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PREDICTED SPECIES RICHNESS VARIATION WITH TIME IN RED MILLIPEDES *CENTROBOLUS* COOK, 1897

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Abstract

The null hypothesis that there was no difference and relationship between predicted species richness and time was tested in red millipedes Centrobolus. The alternative was that species richness differs over time was considered. The least-squares regression equation for SSD versus species richness was calculated from given data (y = -11.8 · x + 14.5). SSD at four points in time was substituted into the equation to get species richness at four points for male C. ruber and female C. digrammus. The difference in species richness from the C. ruber substitution was 0.01 and 1.46 from the C. digrammus substitution. When the multiplication of the smaller value against the index (1.88) resulted in 0.01 for the C. ruber substitution while the C. digrammus substitution was controlled (1.46). This supports the idea that two species may have gone extinct over equal times when female size increased.

Keywords: centrobolus, digramms, ruber, species

INTRODUCTION

A forest genus of diplopods belonging to the Order Spirobolida found along the eastern coast of southern Africa was the subject of this study. The millipede genus *Centrobolus* has its northern limits on the east coast at about -17° South (S) and southern limits at about -35° S [3-92]. It occurs in all the forests of the coastal belt from the Cape Peninsula to Beira in Mocambique [93, 95]. As essentially shade-loving Diplopoda, the members of the genus are especially well represented in these forests of the eastern half of the subcontinent with 39 species [95]. *Centrobolus* illustrates female-biased sexual size dimorphism (SSD) which is compared with species richness across latitude in this pachybolid millipede genus [3-92, 100]. Few studies have shown a causal link between SSD and species richness [1, 3, 31, 97]. The null hypothesis here is that there is no difference and relationship between predicted species richness and time. Alternatively, SSD which is inversely related to species richness differs over time.

MATERIALS AND METHODS

The least-squares regression equation for SSD versus species richness was calculated from given data [7] (y = -11.82585203 · x + 14.49065626). SSD at four points in time was substituted into the equation to get species richness at four points for male *C. ruber* and female *C. digrammus*. To make the values comparable over a similar time an index of 60/32 = 1.875 was used to multiply the smaller predicted species richness to get variation in species richness over time.

RESULTS

Species richness was predicted to be 1.21408585 from *C. ruber* substitution and decreased to 1.20797859 over 60 years; predicted to be 2.66776107 from *C. digrammus* substitution and decreased to 1.20870764 over 32 years. The difference in species richness from the *C. ruber* substitution was 0.00610726 and 1.45905343 from the *C. digrammus* substitution. When the

multiplication of the smaller value against the index (1.875) resulted in 0.0114511125 for the *C. ruber* substitution while the *C. digrammus* substitution was controlled (1.45905343)

DISCUSSION

The results of the comparison of correlations show a decrease in species richness with time. Two species substitutions showed no change in species richness (*C. ruber*) and a variation of 1.46 species (*C. digrammus*). This provides indirect evidence that *C. digrammus* may be unequivocal to the similar *C. promontorius* and *C. dubius* which both have unique SSD [31]. Furthermore, it supports the idea that two species may have gone extinct between the modulated studied times when female size increased (under Fecundity selection). Important factors that influence the rate of extinction of species are population size and geographic distribution [98], body size and longevity [96], decreased competitive ability [99], and minimum viable population [94].

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