SURFACE AREA TO VOLUME RATIO CORRELATES WITH THE LOWEST AVERAGE TEMPERATURE AND POTENTIALLY ALSO SPECIES RICHNESS IN PILL MILLIPEDES *SPHAEROTHERIUM* BRANDT, 1833.

M. I. Cooper
University of Stellenbosch, South Africa.

***Abstract*- The surface area to volume ratio with the lowest average temperature across the distribution of pill millipedes *Sphaerotherium* Brandt, 1833 was calculated. There was a correlation between the surface area to volume ratio with the lowest average temperature across the distribution of pill millipedes *Sphaerotherium* (r=-0.6074, r^2=0.3689, n=7, p=0.02134). Male surface area to volume ratio was related to species richness (P-value calculator: Z score=2.021174, n=2, 6, p=0.043262). Lowest environmental temperature was also related to species richness (P-value calculator: Z score=-8.181650, n=2, 6, p=0). Female surface area to volume ratio was also related to species richness (P-value calculator: Z score=3.194887, n=2, 6, p=0.001399).**

***Keywords*: driest, months, Pill Millipedes, wettest.**

I. INTRODUCTION

Diplopoda are underrepresented in allometric analyses of sexual size dimorphism (SSD), although sexual differences are known in body mass, length, width and leg dimensions of over half the taxa studied [1-380]. Size differences occur with factors such as color, sexes, species, urbanisation and water relations. Diplopoda resemble the majority of invertebrates where SSD is reversed. SSD has consequences for the outcome of sexual encounters in diplopod mating. The macro-evolutionary patterns are being resolved in the class Diplopoda.

In the present study, a correlation between the surface area to volume ratio with the lowest average temperature across the distribution of pill millipedes *Sphaerotherium* Brandt, 1833 was conducted.

II. MATERIALS AND METHODS

The lowest average temperature were obtained at https://en.climate-data.org/africa/south-africa across the distribution of seven pill millipedes Sphaerotherium Brandt, 1833. Surface area was calculated at https://www.omnicalculator.com/math/area-of-sphere from the widths of seven millipede species (https://www.entomoljournal.com/archives/2018/vol6issue1/PartI/5-6-352-508.pdf) (Appendix 1 & 2). A correlation between the two factors was generated at https://www.gigacalculator.com/calculators/correlation-coefficient-calculator.php.

III. RESULTS

There was a correlation between the surface area to volume ratio with the lowest average temperature across the distribution of pill millipedes *Sphaerotherium* (Fig. 1: r=-0.6074, r^2=0.3689, n=7, p=0.02134).

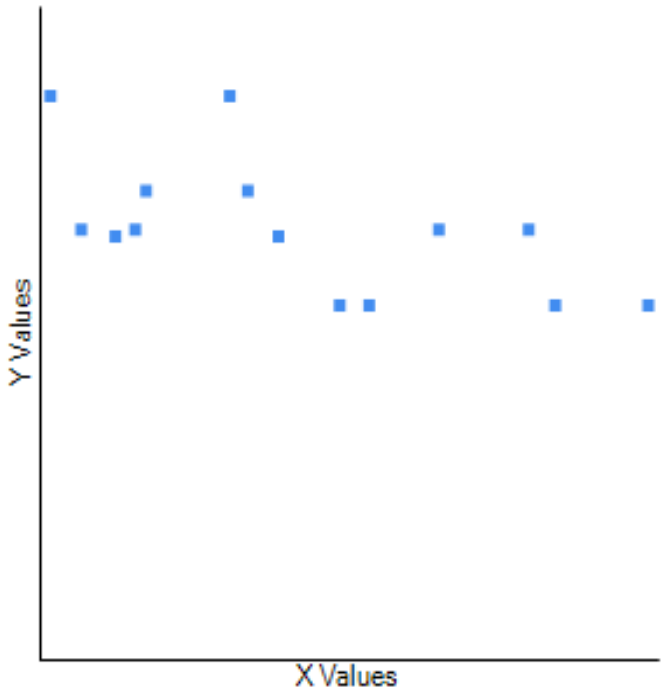

Fig. 1 A negative correlation between the surface area to volume ratio with the lowest average temperature across the distribution of pill millipedes *Sphaerotherium*.

IV. DISCUSSION

The significant effect of weather on males and females in size are known in this genus. There is a negative correlation between the surface area to volume ratio and the lowest average temperature. This is an addition to one of the many potential environmental effects on body size in pill millipedes. Both factors are correlated with species richness.

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APPENDIX 1. The surface area to volume ratios (1/mm) followed by the lowest environmental temperature (degrees Celsius) in seven pill millipedes *Sphaerotherium* Brandt, 1833.

0.19355
0.5
0.27907
0.25
0.26087
0.4286
0.4444
0.1613
0.3158
0.1818
0.14286
0.2
0.375
0.3333
13.2
10.9
13.0
17.3
14.4
13.2
10.9
13.2
10.9
13.0
17.3
14.4
13.2
10.9