Geographic ecology

Alexander von Humboldt
1769 - 1859

Biogeography

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

- Consistent relationships, but…
- Axis scale matters

Species richness and area

Just oceanic islands?

Least chipmunk

Just terrestrial islands?

Yellow perch

Northern pike

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:
- ??
- ??
- ??

Terrestrial isopods on Greek islands (Hortal et al., 2009)

Is area the only thing?

Fig. 22.5

Island biogeography theory (1)

- MacArthur and Wilson (1963)
- Richness on an island represents a dynamic equilibrium between the rates of two important ecological processes: _________ & _________

Island biogeography theory (2)

- Explain these curves

Fig. 22.8

Island biogeography theory (3)

Fig. 22.9

Tests of island biogeography theory (1)

Fig. 22.10
Tests of island biogeography theory (2)
- Mangrove islands; Simberloff and Wilson (1969, 1970)

Fig. 22.11

Tests of island biogeography theory (3)
- Colonization dynamics

Fig. 22.12

Tests of island biogeography theory (4)

Fig. 22.14

Latitudinal trends in richness
- Plants and birds

Fig. 22.15

Why?

- Pianka (1966)
  - Time
  - Spatial heterogeneity
  - Competition
  - Predation
  - Climatic stability
  - Productivity

- Ecology vs. Evolution

Why? (2)
Why? (3)

Fig. 22.20

Fig. 22.21