Geographic ecology

Alexander von Humboldt
1769 - 1859

Lecture outline

- Geographic patterns in species richness
  - Influence of area and isolation
  - Island biogeography theory
  - Latitudinal patterns
    - Underlying mechanisms

Bibby et al. (1992)

Species richness and area

- Bigger is better
- Axis scale matters

Fig. 22.2

Just oceanic islands?

Fig. 22.3

Just terrestrial islands?

Yellow perch

Northern pike

Fig. 22.4

A little math

- Preston (1962):
  - $S = cA^z$
  - Or
  - $\log S = \log c + z \log A$

Mathematical description originated with Arrhenius in 1921
What's so special about area?

- Area is a good surrogate for:
  - ??
  - ??
  - ??

Island biogeography theory (1)
- MacArthur and Wilson (1963)
- Explains species richness patterns on islands
- Richness on an island represents a *dynamic equilibrium* between the rates of two important ecological processes:
  - ___ & ___

Island biogeography theory (2)
- Explain these curves

Island biogeography theory (3)

Tests of island biogeography theory (1)
Tests of island biogeography theory (2)
- Mangrove islands; Simberloff and Wilson (1969, 1970)

Tests of island biogeography theory (3)
- Colonization dynamics

Tests of island biogeography theory (4)
- Latitudinal trends in richness

Why?
- Some reasons
  - Time since disturbance
  - Productivity
  - Environmental heterogeneity
  - Favorableness
  - Niche breadth and interspecific interactions
  - Differences in speciation and extinction rates

- Plants and birds

Why? (2)
Why? (3)

Fig. 22.20

Fig. 22.21