula* as far as Natal and the Transvaal in South Africa. Williamson (1962) restricts *P.t. yakutensis* to East Africa; Dement'ev (1954) places this race in East Africa, reliably found in Kenya and Uganda. This was probably based on Ticehurst (1938). However, the work done by Clancey (1970) further extends the range of *P.t. yakutensis* beyond that of Ticehurst with specimens from Tanzania, Malawi, Zambia and Botswana, Caprivi, Zimbabwe and Natal. This subspecies appears to be restricted to the eastern parts of southern Africa below the tropics. In Clancey's (1970) work, a study of 311 skins collected throughout southern Africa over 20 years gave a race division of *P.t. acredula* - 54,7%; *P.t. trochilus* - 31,2% and *P.t. yakutensis* - 14,1%. In my study, the subspecies totals were: *P.t. acredula* - 59%; *P.t. trochilus* - 41%. There were no captures of *P.t. yakutensis* out of 104 birds caught. A breakdown of mensural data by subspecies and sex is given in Table 1 overleaf.

There is no apparent difference in the commencement date of the moult between *P.t. trochilus* and *P.t. acredula*. On a few birds moult had started on the upper parts during the second half of November and had reached the under parts to coincide with the dropping of the rectrices towards the end of the month. But by far the majority still had old feathers at this time. During December all specimens had active moult throughout, except on the secondaries and the alula, and the first birds with completed primary and secondary coverts moult were taken towards the end of the month. By the beginning of February a few birds had completed all but the body moult, most were still actively moulting whilst retaining the old alula. One specimen of *P.t. acredula* still had old primaries.

A few birds of both races appeared to have undergone a massive moult of rectrices and some of the remiges. Instead of following the normal passerine order of moult, individuals had apparently shed their complete tail feathers in such rapid succession that the new feathers were all still in pin, the feathers just emerging from the sheath. These birds were caught during the last week of January and the first week of February, which is towards the end of the moulting period for

TABLE 1 (A) : MENSURAL DATA

SUBSP. AND SEX		LENGTH WING MM		LENGTH TAIL MM		LENGTH BILL MM		LENGTH TARSUS MM	
	N	MEAN	STAND DEV	MEAN	STAND DEV	MEAN	STAND DEV	MEAN	STAND DEV
PTA MALE	19	69,9	1,85	53,3	1,92	13,1	0,71	22,4	0,85
PTA FEMALE	42	64,8	1,09	49,1	1,28	12,8	0,81	22,7	0,91
PTT MALE	17	67,5	1,90	51,0	1,41	13,1	0,78	21,9	0,83
PTT FEMALE	26	63,2	0,89	48,5	1,05	12,8	0,56	21,6	0,82

TABLE 1 (B) : MENSURAL DATA

SUBSP. AND SEX	MASS (g) PRE-SOLSTICE				MASS (g) POST-SOLSTICE			
	N	PRE-NOON	AFTER NOON	DAILY MEAN	N	PRE-NOON	AFTER NOON	DAILY MEAN
PTA MALE	13	8,8	9,3	8,9	6	9,5	10,0	9,8
PTA FEMALE	23	8,3	9,0	8,4	19	8,4	9,0	8,6
PTT MALE	10	8,6	9,0	8,7	7	8,3	9,5	9,0
PTT FEMALE	13	8,2	8,0	8,2	13	9,2	9,0	9,1

the rectrices. This lateness of the moult may account for the rapidity of the feather renewal. One *P.t. acredula* male netted on 24 January had lost 4 secondaries on both wings, its whole tail was in pin and the primaries were half-way through the normal moult procedure. This bird had great difficulty in flying.

R.K. Brooke (*in litt.*) advises that he recorded moult data on nine specimens of the Willow Warbler that he obtained at various Zimbabwean localities for the National Museums of Zimbabwe. All four December specimens and one on 6 January were in early moult of the primaries but had old rectrices. Single birds obtained in February and March had fresh primaries and rectrices. One obtained on 6 January had nearly completed its tail moult and one on 9 January had the central eight rectrices in pin, apparently of equal age, as well as the outermost pair in sheath, the intervening pair being old. From this it appears that Willow Warblers in southern Africa leave moult of the rectrices until about half-way through the moult of the primaries and then undergo a rapid tail moult through synchronous dropping of many, though not necessarily all, rectrices. However, I found that in birds moulting their rectrices during the latter half of December and the first half of January, the rapid replacement followed the normal passerine moult pattern, with specimens having the four central feathers new and the remainder grading down to two-thirds fully grown for the outer pair, or of a similar ratio depending on the extent of feather growth.

Verheyen (1953), using material collected in southeastern Zaire, has supported Salomonsen's finding that the basic mode of replacement of rectrices in the Willow Warbler is the one starting in the centre and moving outwards, i.e. R1 to R6 on each side of the tail. This is presumably true for those individuals which do not moult their rectrices very rapidly. A full account of the moult timetable is shown on the moult chart (Figure 2 overleaf).

Ortstreue, or the fidelity to the wintering grounds among many Sylvidae species, is well-known. Most records of warbler *ortstreue* occur amongst the *Acrocephalus* genus with a few examples of Garden Warbler *Sylvia borin* being taken in consecutive seasons. Most examples of recapture of a Willow Warbler occur a few days after the original capture. One bird taken in January 1960 (Rowan 1964) was recaptured twice in the March of the following year. In this study one bird, taken on 16 February weighing 10 g, had completed its moult on all but the head and body. It was recaptured a week later having the same weight and had completed its moult. A *P.t. acredula* female, ringed on 2 February 1975, was recaptured two years later on 23 January 1977. Another *P.t. acredula* female caught on 23 January was recaptured on 4 December of the same year, presumably after having migrated.

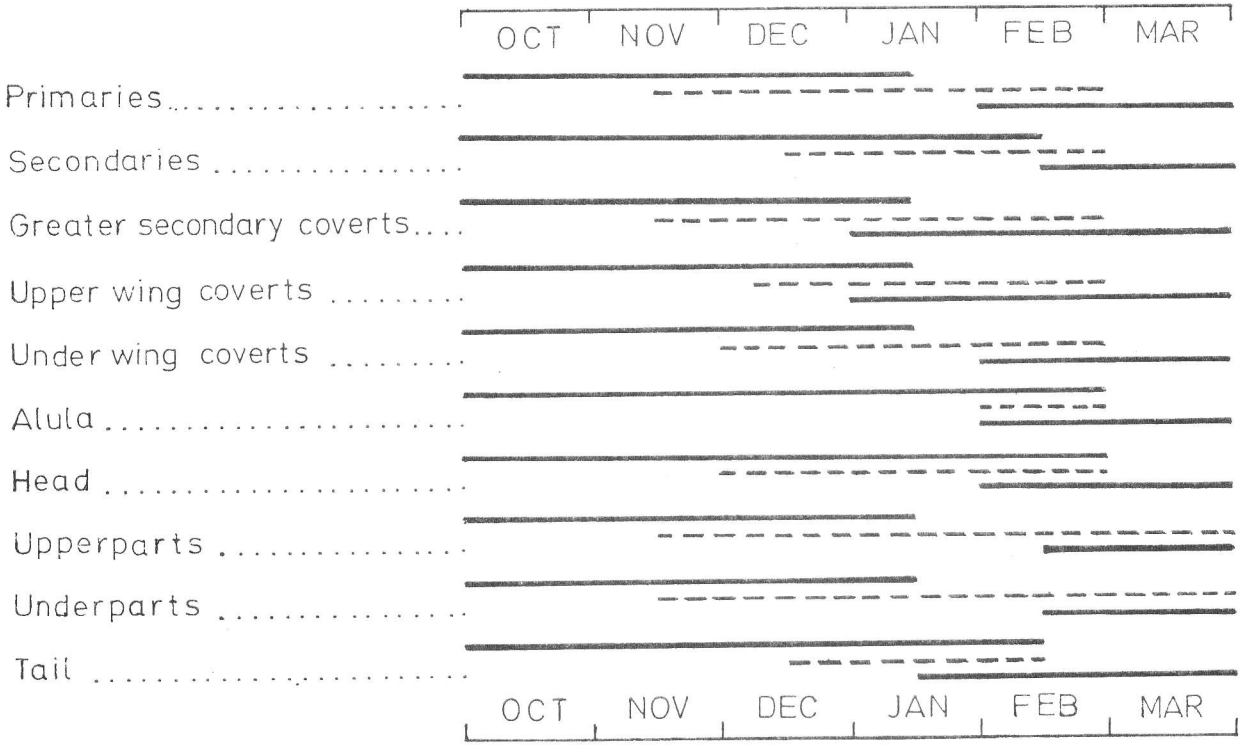

FIGURE 2 MOULT CHART FOR WILLOW WARBLERS. UPPER AND LOWER BARS FOR EACH PLUMAGE AREA REPRESENT OLD AND NEW FEATHERS RESPECTIVELY; INTERMEDIATE DASHED LINE REPRESENTS PERIOD OF MOULT.

It does appear that there was a considerable movement of birds through the study area during the wintering period. Considering the number of birds caught in an area of two acres, the recapture total of 4,8% was small. On 14 November 1976, 14 birds were caught between 08h00 and 14h00. On the following day a further 16 birds were caught between 06h30 and 09h45, but none of the previous day's birds was recaptured.

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