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WEIGHT CHANGES OF GUINEA SAVANNA BIRDS IN GHANA

by P. W. Greig-Smith and N. C. Davidson

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The highly seasonal climate of the West African savanna zones affects most aspects of the ecology of their bird populations, including seasonal change in body weight. Fry (1970) found that the average weight for several species at Zaria, Nigeria (11° 10' N, 7° 40' E) increased during the dry season, though a few species showed decreases, while Ward (1965) demonstrated seasonal changes in weights of Quelea quelea in Nigeria, and Davidson (in prep.) investigated wet season weight changes of Euplectes species.

In an earlier paper (Greig-Smith & Davidson 1977) we listed weights of birds measured at Mole National Park, Ghana, during the wet and early dry seasons, showing several apparent seasonal changes in average weight. Of the 1655 birds trapped during our studies, 475 were marked with unique combinations of colour rings, and there were 98 recaptures (which were excluded from our previous report). In this paper, we present these results, concentrating on seasonal changes between the wet and early dry seasons, and we examine weight changes of individual birds, rather than the means of samples (cf. Ward 1965, Fry 1970, Greig-Smith & Davidson 1977) which are subject to error because of changes in the composition of the population (e.g. annual recruitment of young). (We have not been able to consult an important paper discussing seasonal weight changes among West African savanna birds, by Morel & Morel, in press.)

Birds were mist-netted in several habitats in the vicinity of Samole, Mole National Park (09° 16' N, 01° 51' W), between 8 July and 27 August 1974, 7 July and 2 September 1975, and 2 November and 2 December 1975. In addition to recaptures during these periods, we have included data on three ringed birds that were retrapped by R. B. Payne & C. J. Risley in October 1975. Weights were measured to 0.1g (birds less than 40g), 0.5g (40 - 80g), or 1.0g (greater than 80g). The birds occurring in the area are listed by Greig-Smith (1976), and the species that were netted are given by Greig-Smith & Davidson (1977).

RESULTS

Of the 85 recaptures which were weighed on both captures, 66 (in 26 species) followed intervals of less than 7 days after ringing. In the wet season (July-Sept), 43 of these short-term recaptures lost weight (0.7 - 33.7%), two did not change, and 16 gained weight (1.5 - 42.3%), though only

two birds gained more than 10% (a Camaroptera brachyura gained 42.3% and a Hypergerus atriceps gained 17.5%). In the early dry season (November), four birds lost weight (0.9 - 14.8%) and one did not change. Of birds recaptured after longer intervals, two male Euplectes afra lost 7.7% and 12.3% of their weights during 11 days in the early wet season, and one female Caprimulgus climacurus gained 8.8% during 26 days in the wet season.

Table 1 lists 16 birds which were ringed in the early or mid wet season, and recaptured in the early dry season. Ten of them gained weight (3.1 - 20.2%), two did not change, and four lost weight (0.7 - 1.5%), though three of the latter changes are within the limits of accuracy of the measurements.

Table 1. Weights of birds ringed in the wet season and recaptured in the dry season

SPECIES	Date	Wt (g)	Date	Wt (g)	% CHANGE
Ceyx picta	2 viii	9.6	8 xi	10.4	+ 8.3
Ceyx picta	2 viii	9.7	17 x	10.0	+ 3.1
Ceyx picta	3 viii	10.2	9 xi	10.0	+ 4.9
Halcyon malimbica	4 viii	93.0	8 xi	93.0	0
Halcyon malimbica	4 viii 74	87.5	10 xi 75	100.0	+ 14.3
Lybius dubius ♂	2 viii	95.0	8 xi	104.0	+ 9.5
Lybius dubius ♂	4 viii	105.0	8 xi	105.0	0
Pycnonotus barbatus	4 viii	31.6	9 xi	38.0	+ 20.2
Cossypha niveicapilla	4 viii	34.0	9 xi	33.5	- 1.5
Camaroptera brachyura	2 viii	10.6	9 xi	11.3	+ 6.6
Camaroptera brachyura	3 viii	10.2	10 xi	11.4	+ 11.8
Batis senegalensis ♂	17 vii	9.0	21 xi	8.9	- 1.1
Platysteira cyanea ♂	1 viii	14.1	17 x	14.0	- 0.7
Platysteira cyanea ♀	2 viii	13.0	9 xi	13.4	+ 3.1
Terpsiphone viridis ♀	1 viii	14.5	16 x	16.0	+ 10.3
Nectarinia verticalis ♂	3 viii	13.2	11 xi	13.1	- 0.8

Dates are 1975 unless otherwise stated.

DISCUSSION

Most birds recaptured after short intervals lost weight, although two gained large amounts. The stress of trapping and handling is likely to lead to short-term loss in weight, and precludes further interpretation of these data. Random fluctuations due to a varying food supply (e.g. Britton 1967), and diel cycles of body weight (e.g. Britton 1967, Davidson, in prep.) may also contribute to these changes.

By comparing average "winter" (October-March) and "spring" (April-July) weights, Fry (1970) found a general tendency for an increase during the dry season, although some species decreased significantly. Ward (1965) showed that Q. quelea undergo major weight changes during the wet season, but do not vary greatly during the dry season, while at Mole Euplectes afra decrease in weight during the wet season (Davidson, in prep.), and several estrildine finches show indications of changes (Davidson & Greig-Smith, unpublished).

The results in Table 1 suggest a general pattern of maintenance or increase in weight from the wet season to the dry season. This is supported by the scant information on average weights for these species (Greig-Smith & Davidson 1977), although the two Lybius dubius captured for the first time in the dry season were much lighter than the wet season average. The bulbul Pycnonotus barbatus shows the largest increase (Table 1), and Fry (1970) quotes figures indicating a similar large increase (13%), followed by a decrease during the dry season. However, Britton's (1972) data for P. barbatus in Kenya do not appear to follow this pattern.

It is not immediately obvious why there should be an increase in weight in these species between the wet and dry seasons. Some West African species are known to lay down stores of fat in anticipation of migration (e.g. Jones & Ward 1977), but with the possible exceptions of Terpsiphone viridis and Cossypha niveicapilla (which lost weight), none of the species in Table 1 evidently migrate (Elgood, Fry & Dowsett 1973). Gonad hypertrophy at the start of the breeding season would also lead to an increase in weight, but these species are all wet season breeders (Elgood et al. 1973, Greig-Smith 1977). An increase in the availability of food could induce weight increases, but most of the species in Table 1 are largely or wholly insectivorous, and their food is probably most abundant when insects emerge in the wet season. This effect is therefore unlikely to be important unless the increase from minimum weight at the leanest season is very gradual. Finally, there may be a recovery of condition after the stress of breeding, feeding young, and moulting (see Ward 1965).

The interaction of these effects can result in a complex pattern of seasonal weight changes (e.g. Ward 1965), and more information is needed before their relative importance can be evaluated, involving monitoring of average weights of samples taken throughout the year, and changes in the weights of marked individuals.

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