

SURFACE AREA-TO-VOLUME RATIO IS RELATED TO HIGHEST TOTAL HOURS OF SUNSHINE IN A MONTH IN *CENTROBOLUS* COOK, 1897

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Abstract- Surface area-to-volume ratio was tested for a correlation with highest total hours of sunshine in a month in forest red millipedes *Centrobolus*. Surface-area-to-volume ratio was related to highest total hours of sunshine in a month in males (Pearson's $r=0.39827777$, Z score= 1.83771325 , $n=22$, $p=0.03305228$) and in females (Pearson's $r=0.37056569$, Z score= 1.69595464 , $n=22$, $p=0.04494721$).

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° latitude S and southern limits being -35° latitude S. They are well represented in the littoral forests of the eastern half of the subcontinent [1-326]. It consists of taxonomically important species with 12 species considered threatened and includes nine vulnerable and three endangered species [326]. It occurs in all the forests of the coastal belt from the Cape Peninsula to Beira in Mocambique [325]. These worm-like millipedes have female-biased sexual size dimorphism [57].

Here, surface-area-to-volume ratio was tested for a correlation with highest total hours of sunshine in a month in *Centrobolus* Cook, 1897.

II. MATERIALS AND METHODS

Surface-area-to-volume ratio for 22 species of southern African *Centrobolus* were obtained from published material [68]. These were correlated with highest total hours of sunshine in a month and generated at <https://www.gigacalculator.com/calculators/correlation-coefficient-calculator.php>.

III. RESULTS

Surface-area-to-volume ratio was related to highest total hours of sunshine in a month in males (Fig. 1: Pearson's $r=0.39827777$, Z

score= 1.83771325 , $n=22$, $p=0.03305228$) and in females (Fig. 2: Pearson's $r=0.37056569$, Z score= 1.69595464 , $n=22$, $p=0.04494721$).

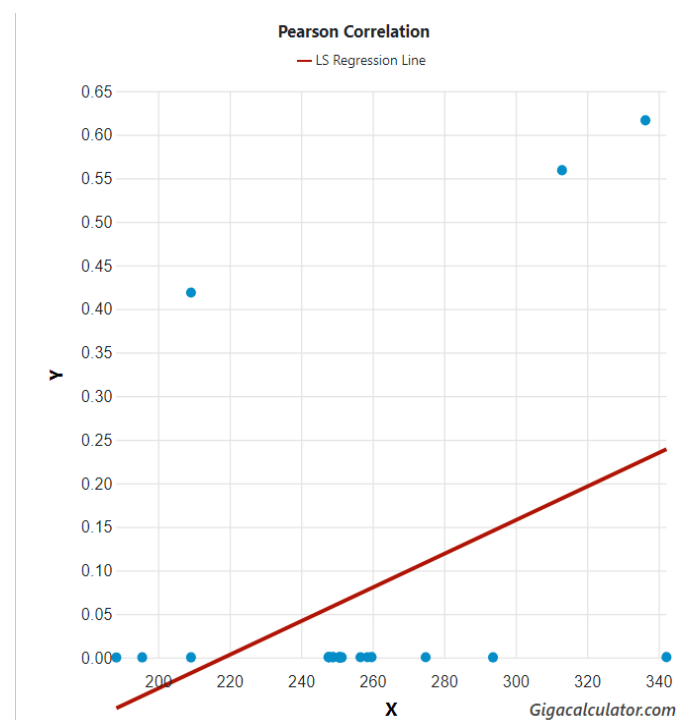


Fig. 1 Surface-area-to-volume ratio correlated with highest total hours of sunshine in a month in male *Centrobolus* Cook, 1897.

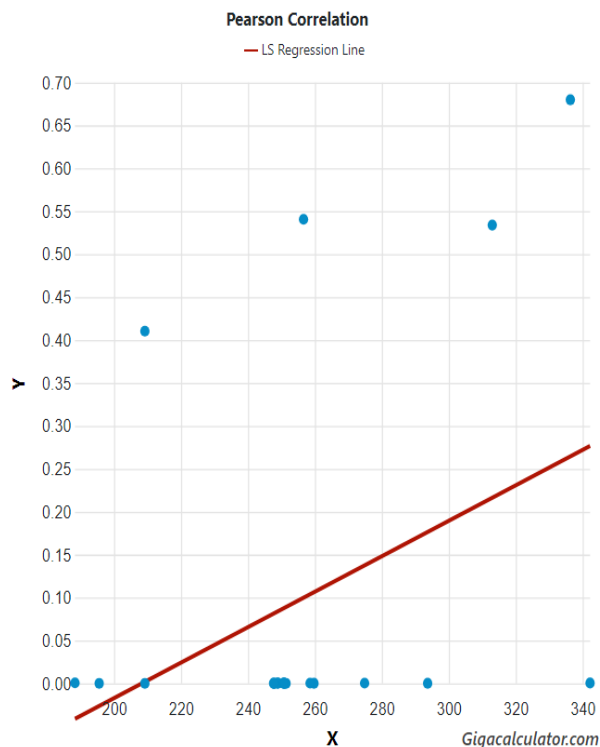


Fig. 2 Surface-area-to-volume ratio correlated to highest total hours of sunshine in a month in female *Centrobolus* Cook, 1897.

IV. DISCUSSION

The significant differences between males and females in volumes are known in this genus [68]. There is a correlation between surface-area-to-volume ratios and highest total hours of sunshine in a month in *Centrobolus*. This is an addition to one of the many correlated with body size in millipedes.

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APPENDIX 1. Male surface-area-to-volume ratios preceded by highest total hours of sunshine in a month throughout the year (h) for 22 species of *Centrobolus* Cook, 1897.

259.73, 0.000510
248.89, 0.000486
256.60, 0.000365
342.21, 0.000485
293.68, 0.000245
209.20, 0.000218
247.85, 0.000294
250.86, 0.000136
248.89, 0.000393
247.77, 0.000335
250.72, 0.000156
336.32, 0.616435
247.65, 0.000510
209.20, 0.418711
251.38, 0.000220
250.72, 0.000223
195.55, 0.000169
250.72, 0.000357
312.99, 0.559114
258.55, 0.000422
274.85, 0.000349

188.32, 0.000136

APPENDIX 2. Female surface-area-to-volume ratios preceded by highest total hours of sunshine in a month (h) for 22 species of *Centrobolus* Cook, 1897.

259.73, 0.000177
248.89, 0.000578
256.60, 0.540690
342.21, 0.000484
293.68, 0.000179
209.20, 0.000132
247.85, 0.000108
250.86, 0.000113
248.89, 0.000274
247.77, 0.000213
250.72, 0.000716
336.32, 0.679931
247.65, 0.000245
209.20, 0.4103607
251.38, 0.000138
250.72, 0.000113
195.55, 0.000135
250.72, 0.000314
312.99, 0.533940
258.55, 0.000335
274.85, 0.000318
188.32, 0.000751