# SECOND POLAR MOMENTS OF INERTNESS ARE RELATED TO HIGHEST TOTAL HOURS OF SUNSHINE IN A MONTH IN FOREST RED MILLIPEDES *CENTROBOLUS* COOK, 1897

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Abstract- Highest total hours of sunshine in a month was tested for a correlation with second polar moments of inertness in forest red millipedes *Centrobolus*. Second polar moments of area in females were related to highest total hours of sunshine in a month (r=-0.5152, r<sup>2</sup>=0.2654, n=22, p=0.01418) and second polar moments of area in males marginally were related to highest total hours of sunshine in a month (r=-0.371, r<sup>2</sup>=0.1376, n=22, p=0.089159).

Keywords: second polar, 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 [1-297]. 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, second polar moments of area are correlated with highest total hours of sunshine in a month in *Centrobolus* Cook, 1897.

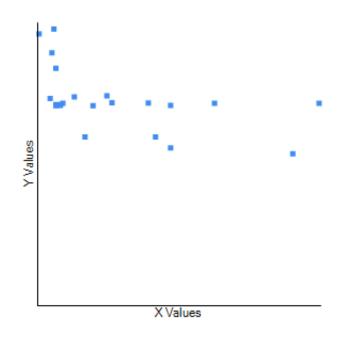
### II. MATERIALS AND METHODS

Horizontal tergite width measurements for 22 species of southern African *Centrobolus* were obtained from published material [57]. These were halved to get radii (r). The surface areas (mm<sup>2</sup>) were calculated based on the equation  $2 \cdot \pi \cdot r \cdot (r + m \cdot r)$ 

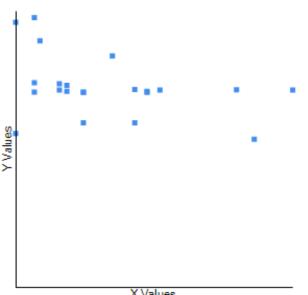
h) for males and females (Appendix 1 & 2 respectively). A correlation between second polar moments of area with highest total hours of sunshine in a month was generated at https://www.gigacalculator.com/calculators/correlati on-coefficient-calculator.php.

# III. RESULTS

Second polar moments of area in females were related to highest total hours of sunshine in a month (Figure 1: r=-0.5152, r<sup>2</sup>=0.2654, n=22, p=0.01418) and second polar moments of area in males marginally were related to highest total hours of sunshine in a month (Fig. 2: r=-0.371, r<sup>2</sup>=0.1376, n=22, p=0.089159).



#### Fig. 1 Second polar moments of area in females correlated to highest total hours of sunshine in a month in Centrobolus Cook, 1897.



X Values

Fig. 2 Second polar moments of area in males marginally correlated to highest total hours of sunshine in a month in Centrobolus Cook, 1897.

#### IV. DISCUSSION

The significant differences between males and females in surface area are known in this genus <sup>[68]</sup>. There is a correlation between second polar moments of area in females and highest total hours of sunshine in a month; marginally in males. This is an addition to one of the many correlated with body size in millipedes.

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**APPENDIX 1.** Highest total hours of sunshine in a month (h; two significant figures after the decimal) followed by second polar moments of area (mm<sup>4</sup>; three significant figures after the decimal) for female *Centrobolus* Cook, 1897.

- 259.73 248.89
- 256.60
- 342.21

293.68	APPENDIX 2. Highest total hours of sunshine in a
209.20	month (h; two significant figures after the decimal)
247.85	followed by second polar moments of area (mm <sup>4</sup> ;
250.86	three significant figures after the decimal) for male
248.89	Centrobolus Cook, 1897.
247.77	259.73
250.72	248.89
336.32	256.60
247.65	342.21
209.20	293.68
251.38	209.20
250.72	247.85
195.55	250.86
250.72	248.89
312.99	247.77
258.55	250.72
247.85	336.32
188.32	247.65
2035.752	209.20
644.1247	251.38
488.7841	250.72
588.7495	195.55
644.1247	250.72
3358.579	312.99
3771.482	258.55
3165.331	247.85
766.4985	188.32
644.1247	402.12386
7820.545	1239.43386
186.2840	644.12467
1658.133	402.12386
1437.377	981.747706
2174.900	1148.50596
4970.098	766.498501
3771.482	1903.39062
833.8440	644.12467
537.0240	766.498501
1148.506	2321.06144
766.4985	263.833465
7101.912	1239.43386

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766.498501 1148.50596 1335.65692 263.833465 588.749544 443.869501 588.749544 402.12386 2035.75204