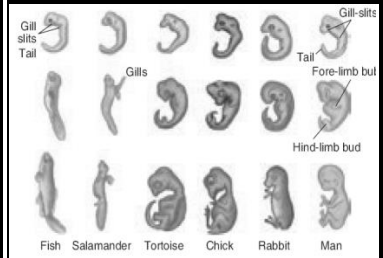


UNIT - 19

ORIGIN AND EVOLUTION OF LIFE



I. Choose the correct answer

- Biogenetic law states that _____. [QR]
 - Ontogeny and phylogeny go together
 - Ontogeny recapitulates phylogeny**
 - Phylogeny recapitulates ontogeny
 - There is no relationship between phylogeny & ontogeny
- The 'use and disuse theory' was proposed by _____.
 - Charles Darwin
 - Ernst Haeckel
 - Jean Baptiste Lamarck**
 - Gregor Mendel
- Paleontologists deal with
 - Embryological evidences
 - Fossil evidences**
 - Vestigial organ evidences
 - All the above
- The best way of direct dating fossils of recent origin is by [PTA – 1]
 - Radio-carbon method**
 - Uranium lead method
 - Potassium-argon method
 - Both (a) and (c)
- The term Ethnobotany was coined by [MAY-2022]
 - Khorana
 - J.W. Harshberger**
 - Ronald Ross
 - Hugo de Vries

II. Fill in the blanks

- The characters developed by the animals during their life time, in response to the environmental changes are called **acquired characters (adaptations)**.
- The degenerated and non-functional organs found in an organism are called **vestigial organs**.
- The forelimbs of bat and human are examples of **homologous** organs. [QR]
- The theory of natural selection for evolution was proposed by **Charles Darwin**. [PTA – 6]

III. State True or False. Correct the false statements

- The use and disuse theory of organs was postulated by Charles Darwin. [PTA – 5] [False]

**The use and disuse theory of organs was postulated by Jean Baptiste Lamarck.*
- The homologous organs look similar and perform similar functions but they have different origin and developmental pattern. [False]

** The **analogous** organs look similar and perform similar functions but they have different origin and developmental pattern.*
- Birds have evolved from reptiles. [PTA – 5] [True]

IV. Match the following

[PTA – 5]

Column A	Column B	Answer
1. Atavism	Caudal vertebrae and vermiform appendix	1. Rudimentary tail and thick hair on the body
2. Vestigial organs	A forelimb of a cat and a bat's wing	2. Caudal vertebrae and vermiform appendix
3. Analogous organs	Rudimentary tail and thick hair on the body	3. A wing of a bat and awing of an insect
4. Homologous organs	A wing of a bat and awing of an insect	4. A forelimb of a cat and a bat's wing
5. Wood park	Radiocarbon dating	5. Thiruvakkarai
6. W.F. Libby	Thiruvakkarai	6. Radiocarbon dating

V. Answer in a word or sentence

1. A human hand, a front leg of a cat, a front flipper of a whale and a bat's wing look dissimilar and adapted for different functions. What is the name given to these organs?	<i>Homologous organs</i>
2. Which organism is considered to be the fossil bird?	<i>Archaeopteryx</i>
3. What is the study of fossils called?	<i>Palaeontology</i>

VI. Short answer questions

1. The degenerated wing of a kiwi is an acquired character. Why is it an acquired character? [PTA – 3]

- ❖ Kiwi have learnt to walk. According to use and disuse theory, wings of Kiwi degenerate.
- ❖ This occurs in response to their change in habitat. Thus, it is an acquired character.

2. Why is Archaeopteryx considered to be a connecting link?

- ❖ Archaeopteryx had wings with feathers, like a bird.
- ❖ It had a long tail, clawed digits and conical teeth, like a reptile.

3. Define Ethnobotany and write its importance. [AUG – 2022, PTA – 2, SEP – 2020]

Ethnobotany is the study of a region's plants and uses through traditional knowledge of local people.

Importance of Ethnobotany:

- ❖ It provides traditional uses of plants.
- ❖ It gives information about known and unknown useful plants.
- ❖ It provides information for preparing herbal medicine to treat various diseases.

4. How can you determine the age of the fossils? [MDL – 19, SEP – 2020]

- ❖ Age of fossils is determined by radioactive elements like carbon, lead or potassium in it.
- ❖ Radioactive carbon (C^{14}) dating method discovered by W.F. Libby (1956) is used often.
- ❖ Carbon consumption stops after death. After that C^{14} starts decaying continuously.
- ❖ Time after death can be calculated by measuring the amount of C^{14} present in their body.

VII. Long answer questions

1. Natural selection is a driving force for evolution - How? [PTA – 6, MDL – 19]

i) **Overproduction:** Living beings reproduce more individuals and multiply geometrically. This leads to overproduction.

ii) **Struggle for existence:** Overproduction leads to population increase but with same space and food. This creates competition and organisms struggle for existence.

- ❖ **Intraspecific struggle :** Competition among individuals of same species.
- ❖ **Interspecific struggle :** Competition between organisms of different species living together.
- ❖ **Environmental struggle :** Natural conditions like extreme heat or cold, drought & floods.

iii) **Variations:** Favourable variations are useful. Unfavourable variations are useless.

iv) **Survival of the fittest or Natural selection:** During the struggle,

- ❖ Organisms which overcome the challenge will survive and adapt to environment.
- ❖ Organisms which are unable to face the challenges are unfit to survive and disappear.
- ❖ This is called natural selection. It is the key for evolution.

v) **Origin of species:** New species originates by gradual accumulation of favourable variations. Thus, above principles determines the evolutionary process and drives the evolution.

2. How do you differentiate homologous organs from analogous organs?

Homologous organs	Analogous organs
1. Look dissimilar. Different functions	1. Look similar. Similar functions
2. They are from common ancestors.	2. They have different origin.
3. Similar developmental pattern.	3. Different developmental pattern.
4. Similar basic structures.	4. Dissimilar basic structures.
5. Ex : Human hand, front leg of cat,	5. Ex: Wings of bird and insect.

3. How does fossilization occur in plants?

[PTA – 1]

Fossilization occurs when plant and animal remains are preserved in sedimentary rock.

Methods of Fossilization	
i) Petrifaction	<ul style="list-style-type: none"> • Silica penetrate and replaces organic tissue and forms a fossil. • Can preserve hard and soft parts. Ex: Bones and wood fossils.
ii) Mold & Cast	<ul style="list-style-type: none"> • Organism buried in sediment leaves a mold. • It is the original shape but does not reveal the internal structure. • Minerals or sediment fill the mold and forms a cast.
iii) Preservation	<ul style="list-style-type: none"> • Entire plant or animal can be preserved in ice or amber (tree sap). • They protect them from decay.
iv) Compression	<ul style="list-style-type: none"> • Hard parts of organism settle at bottom of seabed & covered by sediment. • With continuous sedimentation, fossils are formed.
v) Infiltration (or) Replacement	<ul style="list-style-type: none"> • Precipitation of minerals takes place, which then infiltrate the cell wall. • This is achieved by elements like silica, calcium and magnesium carbonate. • Hard parts are dissolved and replaced by these minerals.

VIII. Higher Order Thinking Skills (HOTS)

1. Arun was playing in the garden. Suddenly he saw a dragon fly sitting on a plant. He observed the wings of it. He thought it looked similar to a wing of a crow. Is he correct? Give reason for your answer. [PTA – 2]

- i) **No**, the wings are different. Wings of dragon fly are thin and transparent, whereas wings of crow are strong, muscular and covered with feathers.
- ii) Wings of dragon fly and crow have same function, but their origin and pattern are different. These are called analogous organs.

2. Imprints of fossils tell us about evolution - How?

- Fossils are the preserved traces of animals, plants, and other organisms.
- Fossils provide solid evidence that organisms from the past are not the same as today
- Fossils show a progression of evolution.
- Fossil record tells the story of past and shows the evolution over millions of years.

3. Octopus, cockroach and frog all have eyes. Can we group these animals together to establish a common evolutionary origin. Justify your answer. [PTA – 4]

- i) **No**, we cannot group these animals together to establish a common evolutionary origin.
- ii) Because, we need more similarities, to group them together.
- iii) They have major dissimilarities like octopus is aquatic, frog is amphibian whereas cockroach is non-aquatic.