

MONTH WITH THE LOWEST NUMBER OF RAINY DAYS IS RELATED TO AT LEAST FOUR FACTORS AND MONTH WITH THE HIGHEST NUMBER OF RAINY DAYS IS RELATED TO FIVE FACTORS IN FOREST RED MILLIPEDES *CENTROBOLUS* COOK, 1897

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Abstract- Four factors were tested for a correlation with the month with the lowest number of rainy days in red millipedes *Centrobolus*. The temperature ($r=0.4528$, $r^2=0.205$, $n=22$, $p=0.034336$), minimum ocean water temperature ($r=0.63447460$, Z score= 1.83435052 , $n=9$, $p=0.03330093$), mean ocean water temperature ($r=0.66698284$, Z score= 1.97254540 , $n=9$, $p=0.02427362$), and minimum precipitation ($r=0.5577$, $r^2=0.311$, $n=22$, $p=0.007$), was correlated with the lowest number of rainy days in a month. Month with the highest number of rainy days was tested for a correlation with five factors in the same red millipedes *Centrobolus*. Month with the highest number of rainy days was related to highest relative humidity ($r=0.5636$, $r^2=0.3176$, $n=22$, $p=0.006258$), altitude ($r=0.40736135$, Z score= 1.88497750 , $n=22$, $p=0.02971637$), highest ocean water temperature ($r=0.61969885$, Z score= 1.77469459 , $n=9$, $p=0.03797412$), minimum ocean water temperature ($r=0.90531504$, Z score= 3.67649734 , $n=9$, $p=0.00011826$) and mean ocean water temperature ($r=0.89410766$, Z score= 3.81527948 , $n=10$, $p=0.00006804$).

Keywords: Red Millipedes, rain, sunshine, volume.

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, four factors were tested for a correlation with the month with the lowest number of rainy days and month with the highest number of rainy days is correlated with five factors 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^2) were calculated based on the equation $2 \cdot \pi \cdot r \cdot (r + h)$ for males and females. A correlation between the month with the lowest number of rainy days and four factors and between month with the highest number of rainy days and five factors was generated at <https://www.socscistatistics.com/tests/pearson/default2.aspx> (Appendix 1-11).

III. RESULTS

The temperature was correlated with the month with the lowest number of rainy days (Fig. 1: $r=0.4528$, $r^2=0.205$, $n=22$, $p=0.034336$).

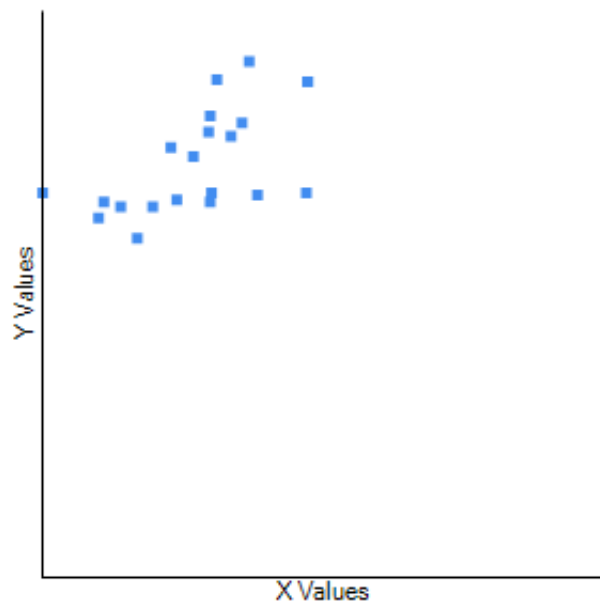


Fig. 1. Correlation between temperature (Y) and the month with the lowest number of rainy days (X) across therange of *Centrobolus* Cook, 1897.

Minimum ocean water temperature was related to the month with the lowest number of rainy days (Fig. 2: $r=0.63447460$, Z score= 1.83435052 , $n=9$, $p=0.03330093$).

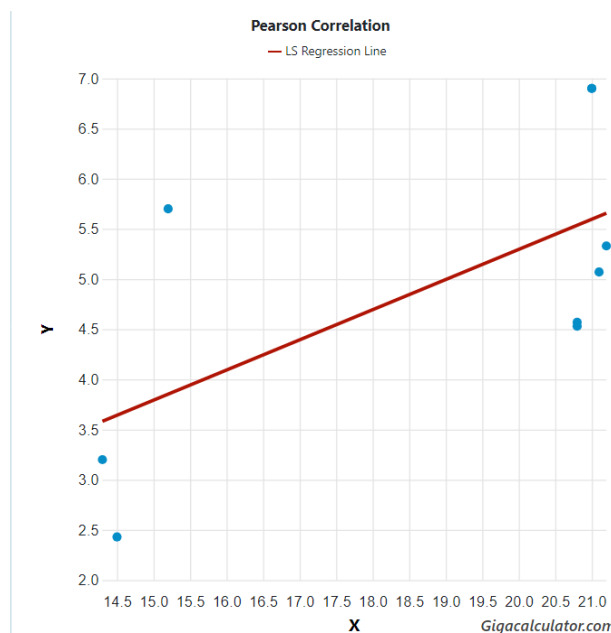


Fig. 2. Correlation between minimum ocean water temperature and the month with the lowest number of rainy days in *Centrobolus* Cook, 1897.

Mean ocean water temperature was related to the month with the lowest number of rainy days (Fig. 3: $r=0.66698284$, Z score= 1.97254540 , $n=9$, $p=0.02427362$).

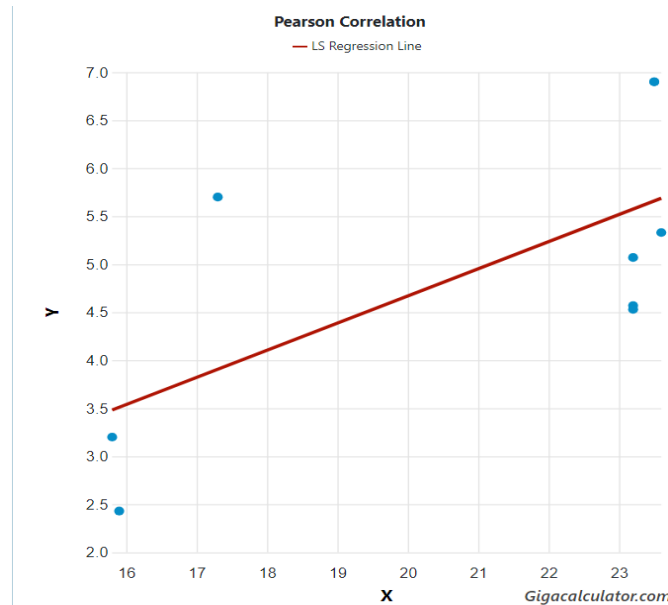


Fig. 3. Correlation between mean ocean water temperature and the month with the lowest number of rainy days in *Centrobolus Cook*, 1897.

The lowest number of rainy days in a month was correlated with minimum precipitation (Fig. 4: $r=0.5577$, $r^2=0.311$, $n=22$, $p=0.007$).

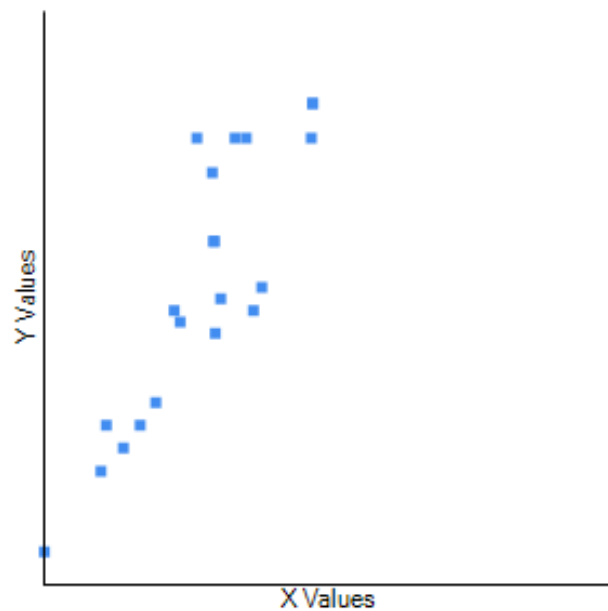


Fig. 4. Correlation between lowest number of rainy days in a month (X) and minimum precipitation (Y) across the range of *Centrobolus Cook*, 1897.

Month with the highest number of rainy days was related to highest relative humidity (Fig. 5: $r=0.5636$, $r^2=0.3176$, $n=22$, $p=0.006258$).

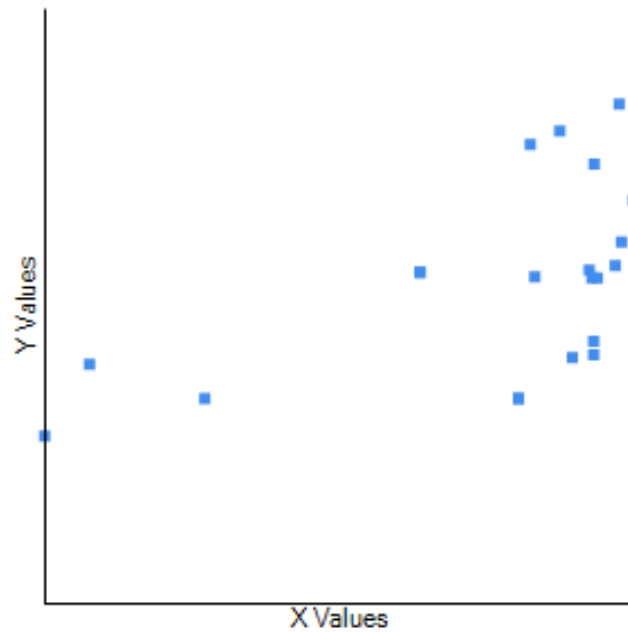


Fig. 5 Correlation between month with the highest number of rainy days and highest relative humidity across therange of *Centrobolus* Cook, 1897.

The month with the highest number of rainy days was correlated with altitude (Fig. 6: $r=0.40736135$, Z score= 1.88497750 , $n=22$, $p=0.02971637$).

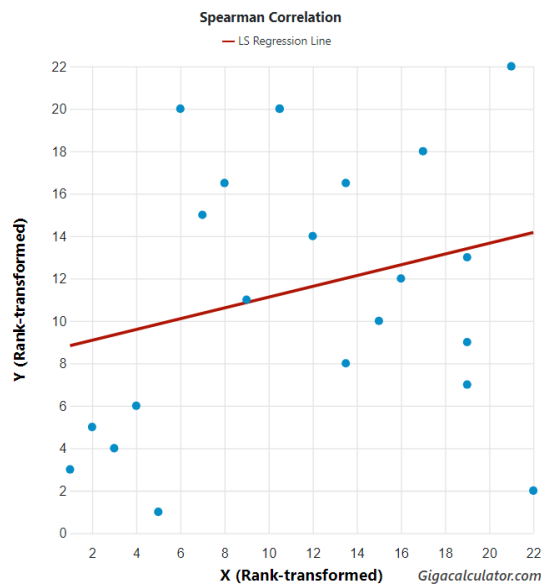


Fig. 6. Correlation between month with the highest number of rainy days (X) and altitude (Y) in *Centrobolus* Cook, 1897.

Highest ocean water temperature was related to the month with the highest number of rainy days (Fig. 7: $r=0.61969885$, Z score= 1.77469459 , $n=9$, $p=0.03797412$).

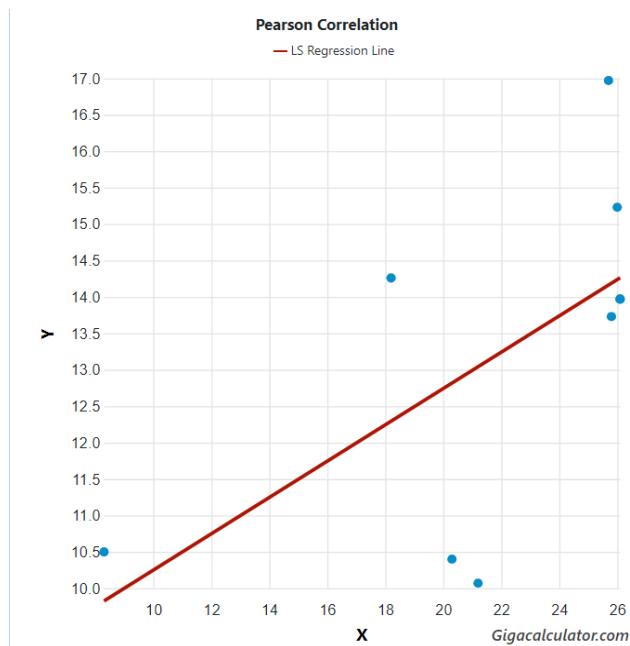


Fig. 7. Correlation between highest ocean water temperature and month with the highest number of rainy days in *Centrobolus* Cook, 1897.

Minimum ocean water temperature was related to the month with the highest number of rainy days (Fig. 8: $r=0.90531504$, Z score= 3.67649734 , $n=9$, $p=0.00011826$).

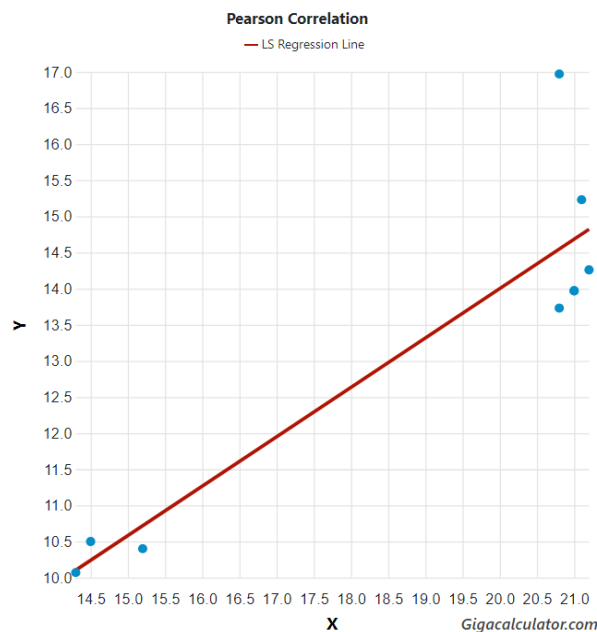


Fig. 8. Correlation between minimum ocean water temperature and month with the highest number of rainy days in *Centrobolus* Cook, 1897.

Mean ocean water temperature was related to the month with the highest number of rainy days (Fig. 9: $r=0.89410766$, Z score= 3.81527948 , $n=10$, $p=0.00006804$).

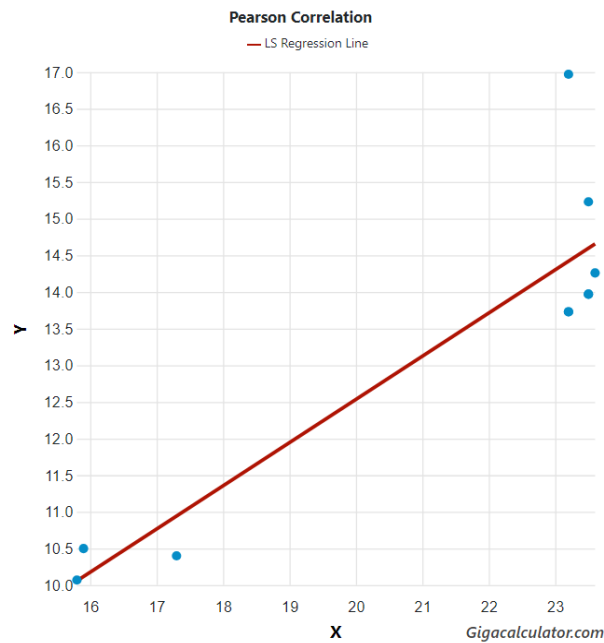


Fig. 9. Correlation between mean ocean water temperature and month with the highest number of rainy days in *Centrobolus Cook*, 1897.

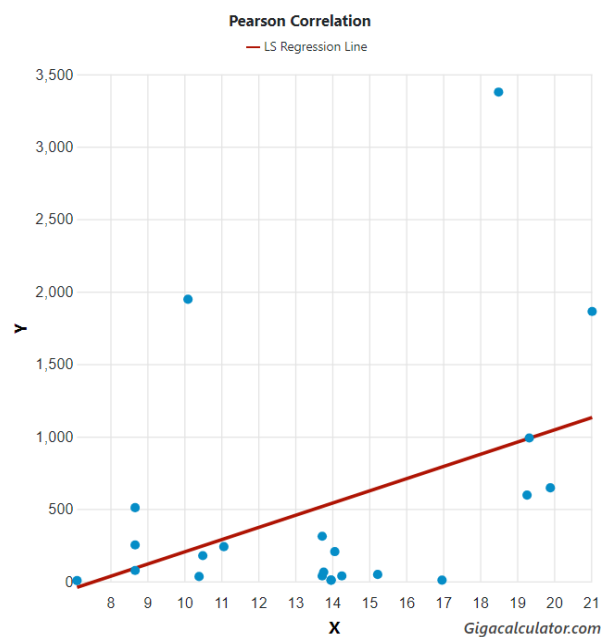


Fig. 10. Correlation between month with the highest number of rainy days (Y) and lowest number of daily hours of sunshine in a day (X) across the range of *Centrobolus Cook*, 1897.

IV. DISCUSSION

There is a correlation between month with the highest number of rainy days and five factors and there is a correlation between temperature with the month with the lowest number of rainy days in *Centrobolus*.

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APPENDIX 1. The average temperature across *Centrobolus* Cook, 1897.

15.9
20.4
16.6
16.4
16.9
21.9
22.8
19.5
16.6
16.7
17.0
16.4
19.5
21.9
20.1
22.0
18.6
19.0
17.0
17.0
15.0
19.7

APPENDIX 2. The month with the lowest number of rainy days across the range of *Centrobolus* Cook, 1897.

1.90
4.57
2.03
2.43
5.70
6.90
5.50
5.07
4.57
3.77
6.87
3.20
14.07

6.90
5.33
4.73
4.17
3.63
4.60
0.57
2.83
4.53

APPENDIX 3. Minimum ocean temperature (degrees Celsius) followed by the month with the lowest number of rainy days in coastal *Centrobolus* Cook, 1897.

20.80, 4.57
14.50, 2.43
15.20, 5.70
21.00, 6.90
21.10, 5.07
14.30, 3.20
21.00, 6.90
21.20, 5.33
20.80, 4.53

APPENDIX 4. Mean ocean temperature (degrees Celsius) followed by the month with the lowest number of rainy days in coastal *Centrobolus* Cook, 1897.

23.20, 4.57
15.90, 2.43
17.30, 5.70
23.50, 6.90
23.20, 5.07
15.80, 3.20
23.50, 6.90
23.60, 5.33
23.20, 4.53

APPENDIX 5. Minimum precipitation (mm) across the range of *Centrobolus* Cook, 1897.

10
30
14
12

26
42
24
39
30
23
39
16
27
42
39
25
39
24
22
3
14
36

APPENDIX 6. Month with the highest number of rainy days across the range of *Centrobolus* Cook, 1897.

24.7
19.90
13.73
19.33
10.50
10.40
13.97
21.03
15.23
13.73
19.27
8.67
11.07
14.07
13.97
14.26
13.77
8.67
8.67
7.10
10.10
18.50
16.97

APPENDIX 7. Highest relative humidity (%) across the range of *Centrobolus* Cook, 1897.259.73

77.31
79.76
75.38

79.52
78.13
68.18
81.18
81.34
79.41
82.51
74.61
79.52
79.22
68.18
80.93
75.67
74.61
54.11
43.65
46.57
79.55
82.11

APPENDIX 8. Altitude (m) across the range of *Centrobolus* Cook, 1897.

646
38
990
178
34
9
1863
48
312
596
252
240
206
9
38
65
76
509
6
1947
3377
9

APPENDIX 9. Highest ocean temperature (degrees Celsius) followed by month with the highest number of rainy days in *Centrobolus* Cook, 1897.

25.80, 13.73
8.30, 10.50

20.30, 10.40
26.10, 13.97
26.00, 15.23
21.20, 10.07
26.10, 13.97
18.20, 14.26
25.70, 16.97

APPENDIX 10. Minimum ocean temperature (degrees Celsius) followed by month with the highest number of rainy days in *Centrobolus Cook*, 1897.

20.80, 13.73
14.50, 10.50
15.20, 10.40
21.00, 13.97
21.10, 15.23
14.30, 10.07
21.00, 13.97
21.20, 14.26
20.80, 16.97

APPENDIX 11. Mean ocean temperature (degrees Celsius) followed by month with the highest number of rainy days in *Centrobolus Cook*, 1897.

23.20, 13.73
15.90, 10.50
17.30, 10.40
23.50, 13.97
23.50, 15.23
23.20, 13.73
15.80, 10.07
23.50, 13.97
23.60, 14.26
23.20, 16.97