

Introduction to Biogeography

Introduction to Biogeography

The study of the distribution of life on Earth and the processes that shape those patterns.

1. What Is Biogeography?

Aspect	Description
Definition	The scientific discipline that examines where organisms live, why they are found there, and how they got there.
Scope	• Spatial patterns (global, continental, regional, local) • Temporal patterns (past, present, future) • Taxonomic groups (plants, animals, microbes)
Key Questions	1. Why are species concentrated in some areas and absent in others? 2. How have past events (e.g., plate tectonics, climate change) influenced present distributions? 3. What mechanisms drive the spread, isolation, and extinction of species?

2. Historical Foundations

Period	Milestones & Contributors
Early Observations (18th? 19th?c.)	• <i>Alexander von Humboldt</i> – “law of the geographic distribution of plants.” • <i>Charles Darwin</i> – noted species similarity on neighboring islands (Galápagos).
Wallace’s Contributions (1850s)	• <i>Alfred Russel?Wallace</i> formulated the “Wallace Line” separating Asian and Australian fauna. • Introduced the concept of vicariance (species split by emerging barriers).
Modern Synthesis (20th? c.)	• Integration of ecology, evolution, and geology. • Development of island biogeography theory (MacArthur & Wilson, 1967).

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Period

Milestones & Contributors

Molecular Era (1990s? present)

- DNA sequencing reveals phylogenetic relationships and historic dispersal routes.
 - **Phylogeography** merges genetics with geographic data.
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3. Core Concepts & Terminology

Term	Meaning	Example
Endemism	Species restricted to a defined area.	<i>Lemurs</i> – Madagascar
Cosmopolitan Distribution	Species found worldwide (in suitable habitats).	<i>Herring gull</i> (<i>Larus argentatus</i>)
Dispersal	Movement of organisms from one area to another.	Wind?borne seeds, bird migration
Vicariance	Geographic separation of a population by a barrier (mountain range, ocean).	Split of <i>Gondwanan</i> flora by continental drift
Ecological Niche	The set of environmental conditions a species can tolerate and use.	Temperature, moisture, substrate
Biogeographic Realm	Large-scale region with a distinct assemblage of flora and fauna.	Nearctic, Palearctic, Neotropical, Afrotropical, Indomalayan, Australasian, Oceanian, Antarctic
Ecoregion	Subdivision of a realm with relatively homogeneous ecosystems.	Amazon Rainforest, Sahara Desert
Island Biogeography	Theory describing species richness on islands as a balance of immigration and extinction rates.	Species?area curve for Hawaiian islands

4. Mechanisms Shaping Species Distributions

Mechanism	Process	Typical Scale	Illustrative Case
Plate Tectonics & Continental Drift	Landmasses move, creating/closing connections.	Millions of years	Distribution of <i>Nothofagus</i> (southern beech) across South America, Australia, New?Zealand

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Mechanism	Process	Typical Scale	Illustrative Case
Glaciation & Climate Oscillations	Ice sheets expand/retreat, altering		