

What is Speciation?

Worksheet

Speciation is the evolutionary process forming new species when populations diverge genetically due to isolation (geographic, reproductive, or temporal) and can no longer produce viable offspring together.

Questions

1. The main driver of Darwin's finch speciation?

- A) Geographic isolation
- B) Rapid mutation
- C) Artificial selection
- D) Sympatry

2. Allopatric speciation requires?

- A) High mutation rate
- B) Geographic separation
- C) Rapid breeding
- D) Predators

3. Reproductive isolation is achieved when?

- A) Two species live in same place
- B) They can't produce fertile offspring
- C) They evolve different colors
- D) They migrate

4. How many finch species in the Galpagos?

- A) 2
- B) 5
- C) 13+
- D) 100

5. Darwin's Finches: how did geographic isolation lead to 13 species?

6. African Elephants: forest vs. savanna - when did they diverge into separate species?

7. Fruit Fly (*Drosophila*) Speciation: Dobzhansky's lab experiment - how fast can speciation happen?

8. Define: What is reproductive isolation?

9. Define: What is allopatric speciation?

10. Define: What is sympatric speciation?

Answer Key

1. A) Geographic isolation - Different Galpagos islands isolated populations, allowing independent evolution.
2. B) Geographic separation - Allo = other, patric = place - populations must be geographically apart.
3. B) They can't produce fertile offspring - This is the biological species definition - reproductive incompatibility.
4. C) 13+ - From one ancestral species, ~13 recognized species evolved via allopatric speciation.
5. One finch ancestor colonized multiple Galpagos islands. Each island: different food, different selection pressures. Islands isolated populations different beak sizes/shapes evolved. Over time: reproductive isolation each island population became a separate species. Result: ~13 endemic finch species that rarely interbreed.
6. Common ancestor: ~7 million years ago. Habitat divergence: forest elephants isolated from savanna elephants. Genetic accumulation: different body size, ear size, trunk shape, behavior. Reproductive isolation: hybrids are sterile or don't reproduce. Result: two distinct species recognized (~6-7 million years).
7. Start: two fly populations, initially interbreeding. Isolation: separate populations in different lab environments (~40 generations). Genetic divergence: different mutations, selection pressures per environment. Result: reproductive barriers evolved new species formed in lab timescale. Lessons: speciation can happen rapidly if isolation is strong.
8. The inability of two populations to produce viable, fertile offspring even if they meet - defines separate species.
9. Speciation via geographic isolation - populations separated by barriers diverge genetically.
10. Speciation without geographic isolation - reproductive barriers evolve while populations overlap.

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