

Species Richness Decreases with Latitude

A widely recognized pattern in species richness is **the decrease in species diversity that occurs from the tropics to the poles**. This can be seen in a variety of groups (Fig. 1) and in terrestrial, marine, and freshwater habitats. The increase in diversity is found not only over large geographic regions, but also in small communities. For instance, there may be 40-100 different species of trees in a single hectare of tropical rainforest, 10-30 species in U. S. deciduous forests, and 1-5 species in the coniferous forests of northern Canada.

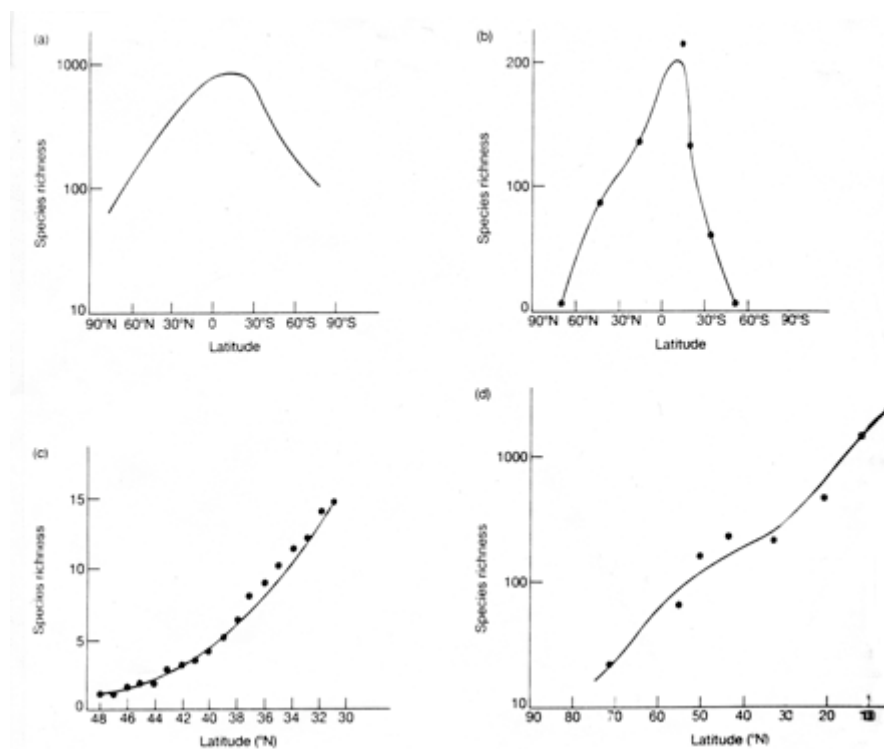


Fig.1. Latitudinal patterns in species richness of: a) marine bivalve mollusks; b) ants; c) lizards in the U.S.; and d) breeding birds in North and Central America.

What is the explanation for the latitudinal trend in species richness? A number of hypotheses have been proposed, but as yet there is no definitive answer to this question. One hypothesis is that diversity has been related to the increase in productivity from the poles to the tropics. Certainly the light, temperature, and rainfall of the tropics lead to high plant biomass, but the biomass is not necessarily diverse. The high plant biomass though leads to nutrient poor soil because most of the nutrients are locked up in the large biomass, and because decomposition and release of nutrients are relatively rapid. According to this argument, it is the nutrient poor soil and different levels of light that penetrate the forest canopy that leads to high species richness. A second hypothesis is that the climate of the tropics is the reason for their species diversity. According to this argument, the tropics are less seasonal than temperate regions and this allows species to become more specialized, and therefore more diverse. Finally, the greater evolutionary age of the tropics has been proposed as a reason for their greater species richness.

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