ABSTRACT

Bergmann’s Rule predicts that body sizes of species in cold regions are larger than body sizes of species in warm regions. Using Bergmann’s Rule, we have used data on Ostracods (microscopic crustaceans) that includes their stratigraphic ranges and body size to create graphs to help us identify whether this hypothesis is true. We started by plotting the mean size throughout geologic time, from the Cambrian period to the Holocene. We also plotted the temperature changes within this time range. Both mean size and temperature gradually decreased through time. When we compare size and temperature directly, we notice a positive correlation of the mean body size versus the average temperature of the Earth over the past 540 million years; however, this graph contradicts Bergmann’s Rule. Evidently, as environmental temperature decreased over time, the mean size of Ostracods also decreased. Lastly, we created our last plot on volume and paleolatitude. The latitude is used as a proxy for temperature because it is difficult to decipher an exact degree of temperature throughout time. Our results demonstrated that as latitude increased, the volume decreased. We discovered a weak, but significant relationship between volume and latitude with a correlation coefficient of -0.144 (p-value << 0.001). This proves that a genus that occurs in multiple locations or time intervals has the same size in our data due to the limitation that we only have one measurement per genus. In conclusion, using stratigraphic range data, our project exemplified a correlation with the mean size and mean global sea surface temperatures since the Cambrian. This relationship, though, is not as obvious when you look at size vs. paleolatitude. We have found that Bergmann’s Rule, which was initially described for mammals, does not apply to Ostracods. This is likely due to distinct physiological consequences of environmental temperature for endotherms and ectotherms.

METHODS

A wide collection of Ostracod data was extracted from thick volume books. Using a digital caliper was usually necessary to measure the different lengths of the specimens. We then used the computer program called R to help us create several plots and organize our data. All together, these sources helped us test correlations between mean size and temperature and also volume and paleolatitude.

CONCLUSION

In conclusion, our project proved that Bergmann’s Rule does not apply to Ostracods. It is evident that mammals are a much better candidate for testing this theory since they do not remain the same temperature as their surroundings just like we saw Ostracods do with the average global sea surface temperatures. Although there has been evidence showing some cold-blooded animals equilibrating there body temperatures, applying the same physiological explanations to ectotherms and endotherms will not result in accordance. Physiological explanations for mammals are not taken into account by cold-blooded animals. For the most part, our research has shown the body size of species, in this case Ostracods, to be large in warm regions and small in cold regions.

REFERENCES


