ABUNDANCE IS RELATED TO AT LEAST SEVEN FACTORS IN FOREST RED MILLIPEDES *CENTROBOLUS* COOK, 1897

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***Abstract*- Abundance was tested for correlations with seven factors in red millipedes *Centrobolus*. Abundance was related to minimum precipitation (r=0.63046242, Z score=1.65957221, n=8, p=0.04850025), maximum precipitation (r=0.63046242, Z score=1.65957221, n=8, p=0.04850025), sternite prominence (Pearson's r=0.63046242, Z score=1.65957221, n=8, p=0.04850025), highest relative humidity (r=0.63046242, Z score=1.65957221, n=8, p=0.04850025), mean ocean water temperature (r=0.63046242, Z score=1.65957221, n=8, p=0.04850025), minimum ocean water temperature (r=0.63046242, Z score=1.65957221, n=8, p=0.04850025), and maximum ocean water temperature (r=-0.63046242, Z score=-1.65957221, n=8, p=0.04850025).**

Keywords: **abundance, Red Millipedes**

I. INTRODUCTION

Red millipedes are found in the southern African subregion with northern limits on the east coast being about -17° latitude S and southern limits being -35° latitude S. They are well represented in the littoral forests of the eastern half of the subcontinent [1-533]. It consists of taxonomically important species with 12 species considered threatened and includes nine vulnerable and three endangered species [226]. It occurs in all the forests of the coastal belt from the Cape Peninsula to Beira in Mocambique [225]. These worm-like millipedes have female-biased sexual size dimorphism [57].
Here, abundance is correlated with seven factors in *Centrobolus* Cook, 1897.

II. MATERIALS AND METHODS

Abundance calculations for 2 species of southern African *Centrobolus* were obtained from published material [7]. Climatic factors were obtained for each species locality at https://en.climate-data.org/. Correlations between abundance and seven factors were generated at https://www.gigacalculator.com/calculators/correlation-coefficient-calculator.php (Appendix 1-7).

III. RESULTS

Abundance was related to minimum precipitation (Fig. 1: r=0.63046242, Z score=1.65957221, n=8, p=0.04850025).

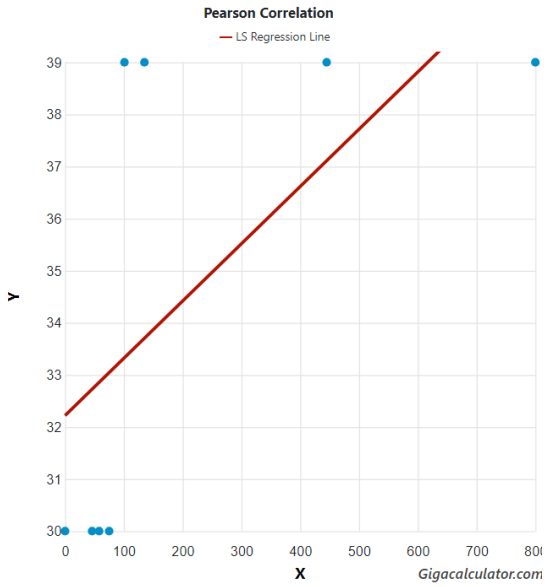

Fig. 1. Correlation between abundance and minimum precipitation across therange of *Centrobolus* Cook, 1897.

Abundance was related to maximum precipitation (Fig. 2: r=0.63046242, Z score=1.65957221, n=8, p=0.04850025).

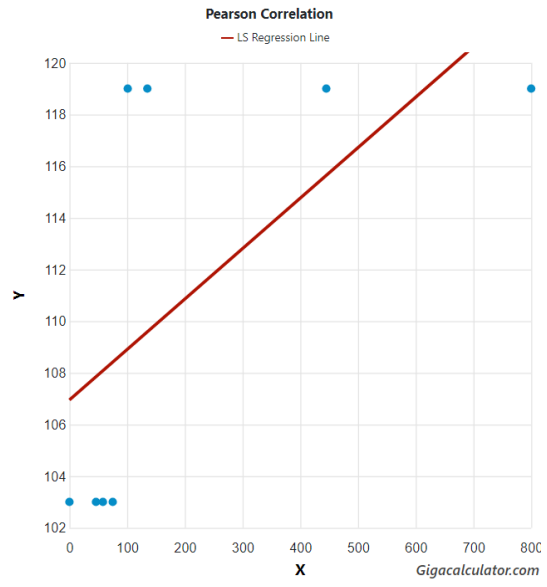

Fig. 2. Correlation between abundance and maximum precipitation across therange of *Centrobolus* Cook, 1897.

Sternite prominence was related to abundance (Fig. 3: Pearson's r=0.63046242, Z score=1.65957221, n=8, p=0.04850025).

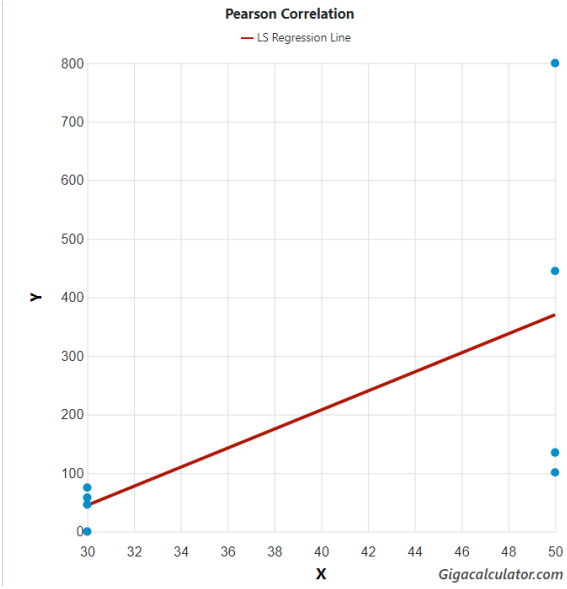

Fig. 3 Sternite prominence correlated to abundance in *Centrobolus* Cook, 1897.

Abundance was related to highest relative humidity (Fig. 4: r=0.63046242, Z score=1.65957221, n=8, p=0.04850025).

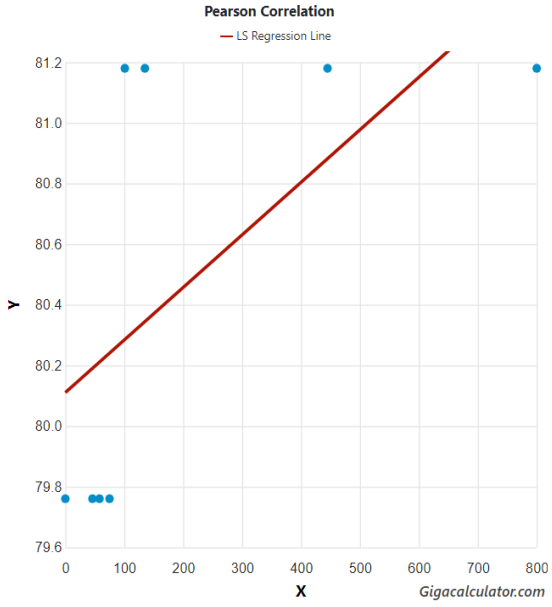

Fig. 4. Correlation between abundance and highest relative humidity across therange of *Centrobolus* Cook, 1897.

Mean ocean water temperature was related to abundances (Fig. 5: r=0.63046242, Z score=1.65957221, n=8, p=0.04850025).

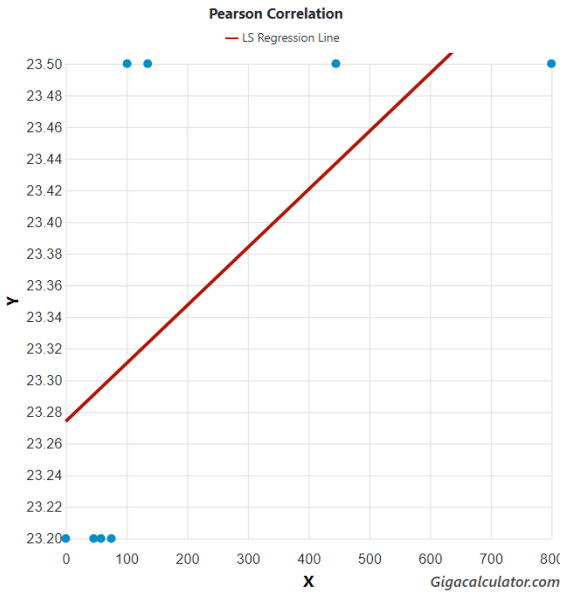

Fig. 5. Correlation between mean ocean water temperature and abundances in *Centrobolus* Cook, 1897.

Minimum ocean water temperature was related to abundances (Fig. 6: r=0.63046242, Z score=1.65957221, n=8, p=0.04850025).

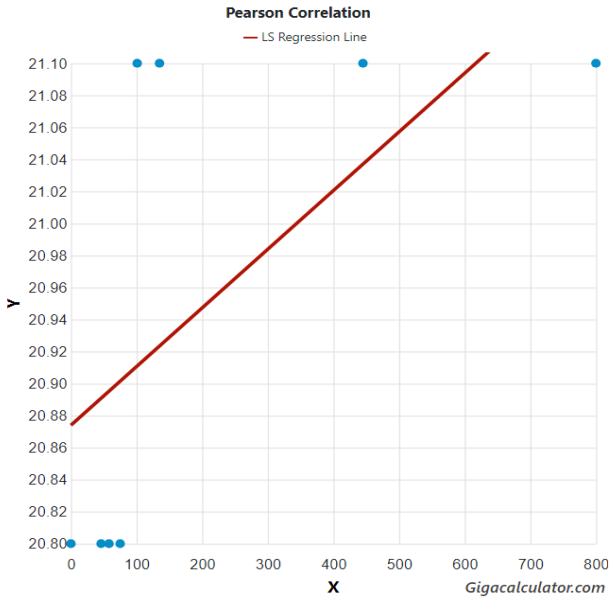

Fig. 6. Correlation between minimum ocean water temperature and abundances in *Centrobolus* Cook, 1897.

Maximum ocean water temperature was related to abundances (Fig. 7: r=-0.63046242, Z score=-1.65957221, n=8, p=0.04850025).

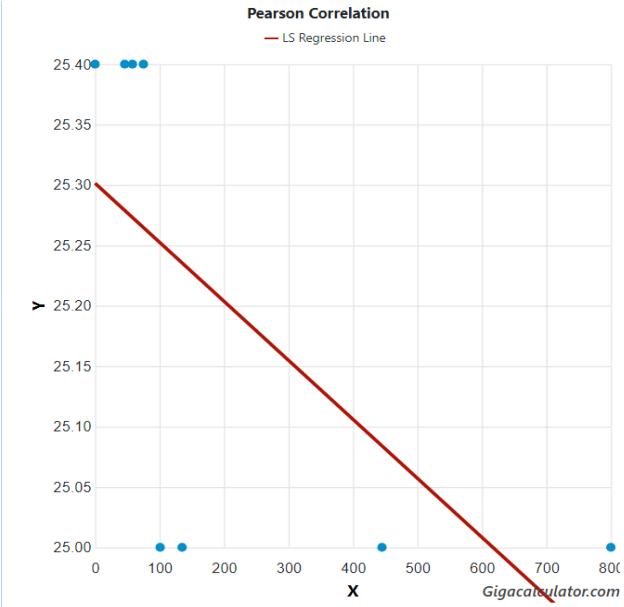

Fig. 7. Correlation between maximum ocean water temperature and abundances in *Centrobolus* Cook, 1897.

IV. DISCUSSION

There is a correlation between abundance and at least seven factors in *Centrobolus*. Each correlation is hypothetical.

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APPENDIX 1. Abundance across two species of *Centrobolus* followed by minimum precipitaion (mm).
101, 39
445, 39
800, 39
135, 39
46, 30
58, 30
75, 30
0, 30

APPENDIX 2. Abundance across two species of *Centrobolus* followed by maximum precipitaion (mm).
101, 119
445, 119
800, 119
135, 119
46, 103
58, 103
75, 103
0, 103

APPENDIX 3. Sternite prominence (%) followed by abundance for two species of *Centrobolus* Cook, 1897.
30, 46
30, 75
30, 58
30, 0
50, 101
50, 445
50, 135
50, 800

APPENDIX 4. Abundance across two species of *Centrobolus* followed by highest relative humidity (%).
0, 79.76
58, 79.76
75, 79.76
46, 79.76
445, 81.18
101, 81.18
135, 81.18
800, 81.18

APPENDIX 5. Mean ocean temperature (degrees Celsius) preceded by abundances in two coastal *Centrobolus* Cook, 1897.
0, 23.2
58, 23.2

75, 23.2
46, 23.2
445, 23.5
101, 23.5
135, 23.5
800, 23.5

APPENDIX 6. Minimum ocean temperature (degrees Celsius) preceded by abundances in two coastal *Centrobolus* Cook, 1897.
0, 20.80
58, 20.80
75, 20.80
46, 20.80
445, 21.10
101, 21.10
135, 21.10
800, 21.10

APPENDIX 7. Maximum ocean temperature (degrees Celsius) preceded by abundances in two coastal *Centrobolus* Cook, 1897.
0, 25.4
58, 25.4
75, 25.4
46, 25.4
445, 25.0
101, 25.0
135, 25.0
800, 25.0