**TOPIC OF ASSIGMENT :**

**Mechanism of evolution**

EVOLUTION :

Any change in charateristics of an species or a population with the passage of time or generation to generation is called evolution .

It is a historical fact that the higher plants and animals are evolved from simple and primitive type.

“ the process in which plants and animals of present life have evolved from the kind of past life by the process of gradual changes is known as organic eolution” .

How evolution occurs ?

Evolution occurs due to mutation in genes . Mutation in these genes can produce new are altered traits , reslting in heritable differences ( genetic variation ) between organisms. Evolution occurs when these heritable differences become more common or rare in in a population ,either non randomly through natural selection or randomly through genetic drift.

Evolutionry examples in nature :

* Peppered moth -this moth had a light coloring darkened after the industrial Revolution due to the pollution of the time . This mutation came about because the light colored moths were seen by birds more readily , so with

natural selection , the dark colored moths survived to reproduce .

Mechanism of evolution:

* Darwin proved on the basis of his theories that variation developed in living organism due to sexual reproduction and mutation .so they are different from each other . these variation are of two types useful variation and harmful variations. these inherited variations play a very important role in process of evolution .
* These are several mechanism of evolution ;
* Natural Selection
* Gene Flow
* Genetic Drift
* Mutations
* Non-Random Mating 1. NATURAL SELECTION :
* In this mechanism of evolution nature selects the living organisms that contain certain usefull variations, this is called natural selection . they agjut themselves in the environment . they increase their population by reproduction . It helps in the mechanism of evolution.
* Affects variations in a population as the better adapted individual survive and reproduce , passing on their genes to the successive generations.
* Acts only upon an organism phenotype.
* If the phenotype is better suited for a changing environment , the individual can survive and pass on its genes .

2. GENE FLOW :

* In a population genetics , Gene flow ( also known as gene migration or allele flow ) is a transfer of genetic variation from one population to the other . gene flow is an important mechanism for transferring genetic diversity among populatios . it is transport of genes by migrating individual. New genes in a population by means other than mutations.
* EX: Migration of birds.

3. GENETIC DRIFT :

* Genetic drift is the change in frequency of an existing gene variant in a population due to random sampling of organisms over the time . the alleles in the offspring are a sample of those in the parents, and chance has a role in detrminig whether a given individual survives and reproduces. A population gene frequency is the fraction of the copies of one gene that share a particular form .
* Change in gene pool that takes place strictly by chance.
* Affects small populations . example of genetic drift are more evident in smaller population of organism.
* Increase the chance of rare alleles .

EX: 1. shipwreck survivors colonizing an island .

2. A population of rabits can have brown fur and white fur with brown fur being a dominant allele. By random chance , the offspring may all be brown and this could reduce the allele for white fur .

3. A mother with blue eyes and a father with brown eyes can have children with blue or brown eyes . if brown is dominant allele , even though there is a 50% chance of having blue eyes , they might have all children with brown eyes by chance .

4. MUTATION

* Mutations is a change in a DNA sequence . mutations can result from DNA copying mistakes made during cell division , exposure to ionizing radiation , exposre to chemicals called mutagens, or infection by viruses . Germ line mutation occur in the eggs and sperm and can

be passed on to offspring, while somatic mutations occur in body cells and are not passed on .

* A mutation is an agent of a substance that can bring about a permanent alteration to the physical composition of a DNA gene such that the genetic message is changed.
* There are three types of mutations: base substitutions , deletion and insertions.
* Causes of mutations : errors in DNA replication , errors in DNA recombination , chemical damge to DNA , radiation , DNA repair , Recombination repair , Regulation of damage control.
* Example :sickle cell anemia and malaria are diseases caused by mutation . moreover example of mutation in animals are those born with extra body parts ,eg.two headed snakes.

5. NON-RANDOM MATING :

* In animals , non-random mating can change allele frequencies as the choice of mates is often an important part of behavior.
* Many plants self-polinate which is also a form of non-random mating (Inbreeding ).
* Mating that has not occurred due to chance and therefore has had human interference.
* People who look alike mate more often they would under totally random conditions.

1. Arranged marriages
2. People who look alike mate together

IMPORTANT PHENOMENON :

In the mechanism of evolution following phenomena are important .

1. Isolation
2. Gene frequency

* ISOLATION :

When living organisms are separated from each other and they live in definite climate region , it is called isolation . it takes part in formation of species, called speciation . when two living organism of same kind live in separate region, they are isolated from each other . they spent their lives in different ways and gradually some variation start to develop in their bodies after a long time they become different from each other in morphological and physiological characteristics . in this way isolation play important role in evolution .

* There are different types of isolation which may be described as follows:

1. Geographic and ecological isolation :

This type of isolation changes the large species population into many small population . due to geographic isolation the small population are separated from each other by rivers, hills and deserts etc.

* The kinds of living organisms which are similar but live in separate geographic areas are called allopatric species , and such species which are closely related and live in same geographic area are called sympatric species .

1. Ethological isolation :

When male and female living organisms are incompatible ; they don’t have equal standards of life, they are isolated from each other , it is called ethological isolation . it also changes gene equilibrium .

1. Physiological isolation :

The main reason for physiological isolation is that the gametes become functionless and they do not take part in formation of zygote.

1. Psychological isolation :

This type of isolation usually occurs among human beings due to mental disturbances , for example white and black have seprate population .this isolation has reduced the exchange of genes between these two populations.

1. Seasonal isolation :

Plants and insects have seasonal isolation . the breading season of species is different time at different places . it stops gene flow and change gene frequency in small population of species .this study indicates that isolation has a key role in formation of new species at different ecological and geographical places and it helps in procees of evolution .

* GENE FREQUENCY :

The proportion of different allele of a gene in a population is called gene frequeny . it is the relative frequency of an allele at a particular locus in a population, expreesed as a fraction or percentage . gene frequency does not depend upon dominance or recessiveness of alleles . the gene frequency of a particular generation depend upon the gene frequency of previous generation and not upon its own genotype .

Factors that affects the gene frequency :

1. Mutation : sometime a change occur in formation of new genes , so they do not resemble to their original genes this is called as mutation . mutation can change the gene frequency .
2. Selection : selection is another cause for change in gene frequency . if the individuals having dominant gene take part in reproduction , the frequency of this gene may be more than recessive gene . it is called selection . the selection occurs in natural way , it is known as natural selection . and if the human being is personally involed in breeding than its known as selective breeding .
3. Fitness of genes : A organism or a gene which can survive better according to environment is known as fiittes of the organisms . when a gene is dominant according to its environment . it reproduce more than other genes, therefore , its number is increased . it indicates that this gene is fit . it is strong and contain superior qualities . in this way fitness of gene is important to bring about changes in frequency of a gene population.
4. Migration : the movement of an organism from one place to another place is known as migration . it maintains a genetic pool and has an important evolutionary effect . Due to migration of individual gene flow occurs which is an important mechanism of evolution .
5. Degree of Dominance : the stage of gene expression is very significant . For the survival of individuals , selection may occur at the stage of gametes or zygotes .the selection depends upon the degree of dominance . if the ‘A’ Is dominat allele and ‘a’ is recessive allele then gene A would be selected and gene ‘a’ would be protected in hytrozygotes. Gene a would not be eliminated, because very few zyote would be formed . and some contain homozygous recessive (aa) genes . the change in frequency would be slow .
6. Direction of forces : Mutation , selection and migration are important forces to ater the gene frequencies in population . when these forces operate in one direction in a constant way. They astablish one allele while other allele disappears from population . By the affect of these forces gene frequencies are balanced . they develop gentic equilibrium between population .
7. Population size : population is basic characteristic of living organisms , by this process they maintain their generation and increase their population . population size is significant to determine gene frequencies . if any other factor is not involved, the dominant and recessive genes in a gene pool of large population remains the same generation after generation , but in small population dominant and recessive allele proportion is different . in a small population the probability of chance mating is higher and it changes the gene frequency . As the population decreases the chance of genetic drift is higher.

* ROLE OF GENE FREQUENCY IN EVOLUTION : population genetics is branch of genetics in which frequency of alleles in a population , their distribution and inheritance are conciderd. The proportion of different allele of a gene in a population is called gene frequency . the gene frequency take part in evolution which is a change in genotype of population over generations . the total number of all genes of population is called gene pool . in the gene pool all alleles of all genes of all organisms are included .

THE END

MCQ BASE QUESTIONS

1. Any change in characteristics of organism with the psassage of time is known as - - - EVOLUTION---.
2. The transfer of gene from one generation to another generation is called -- -GENE – FLOW---.
3. The mechanis in which nature select an organism with certain usefull variation for breeding is called ---NATURAL SELECTION---.
4. The type of breeding in which man himself select organism with useful variation for next generation is known as ---SELECTIVE BREEDING---.
5. The total number of all genes of a population is called ---GENE -POOL---.
6. A change occur in the formation of new gene which change its genotype is called ---MUTATION---.
7. –---GENETIC – DRIFT— is the change in frequency of an existing gene.
8. When organism are separated from each other and live in different areas is called ---ISOLATION---.
9. The proportion of different allele of a gene in population is called ---GENE – FREQUENCY---.
10. The kind of organism which are similar but live in different geographic area is ---ALLOPATRIC- SPECIES--.