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NO AIR PRESSURE-SPECIES RICHNESS RELATIONSHIP IN JULOMORPHIDAE VERHOEFF, 1924

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***Abstract*- Air pressure was tested for a relationship with species richness in Julomorphidae. There was no difference between air pressure at the distribution of high (93894.610625 Pa; n=16) and low (95575.47 Pa; n=2) species richness (Z-test: P-value=0.204507, Z score=0.825630, n=16, 2) (Difference = 1680.859 Pa). Air pressure was not related to species richness when partially controlling for latitude.**

***Keywords*: air, diversity; gradient; latitude; pressure, richness; species.**

I. INTRODUCTION

Species richness is the number of different species represented in an ecological community, landscape, or region [1-4]. Species richness and biodiversity increase from the poles to the tropics for a wide variety of terrestrial and marine organisms and is referred to as a latitudinal diversity gradient (LDG) [1]. Inverse LDG in invertebrates is hypothesized and explained as the result of predation which plays an important "keystone" role in structuring the community [5]. As the abundance of the top predator, decreases, a greater number of taxa in lower trophic levels can persist. There is a higher predation risk for insect prey at lower latitudes [6]. Thus it is predicted there should be an inverse LDG in the (millipede) prey.

Julomorphidae is family of millipedes belonging to the Superorder Juliformia is distributed throughout southern Africa [7, 8]. The null historic or evolutionary hypothesis is the Tropical Conservativism Hypothesis which suggests processes of speciation, extinction, and dispersal result in higher species richness in the tropics and decline away from the equator has been tested [9,10]. The alternative is the Biogeographical Conservativism Hypothesis which suggests the processes invoked are not intrinsic to the tropics but are dependent on historical biogeography to determine the distribution of species richness was corroborated [11]. Here species richness in Julomorphidae is tested for correlations with air pressure.

II. MATERIALS AND METHODS

18 valid species were identified as belonging to the family Julomorphidae [7]. These were tabulated and known localities were also listed (Table 1). Localities were obtained from the literature [7]. GPS coordinates were obtained from internet sources for known localities using the locality followed with the keyword "GPS" or http://gps-coordinates.org. Latitude and longitude coordinates were obtained. Species richness correlations with latitude were calculated. Air pressure was calculated for each type locality (https://www.mide.com/air-pressure-at-altitude-calculator). P-value calculations were produced between air pressure at neighbouring species richness and between the highest species richness and the rest (Appendix 1 & 2). A test for normality of air pressure data was performed at https://www.statskingdom.com/kolmogorov-smirnov-test-calculator.html. The outcome of this test determined what P-value test would be used in comparing the data of air pressure across species richness. If the data were normal a T-test would be used while if the data were not normal a Z-test is used. The P-value calculator can be found at https://www.gigacalculator.com/calculators/p-value-significance-calculator.php.

III. RESULTS

There was no difference between air pressure at the distribution of high (93894.610625 Pa; n=16) and low (95575.47 Pa; n=2) species richness (Z-test: P-value=0.204507, Z score=0.825630, n=16, 2) (Difference = 1680.859375 Pa). Results of the lilliefors test indicated that there is a significant difference from the normal distribution, (D(18) = 0.26, p = 0.00172).

IV. DISCUSSION

Air pressure has been associated with species richness in red millipedes [30] and no relationship was discovered in the pill millipedes [in prep.], but the Dalodesmidae showed two relationships and one marginal relationship between species richness and air pressure. Here no relationship was found in the Julomorphidae.

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Appendix 1. Air pressure (Pa) followed by mean species richness in Julomorphidae. * - low species richness

83104.89
98287.24
98287.24
94863.33
95504.68
100570.08
94863.33
101130.24
100570.08
75190.43
100385.99
99959.94
99565.14
93821.38
95575.47*
83104.89
83104.89
95575.47*