

# CSIR NET UNIT 11 SYLLABUS

## EVOLUTION AND BEHAVIOUR

CSIR NET UNIT 11 covers topics like the emergence of evolutionary thoughts, origin of cells and unicellular evolution, paleontology and evolutionary history, molecular evolution, mechanisms of evolution, and the relationship between brain, behavior, and evolution. Topics include Lamarckian concepts, the Miller-Urey experiment, molecular clocks, mechanisms of evolution, and behavioral aspects.

CSIR NET UNIT 11	Topics
A) Emergence of Evolutionary Thoughts	<ul style="list-style-type: none"><li>- Lamarck</li><li>- Darwin—concepts of variation, adaptation, struggle, fitness, and natural selection</li><li>- Mendelism</li><li>- Spontaneity of mutations</li><li>- The evolutionary synthesis</li></ul>
B) Origin of Cells and Unicellular Evolution	<ul style="list-style-type: none"><li>- Origin of basic biological molecules</li><li>- Abiotic synthesis of organic monomers and polymers</li><li>- Concept of Oparin and Haldane</li><li>- Experiment of Miller (1953)</li><li>- The first cell</li><li>- Evolution of prokaryotes</li><li>- Origin of eukaryotic cells</li><li>- Evolution of unicellular eukaryotes</li><li>- Anaerobic metabolism, photosynthesis, and aerobic metabolism</li></ul>
C) Paleontology and Evolutionary History	<ul style="list-style-type: none"><li>- The evolutionary time scale</li><li>- Eras, periods, and epochs</li><li>- Major events in the evolutionary time scale</li><li>- Origins of unicellular and multicellular organisms</li><li>- Major groups of plants and animals</li><li>- Stages in primate evolution including Homo</li></ul>

- D) Molecular Evolution
- Concepts of neutral evolution, molecular divergence, and molecular clocks
  - Molecular tools in phylogeny, classification, and identification
  - Protein and nucleotide sequence analysis
  - Origin of new genes and proteins
  - Gene duplication and divergence
- E) The Mechanisms
- Population genetics – Populations, Gene pool, Gene frequency
  - Hardy-Weinberg Law
  - Concepts and rate of change in gene frequency through natural selection, migration, and random genetic drift
  - Adaptive radiation
  - Isolating mechanisms
  - Speciation – Allopatricity and Sympatricity
  - Convergent evolution
  - Sexual selection
  - Co-evolution
- F) Brain, Behavior, and Evolution
- Approaches and methods in the study of behavior
  - Proximate and ultimate causation
  - Altruism and evolution-Group selection, Kin selection, Reciprocal altruism
  - Neural basis of learning, memory, cognition, sleep, and arousal
  - Biological clocks
  - Development of behavior
  - Social communication
  - Social dominance
  - Use of space and territoriality
  - Mating systems, Parental investment, and Reproductive success
  - Parental care
  - Aggressive behavior
  - Habitat selection and optimality in foraging
  - Migration, orientation, and navigation
  - Domestication and behavioral changes

**Study tips for CSIR NET UNIT 11:** Understand the historical development of evolutionary thought, focus on key events in the evolutionary time scale, use visual aids for molecular evolution concepts, and practice analyzing mechanisms such as adaptive radiation and speciation. Apply knowledge to understand the behavioral aspects of evolution, and explore practical examples of domestication and behavioral changes.

