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B.Sc. Zoology Part III

NEO-DARWINISM

INTRODUCTION

- Darwin had not given any importance to the process of **mutation** i.e., **sports of nature**.
- Ignorance of sports of nature result in the failure of Darwinism to explain for the origin of variations.
- Many scientists performed various experiment in support of this theory of natural selection.
- Modern biologists modified Darwinism in light of advancement achieved in the field of cytology and genetics to suit the theory in modern science.
- These scientists are known as Neo-Darwinians. Some of them are August, Weismann, Dobzhansky, Mendel, Huxley, Fisher, Wallace, Hackle, Herbert spencer, Holden, Ernst Mayer, G.L. Stebbins, Hugo de Varies.
- **Neo-Darwinism** states that besides small continuous variation and natural selection several other factors like mutation, heredity and isolation are also responsible for evolution resulting in the formation of new species.
- This modernized theory is designated as genetical theory of natural selection or **modern synthetic theory of evolution**.
- Neo-Darwinism proposes that evolution involves following process:-
 1. Mutation
 2. Variation
 3. Transmission of Variations
 4. Natural selection
 5. Isolation

1. MUTATION

- Any structural change in the gene or chromosomes is known as **mutation**.

- As characters are controlled by genes, any change in their composition brings about a change in characters i.e., it serves as a source of variation which results in the formation of new species.

2. VARIATION

- Besides mutation several other processes like genetic recombination, hybridization, genetic drift and migration also bring about **variation**.
- Appearance of new type of gene combination by rearrangement of existing genes during **crossing-over** at the time of meiosis, rearrangement of chromosomes during the formation of gamete, chromosomal aberration either in number or structure is known as **genetic recombination**.
- Mating of individuals belonging to two different species results in the formation of new types of genetic arrangement which leads to the appearance of the new characters.
- This is known as **hybridization**.
- Any alteration in the gene frequency of a small population occurring suddenly only by a chance is known as **genetic drift**.
- Migration of individuals from one population to another and their **interbreeding** bring about variation due to **gene flow** from one population to another.

3. TRANSMISSION OF VARIATIONS

- Beneficial variations occurring in the life time of parents become helpful to their offspring in adapting to the changing or existing environment only when these are transmitted to the later.
- This is known as heredity, so inheritance of heritable advantageous variations brings about many changes in the characters which gradually lead to the formation of new kind of individual.

4. NATURAL SELECTION

- Changing environment or existing nature operates its choice of preference on the individuals with inherited variations.
- It favors the survival of individuals to those which look either useful variations or possess less useful variations.
- This results in the elimination of individuals of later types.

5. ISOLATION

- It means separation of a population into many groups by several types of barriers.
- These separated groups become unable to interbreed.
- These develop variations occurring to their own environment.
- In due course of time difference among these groups arising due to variation become so prominent that these differ from each other as well as from their ancestors and are unable to interbreed i.e., these also become **isolated reproductively**.

- It means, it leads to the formation of new kind of organism i.e., origin of species.

CONCLUSION

Keeping all processes describe above in view it is concluded that Neo-Darwinism is a combination of these processes which participate in the origin of new species in the following manner:-

1. **Mutation** bring about variations
2. Heritable variations serve as raw materials of evolution.
3. Heredity serves to pass on useful variation to offspring.
4. **Natural selection** favors organisms with useful variations in adaption.
5. **Isolation** converts them into different types which results in the origin of new species.

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