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CHAPTER NOTES

Evolution Class 12 Notes — CBSE Biology Chapter 7

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Evolution Class 12 Notes — CBSE Biology Chapter 7

Chapter 7 — **Evolution** — traces the story of life from origin to the diverse species we see today. It covers theories of evolution, evidences, Hardy-Weinberg principle, and human evolution. Carries **5-7 marks** in Board exams.

Key Concepts

Origin of Life

- **Oparin-Haldane theory:** Life originated from pre-existing non-living organic molecules (chemical evolution)
- **Miller-Urey experiment (1953):** Simulated primitive atmosphere (CH_4 , NH_3 , H_2 , H_2O) + electric discharge → amino acids formed. Proved abiogenic origin of life.
- First life: ~3.5 billion years ago; were probably chemoheterotrophs

Theories of Evolution

Theory	Proponent	Key Idea
Use and Disuse	Lamarck	Organs used more develop; acquired characters inherited (disproved)
Natural Selection	Darwin	Survival of the fittest; variations + struggle → adaptation
Mutation Theory	Hugo de Vries	Large sudden heritable changes (mutations) drive evolution

Evidences for Evolution

Evidence	Description	Example
Homologous organs	Same origin, different function (divergent evolution)	Forelimbs of whale, bat, horse, human
Analogous organs	Different origin, same function (convergent evolution)	Wings of bird vs butterfly
Vestigial organs	Reduced/non-functional remnants	Appendix, wisdom teeth, nictitating membrane in humans
Fossils	Preserved remains of ancient organisms	Archaeopteryx (link between reptiles and birds)
Embryology	Similar embryonic development across vertebrates	Gill slits in all vertebrate embryos
Molecular evidence	DNA/protein sequence similarities	Cytochrome c similarity across species

Hardy-Weinberg Principle

$p^2 + 2pq + q^2 = 1$ (genotype frequencies)

$p + q = 1$ (allele frequencies, where p = dominant, q = recessive)

Allele frequencies remain constant in a population IF: no mutation, no selection, random mating, no migration, large population

Factors that disturb equilibrium: mutation, selection, genetic drift, migration, non-random mating

Types of Natural Selection

- **Stabilising:** Favours average phenotype → reduces variation (e.g., birth weight in humans)
- **Directional:** Favours one extreme phenotype (e.g., industrial melanism in peppered moth)
- **Disruptive:** Favours both extremes → may lead to speciation

Human Evolution (in order)

Dryopithecus → Ramapithecus → Australopithecus → Homo habilis → Homo erectus → Homo sapiens neanderthalensis → **Homo sapiens sapiens** (modern humans, ~100,000 years ago, Africa)

Key milestones: Australopithecus (bipedal, 2 mya); Homo habilis (first tool maker); Homo erectus (used fire); Neanderthals (large brain, buried dead); Modern humans originated in Africa.

Solved Examples

Example 1

Q: In a population, frequency of allele 'a' is 0.4. Find genotype frequencies.

Solution: $q = 0.4$, $p = 1 - 0.4 = 0.6$

$AA (p^2) = 0.36$, $Aa (2pq) = 0.48$, $aa (q^2) = 0.16$

Quick Revision Points

- Origin: Oparin-Haldane (chemical evolution); Miller-Urey (proved amino acid synthesis)
- Darwin: natural selection; Lamarck: use/disuse (disproved)
- Homologous: same origin, different function; Analogous: different origin, same function
- Hardy-Weinberg: $p^2 + 2pq + q^2 = 1$; disturbed by 5 factors
- Industrial melanism: directional selection (peppered moth)
- Modern humans: Homo sapiens sapiens; originated in Africa

← Previous

Next: Human Health and Disease →



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