

Biodiversity and Evolution

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1. Keystone Species — A species whose role has an effect on the types and abundance of other species in an ecosystem. Best examples are top predators (Sharks) and pollinators (Bees)
2. Species — A set of individuals who can mate and produce fertile offspring
3. Species Diversity — A variety of species in a given area
4. Ecosystem Diversity — A variety of ecosystems in a given area
5. Genetic Diversity — Diversity within the same species
6. Biome — Regions with distinct climates and species
7. Biological Evolution through Natural Selection explains how life changes over time
 - (a) Fossils — Physical evidence of ancient organisms that reveal what their external structures looked like
 - Fossil Record — Entire body of fossil evidence. Only have fossils of 1% of all species that lived on Earth
 - (b) Biological Evolution — How life on Earth changes over time due to changes in the genetic characteristics of populations (Remember Darwin: *Origin of Species*)
 - (c) Natural Selection — Individuals with certain traits are more likely to survive and reproduce under a certain set of environmental conditions (survival of the fittest)
8. Populations evolve by becoming genetically different
9. Genetic Variations
 - (a) Occur through mutations in reproductive cells
 - (b) Mutations — Random changes in DNA
10. Natural Selection — Acts on individuals

11. Myths about Evolution:
 - (a) “Survival of the fittest” is not “survival of the strongest”
 - (b) Organisms do not develop traits out of need or want
 - (c) No grand plan of nature for perfect adaptation
12. Geologic Processes Affect Natural Selection
 - (a) Tectonic plates affect evolution and the location of life on Earth
 - Locations of continents and oceans have shifted
 - Species physically move, or adapt, or form new species through natural selection
 - (b) Earthquakes
 - (c) Volcanic Eruptions
13. Earth is just right for life to thrive
 - (a) Temperature range: supports life
 - (b) Orbit size: moderate temperature
 - (c) Liquid water: necessary for life
 - (d) Rotation speed: sun doesn’t overheat surface
 - (e) Size: gravity keeps atmosphere
14. Speciation — One species splits into two or more species
15. Geographic Isolation — Happens first; physical isolation of populations for a long period
16. Reproductive Isolation — Mutations and natural selection in geographically isolated populations lead to inability to produce viable offspring when members of two different populations mate
17. Geographic isolation can lead to reproductive isolation
18. Artificial Selection — Use selective breeding/crossbreeding
19. Genetic Engineering — Gene splicing (controversial)
 - Ethics
 - Morals
 - Privacy issues
 - Harmful effects

20. Extinction

- Biological Extinction — Gone from the entire planet
- Local Extinction — Gone from a certain region

21. Endemic Species

- Found only in one area
- Particularly vulnerable
- Ex. Island fox on the Channel Islands

22. Background Extinction (normal extinction rate) — Natural extinction that occurs over time

23. Mass Extinction — 5 over 500 million years

24. Species Diversity — Measure of the diversity in a community

25. Species Richness — The number of different species in a given area

26. Species Evenness — Refers to how close in number each species is in an environment (ex. 50 of species A and 50 of species B, or 50 of species A and 1 of species B)

27. Diversity varies with geographical location

28. Most species-rich communities:

- Tropical rain forests
- Large tropical lakes
- Coral reefs
- Ocean bottom zone

29. Species equilibrium model, theory of island biogeography

- Number of species found on an undisturbed island is determined solely by the number of species immigrating to the island and by extinction rates
- Species may follow evolutionary routes that are different than species on land masses that are not isolated
- Island size and distance from the mainland need to be considered

30. Ecological Niche

- Pattern of living — Everything that affects survival and reproduction
- Water, space, sunlight, food, temperatures

31. Generalist Species

- Broad Niche — Wide range of tolerance

32. Specialist Species

- Narrow Niche — Narrow range of tolerance

33. Native Species — An indigenous or endemic species in a specific region or area

34. Non-native Species — An introduced species that has been brought to the area by humans

35. Indicator Species — A species that provides early warnings of damage to community or ecosystem (canary in the coal mine); can monitor environmental quality (Trout, Birds, Butterflies, Frogs)

36. Keystone Species — Species whose role has a large effect on the types or abundance of other species

37. Foundation Species — A species that forms a foundation for the community; create or enhance their habitats, which benefit others (Elephants, Beavers, Alligators)