

Things to remember in the last hour before the exam – Level 3 Speciation:

(This is not a revision sheet- you've done that by now, it is a list of things you might want to remind yourself about...)

- Evolution is the accumulation of changes over time and it ensures that organisms are well-adapted to their environment.
- Species: a species is a group of individuals that is able to interbreed and produce fertile offspring.
- Speciation is the development of one or more species from an existing species.
- There are five ways that gene pools can change. They are: genetic drift, gene flow, mutation, non- random mating and natural selection.
- Gene flow refers to alleles being passed between populations by migration.
- Genetic drift is the change in allele frequency due to chance and not natural selection
- Founder effect - small numbers of an established population become isolated from the original population
- Bottleneck effect – this occurs when a population becomes small (due to things such as earthquakes, floods, fires or humans hunting) and then expanse,
- Natural selection: “survival of the fittest” occurs as follows:
 - ☐ Variation of alleles exists within the population
 - ☐ The organisms are exposed to a selective pressure such as a changing environment
 - ☐ Those with best genes leave more offspring, those without leave less
 - ☐ Each generation will be better adapted to the current environment
- Three types of natural selection:
 - ☐ Stabilising
 - ☐ Directional
 - ☐ Disruptive

Evidence for evolution:

- Fossils (palaeontology)
- Comparative anatomy (Homologous structures and Analogous structures)
- Embryology
- Biogeographical
- Biochemical and biotechnological evidence (this includes mtDNA, proteins etc.)

Speciation:

The process by which one species gives rise to two or more new species is called speciation.

- **Steps of speciation:**

- ☐ A geographical barrier forms
- ☐ Different selective pressures in the separate environments cause the populations to diverge genetically (possible subspecies) then over time
- ☐ Postzygotic isolating mechanisms occur due to mutations and the creation of new alleles until they can no longer interbreed (speciation has occurred)

Types of speciation:

- Allopatric speciation: (different areas)
- Sympatric speciation: (same area)
- Instantaneous speciation by polyploidy

Reproductive isolating mechanisms.

- **Pre-zygotic** - Prevents gene flow between the two gene pools before fertilization.
 - ☐ Geographical isolation
 - ☐ Temporal (timing of the activity or reproduction between the 2 gene pools is different)
 - ☐ Ethological (behavioural differences)
 - ☐ Ecological (different ecological niches)
 - ☐ Structural (anatomical differences)
 - ☐ Gamete incompatibility
- **Post-zygotic** - These are mechanisms which occur after the zygote has formed
 - ☐ Hybrid inviability
 - ☐ Hybrid sterility
 - ☐ Hybrid breakdown

Patterns of evolution

- Convergent evolution
- Divergent evolution
- Adaptive radiation
- Parallel evolution
- Co-evolution

Rate of evolutionary change

There are two models used to discuss the rate of evolutionary change. Both models have evidence to support them; one model does not contradict the other.

- Gradualism
- Punctuated equilibrium