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BIOGEOGRAPHIC AND EVOLUTIONARY ECOLOGY OF POLYMORPHIC PHENOTYPES: SPATIAL OCCURRENCE OF THE MELANISM IN GEOFFROYI'S CAT (*Leopardus geoffroyi*)

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Polymorphic phenotypes have often been inferred to play some adaptive roles in ecological, physiological and behavioral processes. Melanism is a coloration polymorphism that is present in various groups of organisms and it is rather common in the Felidae family. The Geoffroy's Cat (*Leopardus geoffroyi*) is a South American wild cat that inhabits a wide range of ecoregions from subtropical to temperate zones of the continent. We realized the first distribution mapping of the distinct phenotypes (non-melanistic and melanistic) of this species and investigated if the geographic distribution of each phenotype directly responds to environmental predictors. We assessed the phenotypes frequency using a chi-square test and generated potential distribution models for non-melanistic and melanistic individuals. In addition, we employed the complete spatial randomness (CSR) analysis to test whether the spatial distribution of melanism was random throughout the geographic range of Geoffroy's cat. The present study obtained 916 location records, being 675 of non-melanistic and 241 of melanistic individuals. The presence and frequency of melanism varied considerably among different ecoregions, according to chi-square test and the CSR analysis. The niche equivalency estimates showed that niches of non-melanistic and melanistic models were significantly different (44 to 49%). Moreover, the predictive power of our models was considered excellent for both phenotypes (>95%), giving high confidence levels for the geographic distributions obtained. So, following Gloger's Rule; melanistic Geoffroy's cats are more frequent in ecoregions with a humid environment, especially the Uruguayan Savanna and the Humid Chaco, leading a clear non-random distribution pattern driven by moisture. The non-random pattern exhibited by melanistic Geoffroy's cat may indicate the occurrence of natural selection affecting this trait and open up new avenues for investigations about the ecology of polymorphic phenotypes in natural populations of mammals.

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