

Enhancing Your Time in Nature – Ecological Rules

Chuck Aid. December 30, 2021 :

Ecology has to do with the relationship of organisms to each other and to their environment. One of the many topics that ecologists investigate has to do with looking for patterns that may explain the ability of a species to survive. Some of these identified patterns have become so widely accepted that they are now known as Ecological Rules and being aware of a few of them can help enrich our perception of the world around us.

Cope's Rule does not hold true for all species and applies primarily to mammals. It states that over evolutionary time species in a given lineage tend to get bigger. The presumed advantage is that bigger is better with regard to avoiding predators, capturing prey, competing for resources, and having better mating success. The downside is that larger organisms require more food and water, have a longer gestation period and parental dependence, and may ultimately be headed towards an evolutionary dead end. While small species can better adapt and take advantage of microhabitat resources, the surrounding habitat for large species is relatively more homogeneous and presents less opportunity for evolutionary adaptation.

Bergmann's Rule states that geographic races of species are smaller in warm habitats and larger in cold habitats. It's thought that this simply has to do with the relationship between volume and surface area. As a mammal, or bird, or any object, gets bigger, its volume increases faster than its surface area thereby decreasing the amount of heat loss through its skin. So, bigness is good in cool climates and smallness is good in warm climates.



Emperor Penguin – 48" tall, 50 lbs (c) Björn Svenson, and Galapagos Penguin – 20" tall, 7 lbs (c) Michael O'Brien

Allen's Rule has mammals getting rounder in colder climates to minimize surface area by decreasing the length of appendages such as limbs, tails, ears, and even noses. Being all skinny and long-legged is a tropical and warm desert adaptation to help them lose heat, while being rotund and short-limbed is an arctic adaptation for conserving heat.



Arctic Hare (c) Monikah Wiseman, and Black-tailed Jackrabbit (c) Ned Harris

Gloger's Rule states that races of a species living in warm and humid environments are darker than their counterparts living in colder and drier locales. Originally, two factors were thought to account for this, 1) darker feathers and fur protect better against degrading bacteria which is more plentiful in the tropics and 2) being darker can provide better protection against the excessive UV radiation of the tropics. More recently it's been postulated that Gloger was right about humid environments, particularly with regard to related low-light environments, but he may not have been right about the temperature factor. We here in North America get to see several examples of darker races from the cool temperate rainforests of the Pacific Northwest, which if Gloger, who was an early eighteenth century Prussian, had been able to visit might have influenced his findings.



Song Sparrow – Alaska (c) Steve Mlodinow, and Song Sparrow – Arizona (c) Sean Fitzgerald

Lack's Egg Rule states that average songbird clutch size increases with latitude. This may have evolved to balance the fact that northern songbirds are often only able to raise one brood per breeding season, while farther south two or three broods may be possible.

There are many additional Ecological Rules but these presented here should provide enough food for thought for the present. It behooves us as nature lovers to not only love and learn to identify the various plants and animals with which we live, but to dive a bit deeper and look at some of these ecological relationships.