

Phyletic evolution

- The gradual transformation of one species into another through time (within a single evolutionary lineage).
- If an organism is not perfectly adapted or if the environment changes
- Gradualism is often depicted by showing changes in body proportions or structural features in the fossil record

How can this process produce more species?

Speciation

- The branching of evolutionary lines
- An addition to the number of species requires the splitting of lineages. Strictly speaking it is this process (which require the development of a barrier to prevent interbreeding) which is referred to as speciation.
- Allopatric speciation:
 - o One method of speciation is for genetic exchange between two populations to cease as a result of them becoming geographically separated. Genetic differences will then build up through time as a result of natural selection (if environments are different) or genetic drift.
 - o Influential factors:
 - Degree of isolation
 - Length of isolation
 - Magnitude of selection pressure
 - Population size
- Speciation will be quicker if:
 - o Degree of isolation is more
 - o Magnitude of selection pressure is greater
 - o Population size is smaller
- New species more distinct if:
 - o Length of isolation is longer

A species range can become disjunct (geographically divided up) in various ways

- Cross pre-existing barriers
 - o Individuals cross a pre-existing barrier (terrain where the organism cannot live) e.g. the sea or a mountain range and form a new population. Known as speciation by founders
 - o Within only a few likely to be present in the new population genetic drift is likely to be very important
- Archipelagos (groups of islands) like the Galapagos and Hawaiian islands are particularly rich when compared to single isolated islands even if the latter is larger

Differentiation on island groups

- Initial invasion of islands
- Isolation of islands populations due to water barriers
- Differentiation of populations on separate islands
- Reinvansion of populations on to the other islands in the group