

MOMENTS OF INERTIA ARE RELATED TO SPECIES RICHNESS IN RED MILLIPEDES *CENTROBOLUS* COOK, 1897

Author's Name: Mark Cooper

Affiliation: University of Stellenbosch, South Africa

DOI No. – 08.2020-25662434

Abstract

The correlation coefficients between moments of inertia and mean species richness were calculated in the red millipedes *Centrobolus*. Moments of inertia were correlated against species richness within 3.6-degree classes from -17° S to -35° S. Moments of inertia are related to mean species richness ($r=0.66837694$, Z score= 2.13724796 , $n=10$, $p=0.01628886$). Female moments of inertia were marginally related to mean species richness ($r=0.74619827$, Z score= 1.36375647 , $n=5$, $p=0.08632217$). Male moments of inertia were marginally related to mean species richness ($r=0.78060074$, Z score= 1.48054929 , $n=5$, $p=0.06936339$). Moments of inertia (10.4524 ± 3.829) with high species richness (14.5 species) were different from moments of inertia (4.4 ± 3.4436) with low species richness (2 species) ($T=2.5897$, $p=0.03556$, $d=1.63$, $df=7.0925$).

Keywords: Inertia, Species, Millipedes

INTRODUCTION

A forest genus of diplopods belonging to the Order Spirobolida found along the eastern coast of southern Africa was the subject of this study [1-87]. The millipede genus *Centrobolus* has its northern limits on the east coast at about -17° South (S) and southern limits at about -35° S. It occurs in all the forests of the coastal belt from the Cape Peninsula to Beira in Mocambique. As essentially shade-loving Diplopoda, the members of the genus are especially well represented in these forests of the eastern half of the subcontinent with 39 species. *Centrobolus* illustrates female-biased sexual size dimorphism (SSD) [19].

From the results, correlations between moments of inertia and species richness were checked.

MATERIALS AND METHODS

Five of thirty-nine valid species were identified as belonging to the genus *Centrobolus* Cook, 1897. Millipede localities were obtained from a checklist of southern African millipedes. The correlation coefficients between moments of inertia and mean species richness was calculated at <https://www.gigacalculator.com/calculators/correlation-coefficient-calculator.php>. To test for a linear relationship between moments of inertia and species richness a correlation is performed. Moments of inertia were correlated against species richness within 3.6-degree classes from -17° S to -35° S. To model, this variation moments of inertia with high species richness (14.5) are compared to moments of inertia with low species richness (2) comparing moments of inertia for species between -17° S to -27.8° S (*C. anulatus*, *C. fulgidus*, *C. inscriptus*) with moments of inertia for species between -27.8° S to -35° S (*C. digrammus*, *C. ruber*).

RESULTS

Moments of inertia are related to mean species richness ($r=0.66837694$, Z score= 2.13724796 , $n=10$, $p=0.01628886$). Female moments of inertia were marginally related to mean species richness

($r=0.74619827$, $Z \text{ score}=1.36375647$, $n=5$, $p=0.08632217$). Male moments of inertia were marginally related to mean species richness ($r=0.78060074$, $Z \text{ score}=1.48054929$, $n=5$, $p=0.06936339$). Moments of inertia (4.4 ± 3.4436) with low species richness (2 species) were normally distributed ($D=0.2962$, $n=4$, $p=0.2466$). Moments of inertia (10.4524 ± 3.829) with high species richness (14.5 species) were normally distributed ($D=0.2962$, $n=4$, $p=0.2466$). Moments of inertia (10.4524 ± 3.829) with high species richness (14.5 species) were different from moments of inertia (4.4 ± 3.4436) with low species richness (2 species) ($T=2.5897$, $p=0.03556$, $d=1.63$, $df=7.0925$).

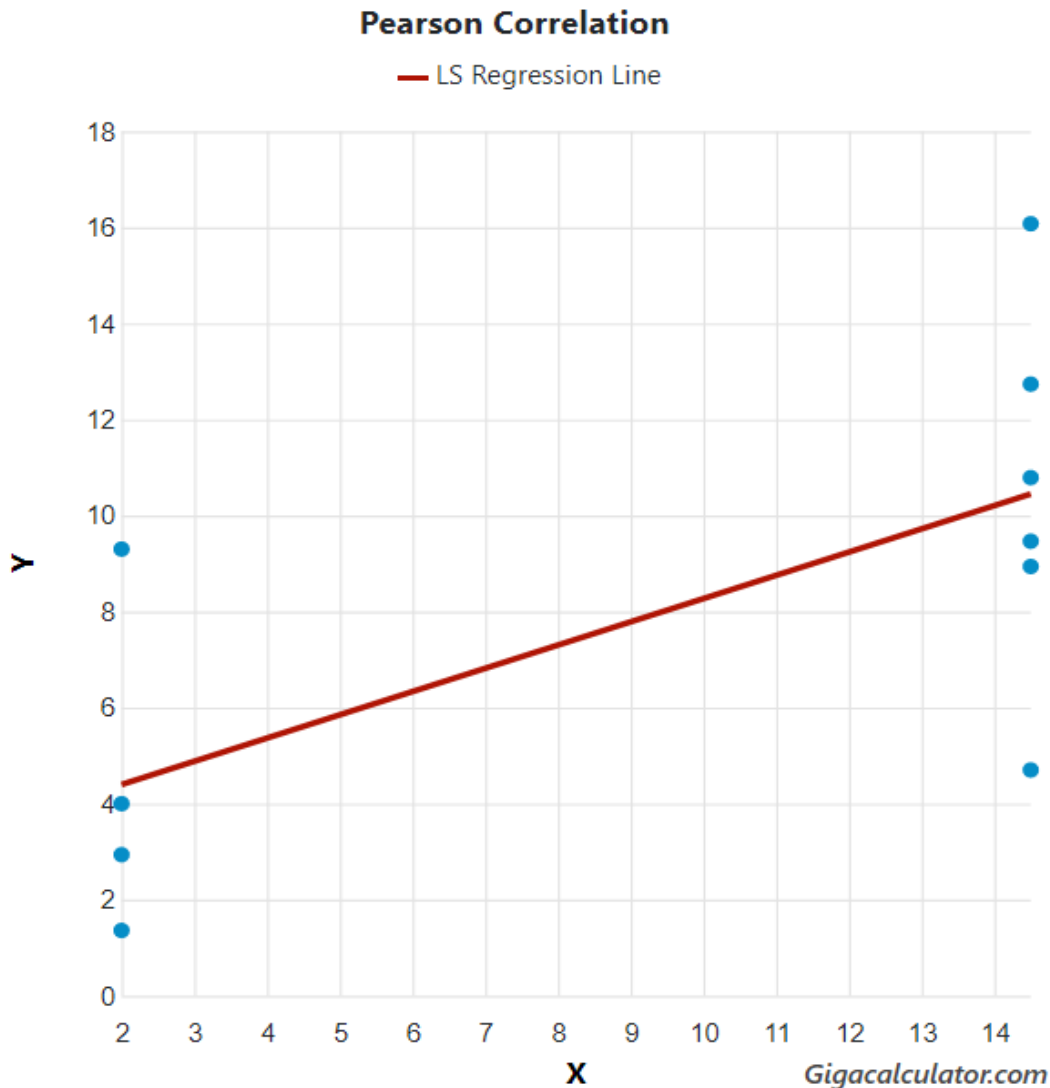


Figure 1. Moments of inertia - species richness relationship in *Centrobolus*.

DISCUSSION

The results of the comparison of correlations show an increase in moments of inertia with mean species richness. I found a positive relationship between moments of inertia and species richness. A linear relationship in the correlation between species richness and moments of inertia validates this. Moments of inertia with high species richness were different from moments of inertia with low species in *Centrobolus* implying a causal link between moments of inertia and species richness.

REFERENCE

- [1] Cooper MI. Mating dynamics of South African forest millipedes *Centrobolus* (Diplopoda: Pachybolidae). The University of Cape Town, 1-141, 1998.
- [2] Cooper MI. Elaborate gonopods in the myriapod genus *Chersastus* (Diplopoda: Trigoniulidae). Journal of Entomology and Zoology Studies. 2015; 3(4): 235-238.
- [3] Cooper M. Julid millipede and spirobolid millipede gonopod functional equivalents. Journal of Entomology and Zoology Studies. 2019; 7(4): 333-335.
- [4] Cooper MI. Sexual size dimorphism and corroboration of Rensch's rule in *Chersastus* millipedes. Journal of Entomology and Zoology Studies. 2014; 2(6): 264-266.
- [5] Cooper MI. Copulation and sexual size dimorphism in worm-like millipedes. Journal of Entomology and Zoology Studies 2017; 5(3): 1264-1266.
- [6] Cooper M. *Centrobolus anulatus* (Attems, 1934) reversed sexual size dimorphism. Journal of Entomology and Zoology Studies. 2018; 6(4): 1569-1572.
- [7] Cooper MI. The relative sexual size dimorphism of *Centrobolus inscriptus* compared to 18 congenics. Journal of Entomology and Zoology Studies. 2016; 4(6): 504-505.
- [8] Cooper MI. Relative sexual size dimorphism in *Centrobolus fulgidus* (Lawrence) compared to 18 congenics. Journal of Entomology and Zoology Studies. 2017; 5(3): 77-79.
- [9] Cooper MI. Relative sexual size dimorphism *Centrobolus ruber* (Attems) compared to 18 congenics. Journal of Entomology and Zoology Studies. 2017; 5(3): 180-182.
- [10] Cooper MI. Competition affected by re-mating interval in a myriapod. Journal of Entomology and Zoology Studies. 3(4):77-78.
- [11] Cooper M. Re-assessment of Rensch's rule in *Centrobolus*. Journal of Entomology and Zoology Studies. 2017; 5(6): 2408-1410. [12] Cooper MI. Sexual size dimorphism and the rejection of Rensch's rule in Diplopoda. Journal of Entomology and Zoology Studies. 2018; 6(1): 1582-1587.
- [13] Cooper MI. Allometry for sexual dimorphism in millipedes. Journal of Entomology and Zoology Studies. 2018; 6(1): 91-96.
- [14] Cooper MI. Trigoniulid size dimorphism breaks Rensch. Journal of Entomology and Zoology Studies. 6(3): 1232-1234.
- [15] Cooper M. A review of studies on the fire millipede genus *Centrobolus* (Diplopoda: Trigoniulidae). Journal of Entomology and Zoology Studies. 2018; 6(4): 126-129.
- [16] Cooper M. *Centrobolus sagatinus* sexual size dimorphism based on differences in horizontal tergite widths. Journal of Entomology and Zoology Studies. 2018; 6(6): 275-277.
- [17] Cooper M. *Centrobolus silvanus* dimorphism based on tergite width. Global Journal of Zoology. 2018; 3(1): 003-005.
- [18] Cooper M. Xylophagous millipede surface area to volume ratios are size dependent in forest. Arthropods. 2019; 8(4): 127-136.
- [19] Cooper MI. Allometry of copulation in worm-like millipedes. Journal of Entomology and Zoology Studies, 5(3): 1720-1722.
- [20] Cooper, Mark. Does sexual size dimorphism vary with longitude in forest millipedes *Centrobolus* Cook, 1897? International Journal of Recent Research in Thesis and Dissertation. 2022; 3(1): 1-5. <https://www.paperpublications.org/issue/IJRRTD/Issue-1-January-2022-June-2022.31>.
- [21] Cooper, Mark. Does sexual size dimorphism vary with latitude in forest millipedes *Centrobolus* Cook, 1897? Int. J. Re. Res. Thesis Diss. 2022; 3(1): 6-11. <https://www.paperpublications.org/issue/IJRRTD/Issue-1-January-2022-June-2022.32>.
- [22] Cooper, Mark. Does sexual size dimorphism vary with temperature in forest millipedes

- Centrobolus* Cook, 1897? Acta Entomol. Zool. 2022;3(1):08-11.
<https://doi.org/10.33545/27080013.2022.v3.i1a.51.33>).
- [23] Cooper, Mark. DOES SEXUAL SIZE DIMORPHISM VARY WITH MONTH WITH THE HIGHEST NUMBER OF RAINY DAYS IN FOREST MILLIPEDES *CENTROBOLUS* COOK, 1897. Universe Int. J. Interdiscip. Res. 2(9): 9-14. <https://www.doi-ds.org/doilink/03.2022-63261534/UIJIR.34>).
- [24] Cooper, Mark. PAIR-WISE COMPARISON OF SEXUAL SIZE DIMORPHISM AMONG NINE FACTORS IN FOREST MILLIPEDES *CENTROBOLUS* COOK, 1897. Universe Int. J. Interdiscip. Res.2(9): 31-33. <https://www.doi-ds.org/doilink/03.2022-75935617/UIJIR>.
- [25]. Cooper, Mark. Does sexual size dimorphism vary with female size in forest millipedes *Centrobolus* Cook, 1897? Acta Entomol. Zool. 3(1): 15-18. <https://doi.org/10.33545/27080013.2022.v3.i1a.57.36>).
- [26] Cooper, Mark. Does sexual size dimorphism vary with hours of sunshine throughout the year in forest millipedes *Centrobolus* Cook, 1897? Acta Entomol. Zool. 3(1): 19-25. DOI: <https://doi.org/10.33545/27080013.2022.v3.i1a.58.37>).
- [27] Cooper, Mark. DOES SEXUAL SIZE DIMORPHISM VARY WITH SPECIES RICHNESS IN FOREST MILLIPEDES *CENTROBOLUS* COOK, 1897? Universe Int. J. Interdiscip. Res. 2(10): 25-29. <https://www.doi-ds.org/doilink/04.2022-91496952/UIJIR>.
- [28] Cooper, Mark. PAIR-WISE COMPARISON OF SEXUAL SHAPE DIMORPHISM AMONG FIFTEEN FACTORS IN FOREST MILLIPEDES *CENTROBOLUS* COOK, 1897. Universe Int. J. Interdiscip. Res. 2(10): 9-14. <https://www.doi-ds.org/doilink/04.2022-18727172/UIJIR.39>).
- [29] Cooper, Mark Ian. Five factors effecting copulation duration in the breeding season in forest millipedes *Centrobolus* Cook, 1897. Zoological and Entomological Letters. 2(1): 17-22. <https://www.zoologicaljournal.com/archives/2022.v2.i1.A.26>.
- [30] Cooper, Mark. Does sexual size dimorphism vary with time in red millipedes *Centrobolus* Cook, 1897? Zool. Entomol. Lett. 2(1): 30-35. <https://www.zoologicaljournal.com/archives/2022.v2.i1.A.29.41>).
- [31] Cooper, Mark. Mating frequencies of sympatric red millipedes differ across substrate due to absolute abundances. Acta Entomol. Zool. 2022; 3(1): 34-39. <https://doi.org/10.33545/27080013.2022.v3.i1a.62>.
- [32]. Cooper, Mark. Does sexual size dimorphism vary with maximum and minimum temperatures in red millipedes *Centrobolus* Cook, 1897? Zool. Entomol. Lett. 2022; 2(1): 60-65. <https://www.zoologicaljournal.com/archives/2022.v2.i1.B.34>.
- [33]. Cooper, Mark. Does sexual size dimorphism vary with sex ratio in red millipedes *Centrobolus* Cook, 1897? Zool. Entomol. Lett. 2022; 2(1): 66-68. <https://www.zoologicaljournal.com/archives/2022.v2.i1.B.35.44>).
- [34]. Cooper, Mark. Millipede mass: Intersexual differences. Zool. Entomol. Lett. 2022; 2(1): 69-70. <https://www.zoologicaljournal.com/archives/2022.v2.i1.B.36.45>).
- [35] Cooper, Mark Ian. Do copulation duration and sexual size dimorphism vary with absolute abundance in red millipedes *Centrobolus* Cook, 1897? Acta Entomol. Zool. 2022; 3(1): 51-54. <https://www.actajournal.com/archives/2022.v3.i1.A.64>. <https://doi.org/10.33545/27080013.2022.v3.i1a.64>.
- [36]. Cooper, Mark. DOES SEXUAL SIZE DIMORPHISM VARY WITH FEMALE LENGTH IN FOREST MILLIPEDES *CENTROBOLUS* COOK, 1897? Universe Int. J. Interdiscip. Res. 2(12): 1-7. <https://www.doi-ds.org/doilink/05.2022-69939779/UIJIR>.
- [37]. Cooper, Mark. DOES SEXUAL SIZE DIMORPHISM VARY WITH PRECIPITATION IN FOREST

- MILLIPEDES *CENTROBOLUS* COOK, 1897? Munis Entomology and Zoology. 17(2): 1185-1189. https://www.munisentzool.org/Issue/abstract/does-sexual-size-dimorphism-vary-with-precipitation-in-forest-millipedes-centrobolus-cook-1897_13813.
- [38]. Cooper, Mark I. Do copulation durations of sympatric red millipedes vary seasonally with mating frequencies? Int. J. Re. Res. Thesis Diss. 2022; 3(1): 85-90. <https://doi.org/10.5281/zenodo.6613001>.
- [39]. Cooper, Mark I. The inverse latitudinal gradients in species richness of Southern African millipedes. Int. J. Re. Res. Thesis Diss. 2022; 3(1): 91-112. <https://doi.org/10.5281/zenodo.6613064>.
- [40]. Cooper, Mark Ian. DOES SEXUAL SIZE DIMORPHISM VARY WITH LOG SEXUAL SIZEDIMORPHISM IN RED MILLIPEDES *CENTROBOLUS* COOK, 1897? Universe Int. J. Interdiscip. Res.2022; 2(12): 52-54. <https://www.doi-ds.org/doi/10.2022-83544225/UIJIR>.
- [41]. Cooper, Mark Ian. Do copulation duration and sexual size dimorphism vary with absolute abundance in red millipedes *Centrobolus* Cook, 1897? Acta Entomol. Zool. 2022; 3(1): 51-54. <https://www.actajournal.com/archives/2022.v3.i1.A.64>. <https://doi.org/10.33545/27080013.2022.v3.i1a.64.46>.
- [42] Cooper, Mark. DOES SEXUAL SIZE DIMORPHISM VARY WITH FEMALE LENGTH INFOREST MILLIPEDES *CENTROBOLUS* COOK, 1897? Universe Int. J. Interdiscip. Res. 2(12): 1-7. <https://www.doi-ds.org/doi/10.2022-69939779/UIJIR>.
- [43]. Cooper, Mark. DOES SEXUAL SIZE DIMORPHISM VARY WITH PRECIPITATION INFOREST MILLIPEDES *CENTROBOLUS* COOK, 1897? Munis Entomology and Zoology. 17(2): 1185-1189. https://www.munisentzool.org/Issue/abstract/does-sexual-size-dimorphism-vary-with-precipitation-in-forest-millipedes-centrobolus-cook-1897_13813.48.
- [44] Cooper, Mark I. Do copulation durations of sympatric red millipedes vary seasonally with matingfrequencies? Int. J. Re. Res. Thesis Diss. 2022; 3(1): 85-90. <https://doi.org/10.5281/zenodo.6613001.49>.
- [45] Cooper, Mark I. The inverse latitudinal gradients in species richness of Southern African millipedes.Int. J. Re. Res. Thesis Diss. 2022; 3(1): 91-112. <https://doi.org/10.5281/zenodo.6613064>.
- [46]. Cooper, Mark Ian. DOES SEXUAL SIZE DIMORPHISM VARY WITH LOG SEXUAL SIZEDIMORPHISM IN RED MILLIPEDES *CENTROBOLUS* COOK, 1897? Universe Int. J. Interdiscip. Res.2022; 2(12): 52-54. <https://www.doi-ds.org/doi/10.2022-83544225/UIJIR>.
- [47] Cooper, M. I. FEMALE VOLUME, LOWEST HOURS OF SUNSHINE, MONTH WITH THE HIGHEST NUMBER OF RAINY DAYS, RAINFALL, AND TEMPERATURES IN THE COOLEST AND WARMEST MONTHS OF THE YEAR ARE RELATED TO LATITUDE (AND LONGITUDE) ACROSS THE DISTRIBUTION OF PILL MILLIPEDES *SPHAEROTHERIUM* BRANDT, 1833. Universe Int. J. Interdiscip. Res. 2022; 3(1): 11-22. <https://www.doi-ds.org/doi/10.2022-51527898/UIJIR>. URL: <http://hdl.handle.net/10019.1/125464.58>.
- [48] Cooper, M. THE TIE-IN OF MALE BODY WIDTH ON COPULATION DURATION IN *CENTROBOLUS* COOK, 1897. Universe Int. J. Interdiscip. Res. 2022; 3(1): 45-47. <https://www.doi-ds.org/doi/10.2022-88932399/UIJIR.59>.
- [49]. Cooper, M. Ian. IS A PROMINENT STERNITE RELATED TO MOMENTS OF INERTIA IN *CENTROBOLUS* COOK, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 8(12): 26-28. http://www.ijesird.com/1_june_22.PDF.60. [50] Cooper, M. Ian. IS COPULATION DURATION RELATED TO MOMENTS OF INERTIA IN *CENTROBOLUS* COOK, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 8(12): 29-31. http://www.ijesird.com/2_june_22.PDF.61.

- [51] Cooper, M. Ian. 2022. COPULATION DURATION IS RELATED TO EJACULATING VOLUME IN CENTROBOLUS INSCRIPTUS (ATTEMPS, 1928). International Journal of Engineering Science Invention Research & Development. 2022; 8(12): 32-40. http://www.ijesird.com/3_june_22.PDF.
- [52]. Cooper, M. Ian. Is a prominent sternite related to mass in Centrobolus Cook, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(1): 1-4. http://www.ijesird.com/1_jul_22.PDF.
- [53] Cooper, Mark Ian. Does sex ratio vary with absolute abundance in red millipedes Centrobolus Cook, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(1): 5-8. http://www.ijesird.com/2_jul_22.PDF.64.
- [54] Cooper, M. Ian. Does copulation duration vary with absolute abundance in red millipedes Centrobolus Cook, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(1): 9-11. http://www.ijesird.com/3_jul_22.PDF.65.
- [55] Cooper, M. Ian. Are a prominent sternite, coleopod spine length, and spine number related to mating frequencies in Centrobolus Cook, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(1): 12-15. http://www.ijesird.com/4_jul_22.PDF.
- [56]. Cooper, M. I. Are coleopod spine length and number related to weather in Centrobolus Cook, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(1): 16-23. http://www.ijesird.com/5_jul_22.PDF.67.
- [57] Cooper, M. I. Are coleopod spine length and number related to mass in Centrobolus Cook, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(1): 24-26. http://www.ijesird.com/6_jul_22.PDF.68.
- [58]. Cooper, Mark I. Is mass related to latitude, longitude, and weather in Centrobolus Cook, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(1): 27-32. https://www.ijesird.com/7_jul_22.PDF.69.
- [59] Cooper, M. Ian. ARE MATING FREQUENCIES RELATED TO ABSOLUTE ABUNDANCE IN CENTROBOLUS COOK, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(1): 33-37. https://www.ijesird.com/8_jul-22.PDF.
- [60]. Cooper, Mark Ian. Does sex ratio vary with absolute abundance in red millipedes Centrobolus Cook, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(1): 5-8. http://www.ijesird.com/2_jul_22.PDF.64.
- [61] Cooper, M. Ian. Does copulation duration vary with absolute abundance in red millipedes Centrobolus Cook, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(1): 9-11. http://www.ijesird.com/3_jul_22.PDF.65.
- [62] Cooper, M. Ian. Are a prominent sternite, coleopod spine length, and spine number related to mating frequencies in Centrobolus Cook, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(1): 12-15. http://www.ijesird.com/4_jul_22.PDF.
- [63]. Cooper, M. I. Are coleopod spine length and number related to weather in Centrobolus Cook, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(1): 16-23. http://www.ijesird.com/5_jul_22.PDF.67.
- [64] Cooper, M. I. Are coleopod spine length and number related to mass in Centrobolus Cook, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(1): 24-26. http://www.ijesird.com/6_jul_22.PDF.
- [65]. Cooper, Mark I. Is mass related to latitude, longitude, and weather in Centrobolus Cook, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(1): 27-32.

https://www.ijesird.com/7_jul_22.PDF.69).

[66] Cooper, M. Ian. ARE MATING FREQUENCIES RELATED TO ABSOLUTE ABUNDANCE INCENTROBOLUS COOK, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(1): 33-37. https://www.ijesird.com/8_jul-22.PDF.

[67] Cooper, M. Ian. DOES COPULATION DURATION VARY WITH SEX RATIO IN THE REDMILLIPEDE CENTROBOLUS INSCRIPTUS (ATTEMS, 1928)? International Journal of Engineering Science Invention Research & Development. 2022; 9(1): 38-40. https://www.ijesird.com/9_jul_22.PDF.

[68] Cooper, M. Ian. IS A PROMINENT STERNITE RELATED TO WEATHER IN CENTROBOLUSCOOK, 1897? International Journal of Engineering Science Invention Research & Development. 2022;9(1): 41-44. https://www.ijesird.com/10_jul_22.PDF.

[69]. Cooper, M. Ian. ARE MATING FREQUENCIES RELATED TO SEX RATIO IN CENTROBOLUS COOK, 1897? International Journal of Engineering Science Invention Research & Development. 2022;9(1): 45-48. https://www.ijesird.com/11_jul_22.PDF.

[70]. Cooper, M. Ian. ARE MATING FREQUENCIES RELATED TO SEXUAL SIZE DIMORPHISM IN CENTROBOLUS COOK, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(1): 49-51. https://www.ijesird.com/12_jul_22.PDF.

[71]. Cooper, Mark. ARE MATING FREQUENCIES RELATED TO MOMENTS OF INERTIA ACROSS THE SEXES IN CENTROBOLUS COOK, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(1): 52-55. https://www.ijesird.com/13_jul_22.PDF.

[72]. Cooper, M. Ian. ARE MATING FREQUENCIES RELATED TO TARSAL PAD LENGTH INCENTROBOLUS COOK, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(2): 1-4. https://www.ijesird.com/1_aug_22.PDF.

[73]. Cooper, Mark. IS COPULATION DURATION RELATED TO TARSAL PAD LENGTH IN CENTROBOLUS COOK, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(2): 65-67. https://www.ijesird.com/3_aug_22.PDF.

[74]. Cooper, Mark. ARE ABSOLUTE ABUNDANCES RELATED TO TARSAL PAD LENGTH INCENTROBOLUS COOK, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(2): 68-70. https://www.ijesird.com/4_aug_22.PDF.78).

[75]. Cooper, M. Ian. ARE MATING FREQUENCIES RELATED TO MALE AND FEMALE SIZE INCENTROBOLUS COOK, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(2): 71-76. https://www.ijesird.com/5_aug_22.PDF.79).

[76]. Cooper, Mark. DOES EJACULATE VOLUME VARY WITH ABSOLUTE ABUNDANCE IN RED MILLIPEDES CENTROBOLUS COOK, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(2): 77-79. https://www.ijesird.com/6_aug_22.PDF.80).

[77]. Cooper, M. Ian. THE MOMENTS OF INERTIA TIE-UP WITH FEMALE SIZE, HOURS OF SUNSHINE THROUGHOUT THE YEAR, LATITUDE, LONGITUDE, AND MINIMUM TEMPERATURE IN RED MILLIPEDES CENTROBOLUS COOK, 1897. Universe Int. J. Interdiscip. Res. 2022; 3(2): 6-12. <https://www.doi-ds.org/doi/10.2022-76913842/UIJIR.81>).

[78]. COOPER, Mark I. ARE MATING FREQUENCIES RELATED TO EJACULATE VOLUMES IN CENTROBOLUS COOK, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(3): 93-95. https://www.ijesird.com/aug_ten.PDF.82).

[79]. Cooper, Mark. 2022. DOES SEXUAL SIZE DIMORPHISM VARY WITH FEMALE WIDTH IN FOREST MILLIPEDES CENTROBOLUS COOK, 1897?. Munis Entomol. Zool. 17(supplement): 1562-1565. https://www.munisentzool.org/Issue/abstract/does-sexual-size-dimorphism-vary-with-female-width-in-forest-millipedes-centrobolus-cook-1897_13854.83).

- [80] Cooper, Mark. 2022. DOES SEXUAL SIZE DIMORPHISM VARY WITH THE HIGHEST TOTAL HOURS OF SUNSHINE IN A MONTH IN FOREST MILLIPEDES CENTROBOLUS COOK, 1897?. Munis Entomol. Zool. 17(supplement): 1596-1602. https://www.munisentzool.org/Issue/abstract/does-sexual-size-dimorphism-vary-with-the-highest-total-hours-of-sunshine-in-a-month-in-forest-millipedes-centrobolus-cook-1897_13858.
- [81]. Cooper, Mark. 2022. DOES SEXUAL SIZE DIMORPHISM VARY WITH BODY MASS INFOREST MILLIPEDES CENTROBOLUS COOK, 1897?. Munis Entomol. Zool. Suppl. 17(supplement):1621-1624. https://www.munisentzool.org/Issue/abstract/does-sexual-size-dimorphism-vary-with-body-mass-in-forest-millipedes-centrobolus-cook-1897_13861.85. [82]. COOPER, MARK. IS SIZE OR SSD RELATED TO ABUNDANCE IN CENTROBOLUS COOK,1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(3): 96-102. https://www.ijesird.com/sep_one.PDF.
- [83]. COOPER, MARK IAN. IS A PROMINENT STERNITE RELATED TO SEX RATIOS AND ABUNDANCE IN CENTROBOLUS COOK, 1897? International Journal of Engineering Science Invention Research & Development. 2022; 9(3): 103-106. https://www.ijesird.com/sep_two_6.PDF.
- [84]. Cooper, Mark I. DOES SEXUAL SIZE DIMORPHISM VARY WITH FEWEST DAILY HOURS OF SUNSHINE IN RED MILLIPEDES CENTROBOLUS COOK, 1897? Universe Int. J. Interdiscip. Res. 2022; 3(3): 89-92. <https://www.doi-ds.org/doi/10.2022-94655978/UIJIR.88>.
- [85]. COOPER, MARK. DOES (PREDICTED) MASS CORRELATE WITH MATING FREQUENCIES IN CENTROBOLUS COOK, 1897? Universe Int. J. Interdiscip. Res. 2022; 3(4): <https://www.doi-ds.org/doi/10.2022>. (ACCEPTED).
- [86]. COOPER, MARK I. IS MASS CORRELATED WITH LENGTH AMONG RED MILLIPEDES CENTROBOLUS COOK, 1897? Universe Int. J. Interdiscip. Res. 2022; 3(4): <https://www.doi-ds.org/doi/10.2022>. (ACCEPTED).
- [87]. Cooper, M. I. Sexual conflict over the duration of copulation in *Centrobolus inscriptus*. JOURNAL OF ENTOMOLOGY AND ZOOLOGY STUDIES 4(6): 852-854. DOI: 10.22271/j.ento.2016.v4.i6l.04.