GEOGRAPHIC AND ENVIRONMENTAL PATTERNS OF BODY SIZE DISTRIBUTION IN THE WATER RAT *NECTOMYS SQUAMIPES* (RODENTIA: MURIDAE: SIGMODONTINAE).

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INTRODUCTION

Size is the most conspicuous trait of living things and it correlates with the majority of life history characteristics of organisms, thus being an excellent dependent variable for testing hypotheses of size-dependence on geographic, climatic and biotic factors (Blackburn *et al.*, 1999; Ashton *et al.*, 2000; Medina *et al.*, 2007). Understanding size variation in small mammals that are reservoirs of human maladies is essential since parasite infestation and incidence, strongly depend on geographic variations in body mass, sexual size dimorphism, and age/ size composition of populations (Moore & Wilson, 2002; Nunn *et al.*, 2004). Furthermore, body size variation is amenable to be analysed at local, specific or macroecological levels. Within this conceptual framework, we have been developing small-and large-scale analyses of body size variation of South American rodents, to understand biotic and abiotic factors influencing the observed patterns (i.e. Bergmann's rule).

MATERIALS AND METHODS

We studied with statistical procedures, the body size distribution of the semi-aquatic rat *Nectomys squamipes* (Brants, 1827) in Brazil. *N. squamipes* is a well known reservoir of schistosomosse. We measured 675 adult *N. squamipes* from 71 populations between 9.15 and 29.8 latitude (S), and 35.53 and 55.15 longitude (W). Altitude of populations ranged between 2 and 1179 m. Estimators of body size employed (for males and females separately) were, mean Head and Body length (H&B), and Condilo-Basal cranial length (CBL). Morphometric measurements were $\log_{10}$-transformed. Mean relative age (estimated by dental patterns) was calculated for each sample. Independent variables were: 1) Geographic: Latitude, Longitude and Altitude; 2). Climatic I: a. Mean, Minimum and Maximum temperatures; b. Annual, Minimum and Maximum Precipitation; 3). Climatic II (Seasonality): Coefficients of Variation of Mean Annual temperature and precipitation; 4). Ambient energy: Potential Evapotranspiration (Priestley-Taylor equation); 5). Primary Productivity: Actual Evapotranspiration (Thornthwaite equation); 6). Water Balance.

Environmental variables show colinearity thus, dimensionality of the predictors was reduced using Principal Components Analysis (PCA). Those PCs retained and used in regression analyses were established according to the *broken stick* criterion (Legendre & Legendre, 1998). Statistical analyses other than standard ones (SPSS. 13.0) were performed with SAM v.2 (Spatial Analyisis in Macroecology; Rangel et al., 2006). Basically, $\log_{10}$ values of body size estimators were regressed against environmental PCs with preset geographic coordinates. We used Simultaneous Autoregression (SAR). Altitude (ALT) and Relative Age (RA) were included as further body size predictors in SAR analyses.

RESULTS AND DISCUSSION

In the case of males of *N. squamipes*, the best predictor of body size when H&B length or CBL were considered, was PC1, a temperature component, although in the latter case the trend was not significant (t= 2.261, P<0.05; t= 1.092, P>0.05, respectively). However, in both cases, when RA was included in the analyses, it became the most significant body size predictor for both estimators (t= 2.276, P<0.05; t= 3.394, P<0.05, respectively). In females, equivalent results were obtained but trends did not show statistical significance. ALT as an independent variable, did not show predictive value with respect of body size independently of estimator (H&B or CBL), or gender.

Based on the results obtained, it can be concluded that: 1. Geographic body size variation in male *N. squamipes*, is correlated with temperature variables with high loadings on PC1 thus, body size in male *N. squamipes* decreases with increasing mean temperature; 3. In female *N. squamipes*, the pattern of variation of body size is not statistically significant with respect to the assayed environmental variables; 4. Relative age is the best body size predictor in male *N. squamipes*; 5. Differences of geographic patterns of body size between males and females of *N. squamipes*, may be due to Sexual Size Dimorphism as observed in other mammals (Medina *et al.*, 2007).

Apoio: PIBIC- FIOCRUZ, IOC-FIOCRUZ, CNPq

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