

BEHAVIOURAL ECOLOGY AND BODY MASS IN *PHOENICULUS DAMARENSIS* - *P. PURPUREUS*

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Abstract. A model was tested between group and territory size as well as sex ratio and body mass in green and violet woodhoopoes. Three differences between violet and green mean territory sizes were calculated. Violet woodhoopoes in Namibia were 38.700 (± 14.233) ha different from Green woodhoopoes (Lake Naivasha, Kenya) (t-statistic = 2.719, d. f. = 35, $P = 0.0101$), 22.800 (± 4.101) ha different from Green woodhoopoes (Kubusi Valley, South Africa) (t-statistic = 5.560, d. f. = 26, $P < 0.0001$), and 11.200 (± 2.142) ha different from Green woodhoopoes (Morgan's Bay, South Africa) (t-statistic = 5.230, d. f. = 64, $P < 0.0001$). Results of the multiple linear regression indicated that there was a very strong collective significant effect between the territory size, territory size variation, sex ratio, group size, group size variation, body mass, and body mass variation, ($F(3, 4) = 143.72$, $p < 0.001$, $R^2 = 0.99$, $R^2_{adj} = 0.98$).

Keywords: mass, sex, territory, *Phoeniculus*, woodhoopoe.

I. INTRODUCTION

The Violet Woodhoopoe is a highly social bird that occupies arid savanna, woodland, and riverine forest along the Namib escarpment. It nests and roosts in natural cavities and clambers in trees, probing bark and crevices for insects and small vertebrates. It communicates using a strong cackling chatter (<https://ebird.org/species/viowool/>). The Namibian Violet Woodhoopoe *Phoeniculus damarensis* is an arid near endemic with a partially resolved taxonomic status [1-3]. It is closely related to the Green Woodhoopoe *Phoeniculus purpureus* yet differs in mass and mantle feather colouration [1, 3]. A study compares Violet Woodhoopoe behavioral ecology with that of the better-known Green Woodhoopoe [4]. Here I provide some resolution to the status of the Violet Woodhoopoe *P. damarensis* in comparison with the Green Woodhoopoe *P. purpureus*, using body mass (variation) across territory and group sizes as well as sex ratio.

II. MATERIALS AND METHODS

Mass and territory sizes, group sizes (and their variations) and sex ratios were given in [1, 4]. Multivariate Statistical Analysis (Multiple Linear Regressions) were used to confirm the results at https://www.statkingdom.com/410multi_linear_regression.html. Live mass from *P. purpureus* adult males (84.8 ± 8.45 g; $n=139$) and adult females (72.9 ± 11.0 g, $n=128$) and *P. damarensis* adult males (91.3 ± 8.84 g, $n=5$) and adult females (77.6 ± 11.2 g, $n=6$) were calculated [1]. Territory sizes were compared using MedCalc comparison of means at https://www.medcalc.org/calc/comparison_of_means.php.

III. RESULTS

Multiple linear regression

Results of the multiple linear regression indicated that there was a very strong collective significant effect between the territory size, territory size variation, sex ratio, group size, group size variation, body mass, and body mass variation, ($F(3, 4) = 143.72$, $p < 0.001$, $R^2 = 0.99$, $R^2_{adj} = 0.98$).

Comparison of mean territory sizes

Three differences between violet and green mean territory sizes were calculated. Violet Woodhoopoes in Namibia were 38.700 (± 14.233) ha different from Green Woodhoopoes (Lake Naivasha, Kenya) (t-statistic = 2.719, d. f. = 35, $P = 0.0101$), 22.800 (± 4.101) ha different from Green Woodhoopoes (Kubusi Valley, South Africa) (t-statistic = 5.560, d. f. = 26, $P < 0.0001$), and 11.200 (± 2.142) ha different from Green Woodhoopoes (Morgan's Bay, South Africa) (t-statistic = 5.230, d. f. = 64, $P < 0.0001$).

Home ranges

The Violet Woodhoopoe home range varies from 60-150 ha [4]. This is larger than the territory sizes of all Green Woodhoopoes with the possible exception of the Green Woodhoopoe (Lake Naivasha, Kenya) which is $-9.000 (\pm 14.233)$ ha different from 60 ha (t-statistic = -0.632, d. f. = 35, P = 0.5313). A predicted defendable home range of 79.9 ha is $-28.900 (\pm 14.233)$ ha different from the latter (t-statistic = -2.031, d. f. = 35, P = 0.0500).

IV. DISCUSSION

Violet Woodhoopoes in Namibia have smaller territory sizes than the Green Woodhoopoe in both Kenya and South Africa, and larger home ranges than Green Woodhoopoes in South Africa. Larger body mass in the Violet Woodhoopoe is associated with smaller territory sizes, males, larger group size, larger group size variation, and male-biased sex ratios. Larger body mass variation in the Violet Woodhoopoe is associated with smaller territory sizes (and variation), larger group size, larger group size variation, and male-biased sex ratios. The converse is true. A predicted home range larger than 94.233 ha in Namibian Violet Woodhoopoes is probably different from the Kenyan Green Woodhoopoe. This study reveals Violet Woodhoopoe body mass may have consequences for energy expenditure [5].

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