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PROBABLE SOLUTION OF RAINY DAY VARIATIONS FOR SET MATING FREQUENCIES AND MALE AND FEMALE WIDTHS IN *CENTROBOLUS* COOK, 1897

M. I. COOPER

* *University of Stellenbosch, SOUTH AFRICA*.

ABSTRACT: **Two simultaneous equations were used to understand the relationships between male and female width, mating frequencies, and rainy days. The -36x + 6.11 = 9.79003864 · x + 5.26958620 (Male width-rainy days for controlled mating frequency equation) solution was =−0.032065mm. The -36x + 6.11 = 13.05338485 · x + 5.85944826 (Female width-rainy days for controlled mating frequency equation) solution was x =−0.010919mm. Therefore when *C. anulatus* male width was inputted 3.929812 days were predicted to lapse with mating frequencies and when the female width was inputted 7.926918 days were predicted to lapse with mating frequencies (a difference of 3.997106 days); and when *C. inscriptus* male width was inputted 4.379812 days were predicted to lapse with mating frequencies and when the female width was inputted 8.993585 days were predicted to lapse with mating frequencies (a difference of 4.613773 day). Positive assortative mating based on width was possible because of the positive relationships between male and female width and mating frequencies. When *C. anulatus* male width was inputted 3.929812 days were predicted to lapse with mating frequencies and when the female width was inputted 7.926918 days were predicted to lapse with mating frequencies (a difference of 3.997106 days). When *C. inscriptus* male width was inputted 4.379812 days were predicted to lapse with mating frequencies and when the female width was inputted 8.993585 days were predicted to lapse with mating frequencies (the difference of 4.613773 days). Thus *C. inscriptus* is primarily affected by differences in 5 days while *C. anulatus* is only sensitive to variation in the same amount of rain over 4 rainy days.**

***KEY WORDS*: Frequency, mating, rain, width.**

I. 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 is found in the temperate South African subregion, its northern limits on the east coast of southern Africa being about -17° latitude S. It occurs in all the forests of the coastal belt from the Cape Peninsula to Beira in Mocambique [1-283]. While the coastal forests of the South-West and Eastern Cape are mist belt temperate forests, those of the Transkei, Natal, Zululand, and Mocambique are somewhat different, being better described as East Coast Bush, they are developed almost entirely in a narrow strip of the litoral on a dune sand substratum, and are more tropical in aspect and composition than those to the west of them. There is a summer rainfall of 762-1016 mm, a uniform environmental temperature, and an absence of frost; the component trees of the coastal bush with their abundant creepers and lianes, while not usually reaching a height of more than 11 meters, provide a dense covering with ample shade and humidity at ground level. As essentially shade loving Diplopoda, the members of the genus are especially well represented in these litoral forests of the eastern half of the subcontinent [1-283].

In this paper, I check and solve equations for correlations between the mating frequencies for males and females, rainy days, and male and female widths in red millipedes *Centrobolus* Cook, 1897.

II. MATERIALS AND METHODS

The data were collected during the rainy season because in southern Africa millipede surface activity is strongly seasonal and related to feeding and reproduction and this is also when population densities peak. The two species of millipedes were sampled in their indigenous tropical coastal forest habitat at Twin Streams Farm, Mtunzini, South Africa (28°55'S; 31 °45'E). It is within this part of the typical coastal forest belt that *C. anulatus* and *C. inscriptus* are in geographical sympatry. An area of forest with continuous tree canopy cover was delimited and all sampling occurred within those bounds. In the first season, two temporally separate sampling efforts were made and the OSR was measured early in the season (December) and late in the season (February). Seven weather patterns for December and February were obtained from https://en.climate data.org/africa/south-africa/kwazulu-natal/mtunzini-772733/. Correlations between mating frequencies and one weather factor (rainy days) and male and female width were produced at https://www.gigacalculator.com/calculators/correlation-coefficient-calculator.php. Equations and simultaneous equations were solved at https://www.mathpapa.com/equation-solver/. Both sides of each equation were solved (step 1) and these were then flipped (step 2). Two simultaneous equations were used to understand the relationships between male and female width, mating frequencies, and rainy days. The -36x + 6.11 = 9.79003864 · x + 5.26958620 (Male width-rainy days for controlled mating frequency equation) was set up and the -36x + 6.11 = 13.05338485 · x + 5.85944826 (Female length-rainy days for controlled mating frequency equation) was set up. Then male and female widths for *C. anulatus* and *C. inscriptus* were inputted to generate the number of rainy days for controlled mating frequencies.

RESULTS

The 36x + 6.11 = 13.05338485x + 5.85944826 (Female width-rainy days for controlled mating frequency equation) solution was x =−0.010919mm. Therefore when female width variations were inputted into the equation of (36x + 6.11 = 13.05338485 · x + 5.85944826), 5.716916 ≠ 5.716918 rainy days were recorded. Therefore when male width variations were inputted into the equation (36x + 6.11 = 9.79003864 · x + 5.26958620) 4.95566 ≠ 4.955669 rainy days were recorded. When C. anulatus male width was inputted 3.929812 days were predicted to lapse with mating frequencies and when the female width was inputted 7.926918 days were predicted to lapse with mating frequencies (a difference of 3.997106 days). When C. inscriptus male width was inputted 4.379812 days were predicted to lapse with mating frequencies and when the female width was inputted 8.993585 days were predicted to lapse with mating frequencies (a difference of 4.613773 day).

DISCUSSION

From the results, it may conclude that 3.997106 -4.613773 rainy days resulted in the inverse relationship between mating frequencies and width in both sexes. Under these conditions, positive assortative mating was rendered possible based on width. Positive assortative mating based on width was rendered possible because of the positive relationships between male and female width and mating frequencies. Differences of 3.997106 rainy days and 4.613773 rainy days also contributed to differences in the mating frequencies of *C. anulatus* and *C. inscriptus*, respectively. When *C. anulatus* male width was inputted 3.929812 days were predicted to lapse with mating frequencies and when the female width was inputted 7.926918 days were predicted to lapse with mating frequencies (a difference of 3.997106 days). When *C. inscriptus* male width was inputted 4.379812 days were predicted to lapse with mating frequencies and when the female width was inputted 8.993585 days were predicted to lapse with mating frequencies (the difference of 4.613773 days). Thus *C. inscriptus* is primarily affected by differences in 5 days while *C. anulatus* is only sensitive to variation in the same amount of rain over 4 rainy days. Male mating frequency of either species is affected by about 4.154812 rainy days while female mating frequencies are affected by about 8.4602515 days. Thus female width has twice the influence on mating frequencies with controlled rainy days *cf.* male width.

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