

## STERNITE PROMINENCE AND OCEAN WATER TEMPERATURE ARE RELATED TO ABUNDANCE IN *CENTROBOLUS* COOK, 1897

M. Cooper

University of Johannesburg, South Africa.

**Abstract-** Sternite prominence was tested for a correlation with abundance in forest red millipedes *Centrobolus*. Sternite prominence was related to abundance (Pearson's  $r=0.63046242$ ,  $Z$  score= $1.65957221$ ,  $n=8$ ,  $p=0.04850025$ ). Ocean water temperature was tested for a correlation with abundance in red millipedes *Centrobolus*. Mean ocean water temperature was related to abundances ( $r=0.63046242$ ,  $Z$  score= $1.65957221$ ,  $n=8$ ,  $p=0.04850025$ ). Maximum ocean water temperature was related to abundances ( $r=0.63046242$ ,  $Z$  score= $1.65957221$ ,  $n=8$ ,  $p=0.04850025$ ). Minimum ocean water temperature was related to abundances ( $r=0.63046242$ ,  $Z$  score= $1.65957221$ ,  $n=8$ ,  $p=0.04850025$ ).

**Keywords:** surface area, SSD, Red Millipedes

### I. INTRODUCTION

Red millipedes are found in the southern African subregion with northern limits on the east coast being about  $-17^\circ$  latitude S and southern limits being  $-35^\circ$  latitude S. They are well represented in the littoral forests of the eastern half of the subcontinent [1-297]. 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, sternite prominence and ocean water temperature were tested for correlations with abundance in *Centrobolus* Cook, 1897.

### II. MATERIALS AND METHODS

Sternite prominence (Appendix 1) measurements for 4 species of southern African *Centrobolus* were obtained from published material [7, 18, 28]. These were correlated with abundance and generated at <https://www.gigacalculator.com/calculators/correlation-coefficient-calculator.php>. Horizontal tergite width measurements for 9 species of southern African *Centrobolus* were obtained from published material [57]. These were halved to get radii ( $r$ ). The curved surface areas ( $\text{mm}^2$ ) were calculated based

on the equation Surface Area (Curved) =  $2 \times \pi \times$  Radius  $\times$  Height. A correlation between maximum, mean and minimum ocean water temperature and abundances were generated at <https://www.socscistatistics.com/tests/pearson/default2.aspx> (Appendix 2-4).

### III. RESULTS

Sternite prominence was related to abundance (Fig. 1: Pearson's  $r=0.63046242$ ,  $Z$  score= $1.65957221$ ,  $n=8$ ,  $p=0.04850025$ ).

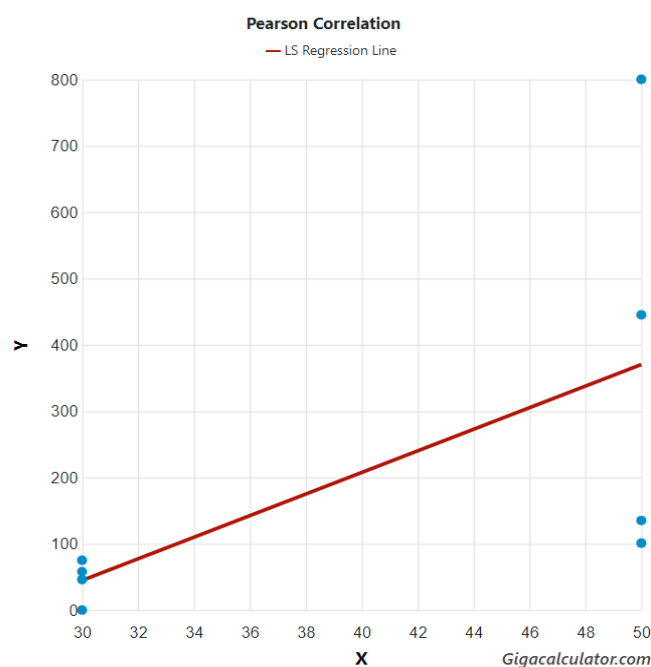
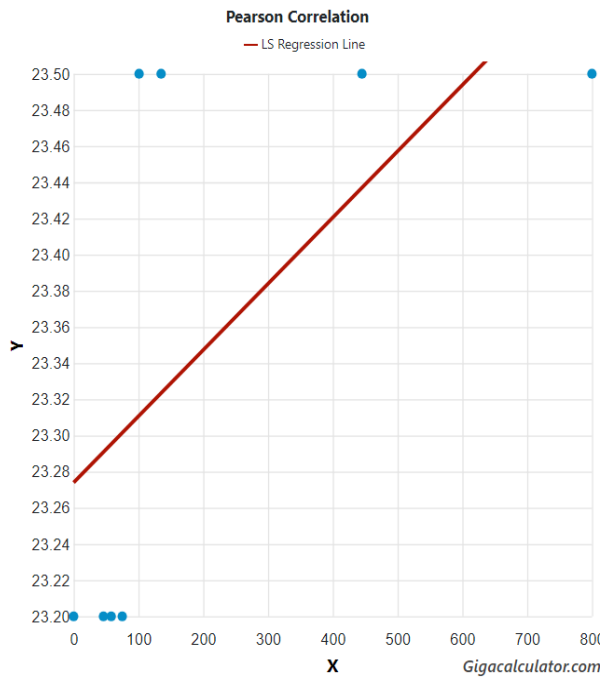


Fig. 1 Sternite prominence correlated to abundance in *Centrobolus* Cook, 1897.

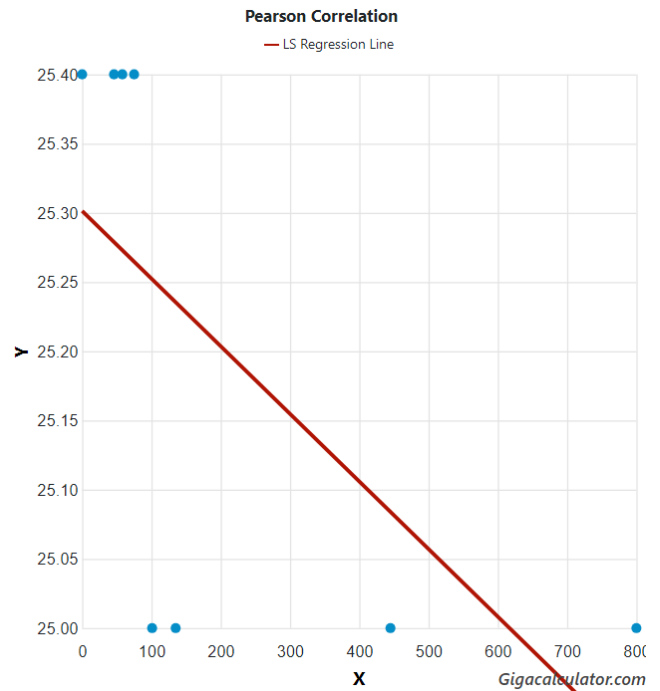
Mean ocean water temperature was related to abundances (Fig. 2:

$r=0.63046242$ ,  $Z$   
 score= $1.65957221$ ,  $n=8$ ,  
 $p=0.04850025$ ).



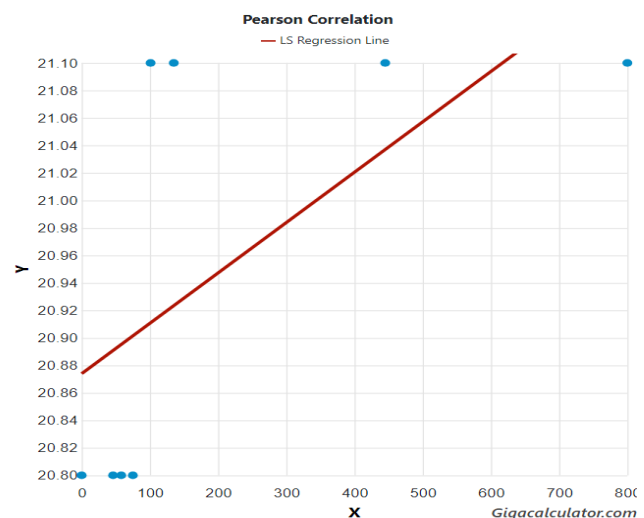
**Fig. 2. Correlation between mean ocean water temperature and abundances in *Centrobolus* Cook, 1897.**

Maximum ocean water temperature was related to abundances (Fig. 3:  $r=-0.63046242$ ,  $Z$  score= $-1.65957221$ ,  $n=8$ ,  $p=0.04850025$ ).



**Fig. 3. Correlation between maximum ocean water temperature and abundances in *Centrobolus* Cook, 1897.**

Minimum ocean water temperature was related to abundances (Fig. 4:  $r=0.63046242$ ,  $Z$  score= $1.65957221$ ,  $n=8$ ,  $p=0.04850025$ ).



**Fig. 4. Correlation between minimum ocean water temperature and abundances in *Centrobolus* Cook, 1897.**

#### IV. DISCUSSION

The significant differences between males and females in structure are known in this genus [7, 18, 28]. There is a correlation between sternite prominence and abundance in *Centrobolus*. This is an addition to one of the many correlated with body size in millipedes. There is a correlation between mean, minimum and maximum ocean water temperature and abundances in *Centrobolus*.

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**APPENDIX 1.** 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 2.** 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 3.** 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

**APPENDIX 4.** 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