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## A TRAPPING STUDY OF PALAEARCTIC PASSERINES AT NCHALO, SOUTHERN MALAWI

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Information available up to 1975 on the Palaearctic migrant warblers and thrushes in Malawi was published by Benson & Benson (1977), who gave details of arrival and departure, habitat and numbers, and some data on ringing recaptures. This paper summarizes data from netting and ringing at Nchalo during the six seasons 1973/74 to 1978/79. Details of weight, moult, habitat, numbers and *Ortstreue* are given for nine species, namely *Acrocephalus arundinaceus*\*, *A. griseldis*, *A. palustris*, *A. scirpaceus*, *A. schoenobaenus*, *Sylvia borin*, *Phylloscopus trochilus*, *Locustella fluviatilis* and *Luscinia luscinia*.

### STUDY AREA

Nchalo (16°16'S., 34°55'E.) lies in the Rift Valley, beside the Shire River in southern Malawi, at an altitude of 60 m a.s.l. Temperatures are high: the mean is highest in October and November (28.5°C; mean maximum in both months is 35.5°C), decreasing to 26.0°C in April. During 1966-1978 annual rainfall averaged 680 mm (1978 was the wettest year since 1966, with 927 mm), with 95 per cent falling between December and March. The original trapping area in 1973-1974, about 6 ha, consisted of 3.5 ha of *Combretum-Commiphora* thicket with patches of rough grassland, 0.8 ha of *Acacia* woodland with fairly dense undergrowth of herbs and young trees, 0.25 ha of pond with bulrushes *Typha* sp. and the remainder lawns and garden with thick hedges, shrubberies and trees. By late 1977 less than 2 ha of dense vegetation (thicket, hedges, shrubberies and bulrushes) remained scattered in and round the garden; the rest, including the *Acacia*, had been cleared for cotton or maize cultivation. Between 48 and 54 m of mist net was in use for a monthly average of 20.7 - 24.2 d over six seasons, except in February (10.8 d) and March (12.7 d).

Some birds were caught at Mopeia, Mozambique, in the Zambezi delta (17°59'S., 34°44'E.) in 1972/73 (Hanmer 1976). These are mentioned in this paper where relevant; the numbers were small.

### METHODS

All birds netted (between 05:30 - 09:00 hrs and 16:30 - 18:00 hrs on every day when netting was done) were weighed, measured, examined for moult, ringed and released. Weights were taken on a Pesola balance, to 1 g in larger species and 0.1 g in smaller ones. Moult scores of individual feathers were taken for primaries only, using 0 = old, 1 = missing or in pin, 2,3,4 = growing and 5 = new. The primaries (P) were numbered 1 to 10 centrifugally and overall scores (from 0 to 50) were obtained by summing the scores of individual feathers. When birds were caught twice during the same moult, primary scores were used

\*English names are given in the species' accounts.



to estimate the duration of primary moult, on the assumption that the score increased linearly with time (cf. Newton 1967).

### SPECIES ACCOUNTS

#### *Acrocephalus arundinaceus* Great Reed Warbler

This is the most common migrant warbler at Nchalo between mid December and early April (extreme dates are given in Table 1), in all types of vegetation, most frequently in thicket, bulrush and long grass, but often seen in the open, in a small mulberry *Morus nigra* by the house, for example. In the evening there appeared to be a move from thicket into bulrush. Ringing has shown that some birds return annually to Nchalo: 8 per cent of birds ringed have been recaptured in subsequent seasons (see Table 2). Some remain for most of the season; birds ringed in November/December have been recaptured up to early February, while those ringed in January/February have been recaptured in March/April and the following December. Birds ringed in March/April have only been recaptured in following seasons from late January, suggesting that they did not normally arrive at Nchalo until late in the season. Figure 1 overleaf shows the number of birds caught per netting day ( $\times 10$ ) and suggests that many are on passage southwards during December/January. There is no indication, however, of a major northward passage in March/April. Birds sang from arrival and throughout the season.

TABLE 1

Numbers of Palaeartic migrants caught at Nchalo between 1973/74 and 1978/79.  
The number of netting days in each season is given as are  
extreme capture dates.

Species	73/4*	74/5	75/6	76/7	77/8	78/9	Total	1st - last date
<i>A. arundinaceus</i>	11	96	54	63	16	26	266	25.11 - 16.4
<i>A. griseldis</i>	3	24	9	22	3	5	66	27.11 - 12.4
<i>A. scirpaceus</i>	0	0	0	4	1	2	7	7.1 - 7.4
<i>A. palustris</i>	12	21	19	17	6	8	83	24.11 - 23.4
<i>A. schoenobaenus</i>	5	18	4	58	8	17	110	27.11 - 24.4
<i>S. borin</i>	3	73	42	35	14	22	189	25.10 - 9.4
<i>P. trochilus</i>	1	0	0	2	1	5	9	9.11 - 13.4
<i>L. fluviatilis</i>	1	1	0	0	1	0	3	21.12 - 30.3
<i>L. luscinia</i>	3	24	11	12	5	2	57	5.12 - 2.4
Netting days	54	173	134	117	102	125	705	

\*Netting confined to March/April.

Table 3 shows the state of the flight feathers in all birds caught. Most arrived already moulted (some had slight head and body moult). A few arrived in suspended moult, with P1-7 new or with all primaries new but some secondaries old (a few had some head and body moult), but one bird had P1-3 new and all the rest of the flight feathers old. A few arrived unmoulted (some were first year, age not recorded in the others) and started moult in late December or early January. All but one bird caught in February had completed primary moult,



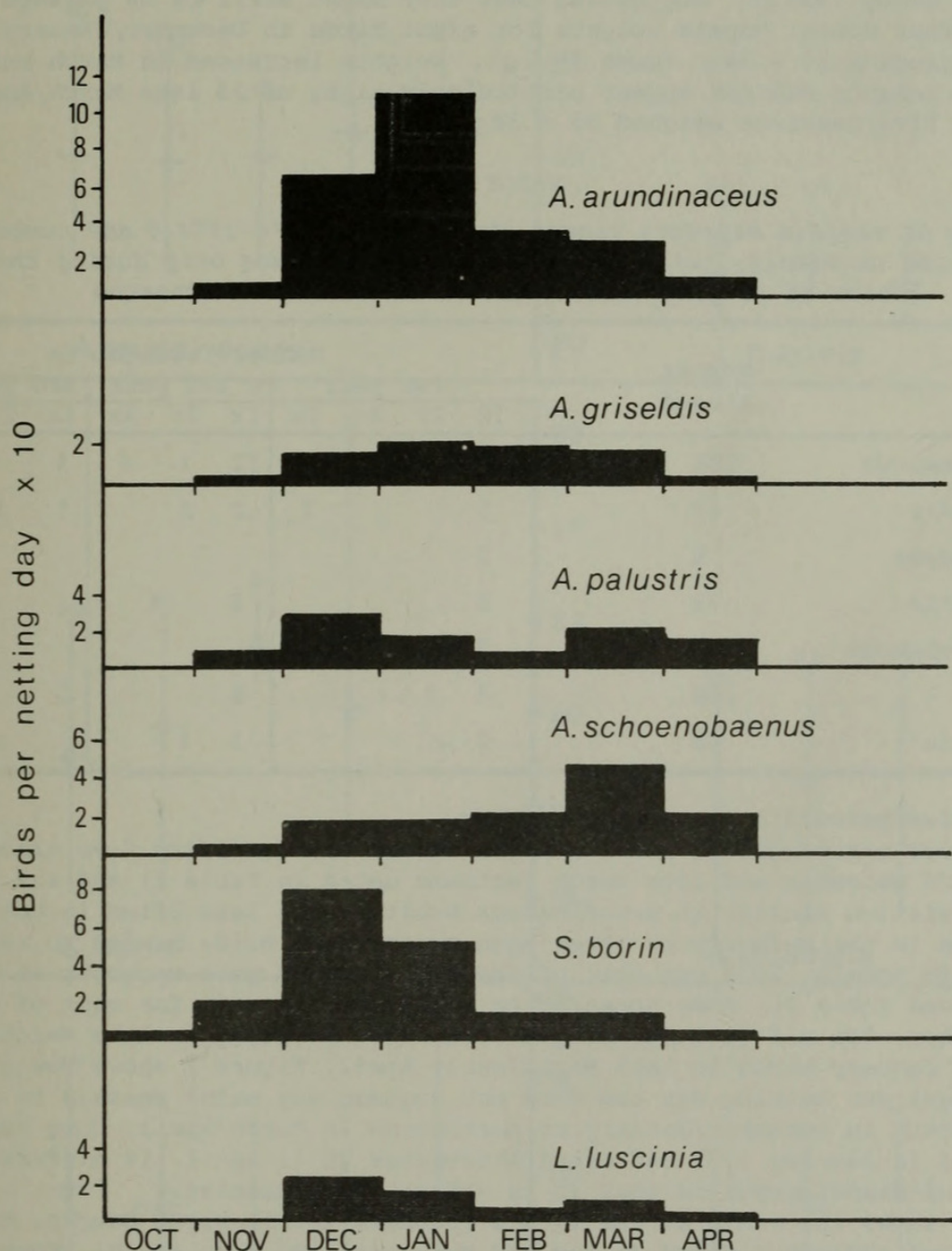


Fig.1 Monthly capture rates for six Palaeartic passerines at Nchalo expressed as the mean daily catch x10.

Data for the six seasons 1973/4-1978/9 are amalgamated.

as had all caught in March; one caught on 6 April had completed primary but not secondary moult, this bird having been caught earlier on 17 January with  $P=9$ . Generally two primaries were growing at one time in each wing, but in birds starting moult in January, three was more common during the growth of  $P1-5$ . Duration of primary moult estimated for three recaptured birds was 85, 87 and  $<96$  d. Many birds had a moult of head and body in March/April when wing



moult was complete.

Weight is summarized in Fig.2. November birds were light, but some December ones were heavy (>35 g), suggesting that they might still be on passage to areas further south. Mopeia weights for eight birds in December/January were similar, ranging 25 - 34 g (mean 28.9 g). Weights increased in March but departure weights did not appear particularly high; of 23 late March/April birds the five heaviest weighed 35 - 38 g.

TABLE 2

Numbers of various migrants ringed at Nchalo, 1973/4-1978/9 and numbers recaptured once only, twice only, three or four times only during the season of ringing (=1st year) or in subsequent seasons

Species	Number ringed	Number recaptured in									
		1st year				2nd year			3rd yr		4th yr
		1x	2x	3x	4x	1x	2x	3x	1x	2x	1x
<i>A. arundinaceus</i>	201	22	5			12	1	1	1		1
<i>A. griseldis</i>	47	5			1	2	1		1	1	
<i>A. scirpaceus</i>	5	2									
<i>A. palustris</i>	73	3				3					2
<i>A. schoenobaenus</i>	100	5		1							
<i>S. borin</i>	160	7	1			6			3		
<i>L. luscinia</i>	48	3				1	1			1	

#### *Acrocephalus griseldis* Basra Reed Warbler

This species was caught in small numbers (about one for every five *arundinaceus*) between mid December and late March (extreme dates in Table 1) and was found in dense vegetation similar to *arundinaceus* habitat, but less often in bulrush and seldom in the mulberry or other open vegetation. Birds tended to return annually to Nchalo: 10.5 per cent of the birds ringed were recaptured in subsequent seasons (see Table 2). Some appeared to remain at the site for most of the season; thus, two mid December ringed birds were recaptured in late March, and three mid January birds in late March/early April. Figure 1 shows the number of birds caught per netting day and does not suggest any major passage to areas further south in December/January or northwards in March/April. Song was identified in January 1979 and heard thereafter until April. It differs from the song of *arundinaceus* in that it is softer, less grating.

Table 3 shows the state of the flight feathers in all birds caught. Many must have arrived already moulted (a few had some head and body moult). Some were in suspended moult early in the season, usually with P1-4 new, but in two cases with new primaries and some old secondaries (a few had some head and body moult). Some arrived unmoulted and started moult in January. One bird showing evidence of an earlier suspended moult after the growth of P4, had completed primary and almost completed secondary moult on 27 February. One first year bird had a primary score of 11 on 4 February and another, age unknown, showing no signs of suspension, had a primary score of 44 on 29 March; these birds would have been unlikely to complete moult before April. Usually, two primaries were growing at one time on each wing, but one bird in late January was growing P1-4 all at once. There was some moult of head and body in March/April in birds with wing moult complete.

Weight is summarized in Figure 1. There were a few fairly heavy birds (>19 g) in December and January, suggesting a small passage to areas further south.



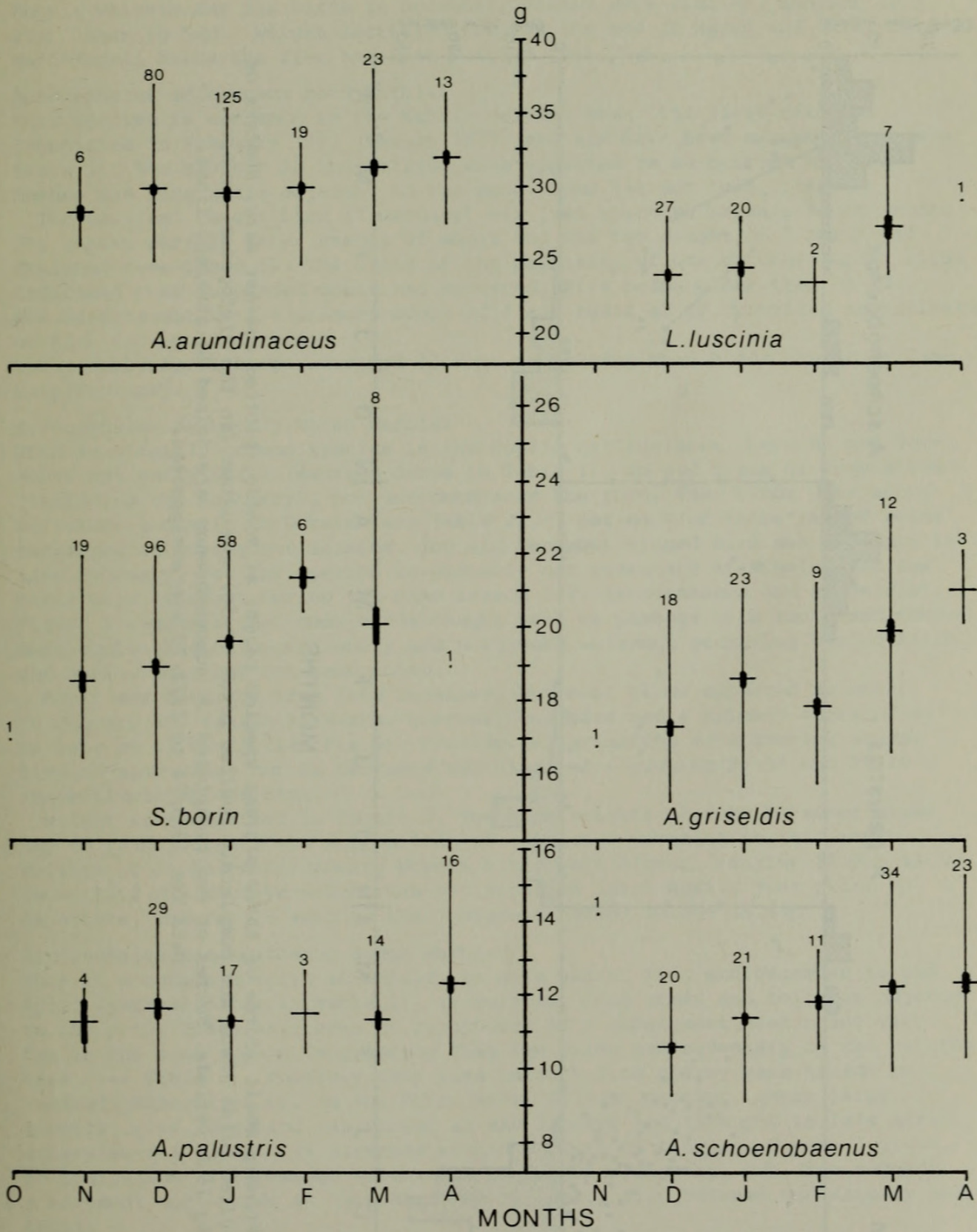


Fig.2 Summarized monthly weight data for various migrants caught at Nchalo, 1973/4-1978/9. Ordinate: range of weights in each sample. Horizontal bar: mean weight of the sample. Solid rectangle: 2x S.E. of the mean. Numeral at top of ordinate (or above point): number of birds in sample.



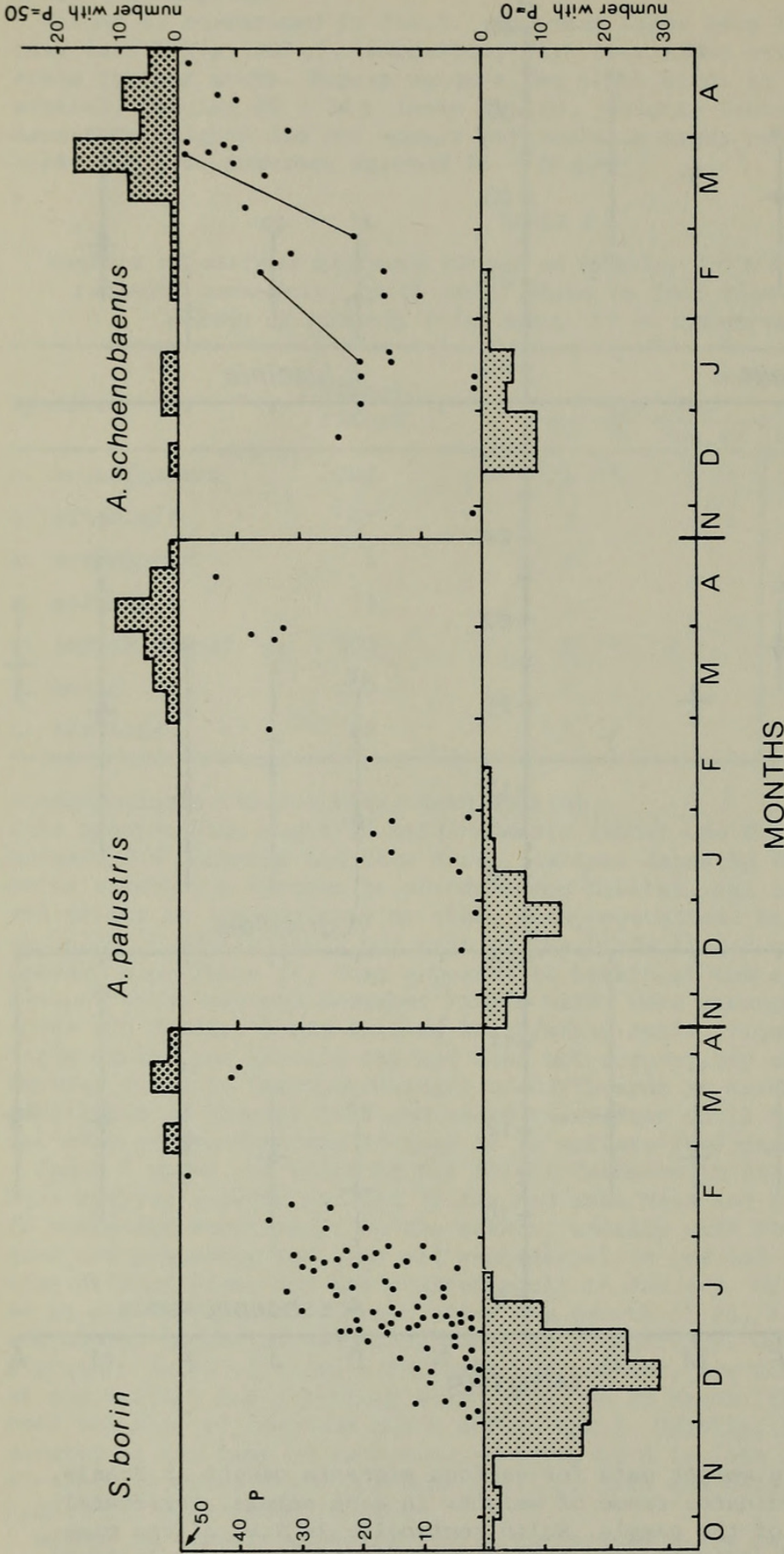


Fig. 3 Primary moult scores of three migrant species caught at Nchalo, plotted against date. Numbers of unmoulted birds ( $P=0$ ) and completely moulted birds ( $P=50$ ) are shown (in the histograms) grouped by 10 d periods. Scores of two recaptured *A. schoenobaenus* are joined by straight lines. Data for 1973/74 to 1978/79 are amalgamated.



Mopeia weights for six birds in December/January were similar, ranging 16 - 20 g (mean 18.5 g). Weight increased towards the end of March and of 11 late March/April birds the five heaviest weighed over 20 g.

#### *Acrocephalus scirpaceus* Reed Warbler

This species is uncommon in the Nchalo netting area. The first bird was identified in February 1977 (Hanmer 1977) and six have been caught since (see Table 1). The habitat in the netting area appeared to be bulrush and the bushes and long grass adjacent to the pond. Song has not been noted.

The earliest caught bird (7 January) was just starting primary moult (score 1); others were in later stages of moult and the two caught on 7 April had finished (see Table 3). The state of the primaries of one of these April birds indicated that suspended moult had occurred, P1-4 being older than P5-10. One bird caught with a primary score of 1 and again at 19, provided an estimate of 82 d for moult duration.

Two early April birds averaged 11.6 g, no heavier than birds caught in January/February.

#### *Acrocephalus palustris* Marsh Warbler

This is a fairly common species in the Nchalo netting area, between mid December and early April (extreme dates in Table 1), in all types of vegetation (including the mulberry), but uncommon near the pond. Some birds were shown to return annually to Nchalo (see Table 2), 7 per cent of those ringed being retrapped in subsequent seasons. One mid December ringed bird was recaptured in late February, but the species is probably not sedentary at Nchalo, for few birds were recaptured during the same season (cf. *arundinaceus* and *griseldis*). Figure 1 suggests that most birds caught were on passage with southward movement continuing through January and northward movement occurring during March and April. Song has not been noted.

Moult was recorded from late December, but most birds appeared to start in January and finish in March; however, one bird had a primary score of 44 as late as 17 April (see Fig. 3). Usually 2-3 primaries were growing at one time on each wing, but in February two birds were growing P7-10 and P6-10 respectively at one time.

Weight is summarized in Figure 2. The high weights of some December birds (up to 14 g) support the supposition of a passage movement in this month. Weights of 11 November/January Mopeia birds were higher, ranging 11.0 - 13.5 g (mean 12.2 g). Maximum weight was not attained until April, just prior to departure, when of 16 weights the 7 highest ranged 13.0 - 15.4 g.

#### *Acrocephalus schoenobaenus* Sedge Warbler

This is a common species at Nchalo, in some years, from mid December to mid April (extreme dates in Table 1), in bulrush, long grass and thickets adjacent to the pond. There have been no recaptures in a subsequent season and very few in the same season, suggesting that few birds are sedentary in the netting area (see Table 2). Possibly they pass through from nearby cane fields to reedbeds *Phragmites* sp. on the Shire River 0.25 km distant, where large numbers occur. One bird was ringed in mid January and recaptured in late April, otherwise all recaptures occurred within a month of ringing. Figure 1 gives no indication of a passage southwards in December/January, but does suggest a movement northwards in late March/April. Birds sing between mid January and April.

Three birds caught had apparently arrived already moulted (in very new plumage on 22 December, 5 and 8 January respectively), and some showed suspended moult early in the season (usually P1-3 or P1-4 new). One bird started moult in late November, but most started or continued suspended moult in January. Two birds started moult in early March. Many birds had completed



primary moult by late March and nearly all by mid April (see Fig.3). Two recaptured birds gave estimates of primary moult duration of 59 and 75 d respectively.

Weight is summarized in Figure 2. One bird was heavy (14.2 g) in late November, and possibly still on passage southwards. Mopeia weights in December/January for four birds ranged 11.5 - 13.1 g (mean 12.1 g). Major weight gains were not made until late March/April, when six out of 33 birds weighed 14 - 16 g.

TABLE 3

*State of the flight feathers of four species of Acrocephalus caught at Nchalo*

Species	No.	State of flight feathers	Number of birds in (months)					
			Nov	Dec	Jan	Feb	Mar	Apr
<i>A. arundinaceus</i>	266	Old	2	7	5			
		Active moult	1	2	9*	3*	4*	1*
		Suspended moult	-	1	5			
		New	3	70	106	16	19	12
<i>A. griseldis</i>	66	Old	-	3	1			
		Active moult	-	1	4	2*	1	
		Suspended moult	1	6	2			
		New	-	8	16	7	11	3
<i>A. schoenobaenus</i>	110	Old	-	18	8	1		
		Active moult	1	1	6	6	11*	6*
		Suspended moult	-	-	5	1		
		New	-	1	2	3	23	17
<i>A. scirpaceus</i>	7	Old	-	-	1			
		Active moult	-	-	1	3		
		New	-	-	-	-	-	2

\*Some with primaries complete, secondaries not complete.

#### *Sylvia borin* Garden Warbler

This is a very common species in the Nchalo netting area, between late November and mid March, in thicket and shrubbery, open grassland with scrub and in the mulberry, but seldom near the pond. Capture rates shown in Figure 1 suggest a large movement southwards in December/January, but give no indication of a northward passage in March/April. Six per cent of birds ringed were retrapped in the same area in a subsequent season (see Table 2). Recaptures indicated that most birds were not sedentary at Nchalo; of 116 ringed in October to December, seven were retrapped in November/December, but none later in the season. Four October/December birds were recaptured in subsequent seasons in November/December and three in mid to late January. One bird ringed in March recaptured the following December. Song has been heard in November, but mainly from January to April.

Most wintering birds started primary moult in December, but a few not until early January; it was typically completed by mid to late March (see Fig.3). Three to four primaries were usually growing at one time in each wing.

Weights are summarized in Figure 2. Most birds were fairly light (<20 g) between November and January. For the same period, Mopeia weights for 22 birds were slightly lower, ranging 16.0 - 20.3 g (mean 18.0 g). Heavier weights were



were not noted until late March/April, when three out of seven birds caught ranged 22 - 26 g.

#### *Phylloscopus trochilus* Willow Warbler

This is not a common species in the Nchalo netting area, although fairly common in the woodlands of the escapments. The first birds were caught in November, but the species has been heard singing from late October to early April (although apparently silent between late December and early February).

Three November birds weighed 7.8, 10.0 and 10.2 g, four in December 7.8 - 8.9 g (mean 8.2 g) and two in April 9.2 and 10.5 g.

#### *Locustella fluviatilis* River Warbler

Three were caught at Nchalo: one on 21 December (first winter bird) weighed 17.5 g and was not moulting. Two on 15 and 30 March weighed 18.0 and 18.2 g, and had primary moult scores of 39 and 44 respectively. Two were caught in bulrush and the third in thicket by the pond. At Mopeia one bird was shot on 11 January in a low scrubby tree with longish grass underneath. It weighed 18 g and was moulting P1-3 (score 4).

#### *Luscinia luscinia* Sprosser

This was a fairly common visitor to Nchalo until 1977, but was more affected than other species by the removal of the *Acacia* woodland and the thickets surrounding it. Few have been caught elsewhere in the netting area. They were usually present between mid December and late March (extreme dates in Table 1). Figure 1 suggests a passage of birds southwards in December/January and perhaps a northward movement in March. A few birds may be sedentary at Nchalo during January to March, for two ringed in January were recaptured in March, and one ringed in March was recaptured in subsequent seasons in Late December, January and March. However, birds ringed in December have only been recaptured in December of the same or subsequent seasons. Song has not been noted.

Weights are summarized in Figure 2. There were high weights in December/January (>25 g), suggesting that some birds were still on passage. Weight did not appear to increase in spring until late March, but five late March/April birds weighed 25 - 33 g.

### DISCUSSION

#### Migration timing, wintering and *Ortstreue*

Capture rates at Nchalo revealed a decrease in numbers of most thicket species in 1977/78 and 1978/79 (Table 1), probably due to habitat destruction and disturbance, or mortality resulting from insecticide spraying in 1976 and 1977. *Acrocephalus schoenobaenus* shows fluctuations in annual numbers which are probably not related to habitat disturbance.

Hanmer (1976) recorded the discovery of *A. griseldis* at Mopeia (identification by Clancey (1975)). The present paper documents regular wintering of this species in southern Malawi. Elsewhere in Africa, the only known regular wintering sites appear to be on the lower Tana River in eastern Kenya (Pearson, Britton & Britton 1978). In Malawi and Mocambique the species occurs in thicket, long grass, scrub, reeds and bulrush; in eastern Kenya it also occurs in long grass and thicket, but typically seems to frequent low bushes on seasonally flooded ground (D.J. Pearson *in litt.*).

The main arrival dates of *A. palustris*, *A. griseldis* and *Luscinia luscinia* fit well with passage dates for these species at Ngulia (Pearson & Backhurst 1976a, 1978) and elsewhere in eastern Kenya (D.J. Pearson *in litt.*), but early *Sylvia borin* and *Phylloscopus trochilus* at Nchalo probably arrive via Uganda and western Kenya where passage is already well established during October (Pearson 1972 and *in litt.*). *Acrocephalus scirpaceus*, *A. arundinaceus* and *A. schoenobaenus* are almost absent from passage movements through eastern



Kenya (Pearson & Backhurst 1976a, 1978), and these three species presumably reach Malawi via Uganda and western Kenya. However, Pearson (1975) suggests that most passage *A. arundinaceus* and *A. schoenobaenus* overfly Uganda and Kenya, as the two species are scarce there until December. The main times of spring departure from Nchalo fit for all species with passage dates in Uganda and/or early passage dates in central Kenya (Pearson 1972, Pearson & Backhurst 1976b, Pearson, Backhurst & Backhurst 1979). *A. palustris* and *A. schoenobaenus*, which are the last species to depart from Nchalo (mid to late April), are frequently recorded on passage through Kenya until early May; the other species, which depart earlier from Nchalo, pass through Kenya mainly between 5 and 25 April (Pearson & Backhurst 1976b).

Recaptures in Zambia (Tree 1965, 1966), South Africa (Hewitt 1967), Uganda (Pearson 1972) and Zimbabwe-Rhodesia (Manson & Manson 1976) have shown that Palaeartic warblers are likely to return to the same wintering area annually and may remain sedentary there for some time. Fidelity to the Nchalo wintering site was demonstrated in the case of *A. arundinaceus*, *A. palustris*, *A. griseldis* and *Sylvia borin*. *A. arundinaceus* and *A. griseldis* in particular were frequently retrapped, and many were clearly sedentary over a period of months.

#### Moult

Of the six main species caught at Nchalo, all except *L. luscinia* are known to moult completely in Africa. All *A. palustris* and *S. borin* and most *A. schoenobaenus* moulted after arrival at Nchalo. However, some *A. schoenobaenus* and most *A. arundinaceus* and *A. griseldis* were already partly or fully moulted on arrival, and there appears to be a major moulting area for these species in northeast Africa. In Kenya and Uganda, most wintering *A. schoenobaenus* and practically all *A. arundinaceus* are newly moulted in December/January when they arrive (Pearson 1973, 1975, Pearson, Backhurst & Backhurst 1979). Thus, Malawian wintering *A. schoenobaenus* in particular show more tendency to delay moult until after arrival than do East African birds. For *A. arundinaceus* the proportion of Nchalo birds moulting before arrival (about 80 per cent) was similar to that given for Malawi and Zambia by Pearson (1975). In *A. griseldis* the incidence of completed and suspended moult among Nchalo arrivals was similar to that observed at Ngulia (eastern Kenya) passage birds (Pearson & Backhurst 1976a, D.J. Pearson *in litt.*).

Adult *Locustella fluviatilis* caught at Ngulia during November and December all appeared to have recently moulted the outer primaries in reverse order (Pearson & Backhurst 1976a). The unmoulted Nchalo bird showed no sign of such a moult and the other three were in normal centrifugal moult during January-March, again with no sign of newer outer primaries. All four were presumably first year birds.

In *Sylvia borin* the typical duration of primary moult at Nchalo (see Fig. 3) appeared to be similar to that found in Uganda (Pearson 1973) although its timing may have been slightly earlier. For *A. palustris* and for *A. schoenobaenus* the Nchalo data plotted in Figure 3 suggest a typical duration of 60 to 80 d. No moult has been reported in *A. schoenobaenus* caught in East Africa during April/May (Pearson 1973, Pearson, Backhurst & Backhurst 1979); this contrasts with the situation at Nchalo where 20 per cent of the birds caught in April were still moulting flight feathers.

#### Weights

November-December weights at Nchalo were similar to those reported for the same species in Uganda and/or eastern Kenya (Pearson 1971, Pearson & Backhurst 1976a). Some birds were heavy, suggesting that they might still be on passage with reserves for further flight southwards, particularly *A. arundinaceus*, *A. palustris*, *A. schoenobaenus* and *P. trochilus*.

In general, there seems to be no major weight loss during moult at Nchalo



and the mean monthly weight remained fairly constant in most species until March. Even in late March and April weights 20 - 50 per cent above the January-February average were found only in a few birds, mostly *A. griseldis*, *A. palustris*, *A. schoenobaenus* and *L. luscinia*. Maximum weights in late March-April were low compared to some for Uganda and Kenya, where, for example, *A. arundinaceus* has reached 52.5 g, *A. scirpaceus* 17.0 g, *A. schoenobaenus* 21.5 g and *P. trochilus* 14.5 g (Pearson 1971 and in litt., Pearson, Backhurst & Backhurst 1979). Southern Malawi birds probably fatten further north in Africa for the flight to the Palaeartic. One March *L. luscinia* was extremely heavy (33 g); at Ngulia the mean weight recorded during a mid April fall was 28.2 g, but none reached 33 g (Britton & Britton 1977). This species may reach weights in Malawi similar to maximum weights near the equator, but in view of the estimates of Nisbet, Drury & Baird (1963) it seems unlikely that even a 33 g bird could reach the Palaeartic without a stopover in East Africa.

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