

Assignment of Botany

Department of B.S

Zoology 4th Semester

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DATE:

Nature of evolutionary force:

The nature of evolutionary forces refers to the mechanisms that drive the process of the evolution, which is the change in the characteristics of a specie over time.

Driving evolution in a specific direction, generating new variation **Such as** gene flow introducing new genes, preserving existing traits **like** genetic hitchhiking, maintaining beneficial genes. Acting at multiple levels, from genes to populations.

Influenced by environmental and demographic factors. Occurring over time, with small changes accumulating. Dependent on historical events and circumstances.

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Factors:

There are several key forces that contribute to the evolution:

- Natural Selection
- Genetic Drift
- Mutation
- Gene flow
- Artificial Selection
- Linkage
- Genetic Hitchhiking
- Co-evolution
- Hybridization
- Genome evolution
- Molecular evolution

• Natural Selection:

Natural selection is the process by which certain traits or characteristics that are beneficial for survival

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and reproduction become more common in a population over time. This occurs because individuals with these traits are more likely to:

- Survive
- Reproduction.

Key points of natural selection:

- Variation
- Heritability

• Genetic drift:

Genetic drift is the random change in the frequency of a gene and the genetic variation in a population over time. Genetic drift occurs because:

- Random sampling
- Finite population size
- Chance events

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Types of genetic drift:

- Bottleneck effect.
- Founder effect.

• Mutation:

Mutation is a change in the DNA sequence in an individual's gene or chromosome, leading to new genetic variation.

Types of mutation:

- Point mutation
- Frameshift mutation
- Chromosomal mutations
- Genetic duplication.

• Gene flow:

Gene flow, also known as gene migration, is the movement of genes from one population to another, leading

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to the exchange of genetic information. This can occur through various mechanisms, including;

- Migration
- Gene transfer
- Admixture.

• Artificial Selection:

Artificial selection is the process by which human intentionally breed individuals with specific traits or characteristics, leading to changes in the population's characteristics over time.

Human use various techniques to achieve artificial selection:

- Selective breeding
- Inbreeding
- Hybridization
- Genetic engineering

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• Linkage:

Linkage refers to the tendency of certain genes or genetic markers to be inherited together due to their physical proximity on the same chromosome.

Linkage characteristics are given below:

- Linkage disequilibrium
- Close physical proximity
- Low recombination rate.
- Co-inheritance

• Genetic hitchhiking:

Genetic hitchhiking is a process where a neutral or slightly deleterious gene is dragged along with a beneficial gene, resulting in an increase in frequency of the neutral gene in a population.

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Genetic hitchhiking can leads to:

- Increase natural gene frequency.
 - Reduced genetic variation
 - Genetic draft
- Evolutionary consequences.

Factors influencing genetic hitchhiking:

- Strength of selection.
- Linkage disequilibrium
- Recombination rate
- Population size.

• Co-evolution:

Co-evolution refers to the reciprocal evolutionary changes that occur between two or more species that interact closely with each other. These interactions can be:

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Predator - prey
Host - parasite
Competitors
Mutualists

Example:

- claw fish
- Oxpeckers

• Hybridization:

Hybridization is a process of combining different evolutionary algorithms or techniques to create a new, hybrid approach. This can be done to:

- improve performance.
- Increase efficiency
- Enhance scalability
- Expand applicability.

• Gene evolution

Genome evolution
refers to the changes that occur
in the structure and function
of genomes over time.

• Molecular evolution:

Molecular evolution
refers to the process of change
in the sequence, structure,
and function of molecules such
as DNA, RNA and proteins
over time.

Key aspects:

- Sequence evolution
- Structural evolution
- Functional evolution
- Molecular phylogenetics.
- Molecular clock.