

Class XI Session 2024-25
Subject - Biology
Sample Question Paper - 7

Time Allowed: 3 hours

Maximum Marks: 70

General Instructions:

1. All questions are compulsory.
2. The question paper has five sections and 33 questions. All questions are compulsory.
3. Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.
4. There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
5. Wherever necessary, neat and properly labeled diagrams should be drawn.

Section A

- The remains and left impressions of an organism are called as _____. [1]
 - a) Dead remains
 - b) Calcareous
 - c) Coals
 - d) Fossils
- The part of a nephron which adds some material to the filtrate is: [1]
 - a) Loop of Henle
 - b) Proximal convoluted tubule
 - c) Distal convoluted tubule
 - d) Bowman's capsule
- The primary structure of a protein molecule has: [1]
 - a) No ends
 - b) Two ends
 - c) Three ends
 - d) One end
- Anatomy of stem differs from the root in: [1]
 - a) Stem hairs, absence of chloroplast and broad cortex
 - b) Cutinized epidermal wall, conjoint vascular bundle, and narrow cortex
 - c) Xylem exarch, vascular bundle radial and narrow cortex
 - d) Secondary vascular growth and presence of stomata
- The regulatory centres for respiration are located in: [1]
 - a) Diencephalon and pons
 - b) Pons and cerebellum
 - c) Medulla oblongata and pons
 - d) Cerebellum and medulla oblongata
- Chloroplast dimorphism is a characteristic feature of _____. [1]

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16. **Assertion (A):** Voice of women and children is high pitched whereas that of men is low pitched. [1]
Reason (R): Vocal cords of men are longer than of women and children.
- a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false. d) A is false but R is true.

Section B

17. How does cambium ring form in a dicot stem? [2]
18. Distinguish between Kinocilia and Stereocilia. [2]
19. Define the following: [2]
a. Exocrine gland
b. Endocrine gland
c. Hormone
20. What is the need of biological classification? [2]
21. A cyclic process is occurring in C_3 -plants, which is light-dependent and needs CO_2 . This process does not produce, but consumes energy. [2]
i. Can you name the given process?
ii. Is it essential for survival?

OR

What is the basis for designating C_3 and C_4 pathways of photosynthesis?

Section C

22. Explain the main characteristics of pteridophytes. [3]
23. List the main features of class Reptilia. [3]
24. Explain with the help of an example, the feed-back inhibition in an enzyme. [3]
25. Which parts of the plants produce gibberellins? State two functions of this hormone and mention why it was named gibberellin. [3]
26. How many pairs of ribs are found in humans? How do you categorise these on the basis of their attachment? Explain. [3]
27. What is meant by coronary artery disease? [3]

OR

Differentiate between Tricuspid and Bicuspid valve.

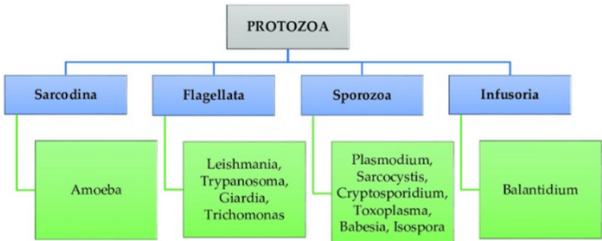
28. Why is conduction in a nerve called on the electric phenomenon? [3]

Section D

29. **Read the following text carefully and answer the questions that follow:** [4]
Sarcodines are unicellular/jelly-like protozoa found in fresh or sea water and in moist soil. Their body lacks a periplast. Therefore, they may be naked or covered by a calcareous shell. They usually lack flagella and have temporary protoplasmic outgrowths called pseudopodia. These pseudopodia or false feet help in movement and capturing prey. They include free-living forms such as Amoeba or parasitic forms such as Entamoeba. Zoo flagellates ciliates and I sporozoans are other groups of protozoan protists. They are all unicellular and



heterotrophic. They may be holozoic, saprobic or parasitic.



- i. Write two lines about flagellated protozoans and also mention some flagellated protozoans. (1)
- ii. Observe the given protozoan classification and mention what is the basis of protozoan classification. (1)
- iii. Mention some locomotory organs of protozoa. (2)

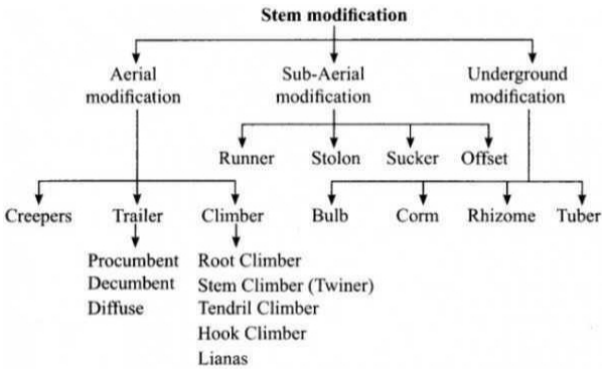
OR

Which protozoan group has two nuclei, macronucleus, and micronucleus? Mention characteristics of it. (2)

30. **Read the following text carefully and answer the questions that follow:** [4]

Various parts of the plant such as stems leaves, and even fruits are modified into underground parts to perform various functions such as stems, leaves, and even fruits.

The stems in ginger and banana are underground and swollen due to storage of food. They are called rhizome. Rhizome of ginger is a modification of stem because it bears nodes, internodes, terminal buds, scaly leaves and buds, which give rise to aerial shoots. It is not a root because root does not have nodes and internodes. Also, rhizome does not perform the function of roots i.e. anchorage and absorption, rather it serve as reservoir for storage of food. Similarly, corm is an underground stem in Colocasia (jimikand) The tips of the underground stem in potato become swollen due to accumulation of food and forms tuber.



- i. Observe the given flow chart and mention what are the four types of Underground stem modification also mention one example of each. (1)
- ii. Ginger is an underground stem but why it is distinguished from a root? (1)
- iii. Why do the tips of modified stems in potatoes become swollen? (2)

OR

Are all underground parts of a plant roots? (2)

Section E

31. Describe the following: [5]

- i. synopsis
- ii. bivalent
- iii. chiasmata

Draw a diagram to illustrate your anwer.

OR

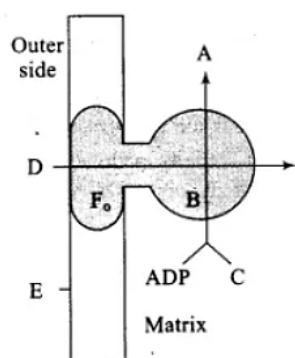
Distinguish anaphase of mitosis from anaphase I of meiosis.

32. Explain ETS.

[5]

OR

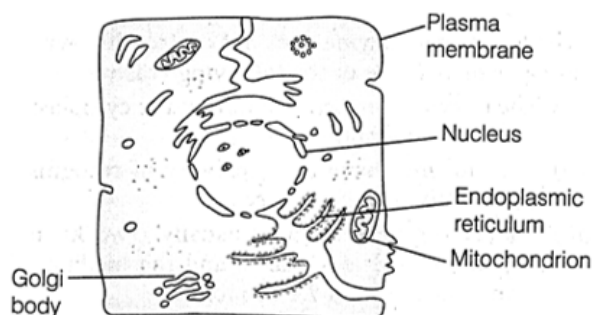
Given below is a diagram showing ATP synthesis during aerobic respiration, replace the symbols A, B, C, D and E by appropriate terms given in the box.



F₁ Particle, P_i, 2H⁺, Inner mitochondrial membrane, ATP, F_o particle, ADP

33. The diagram shows some of the structures present in an animal cell.

[5]



Which of these structures is responsible for

- Manufacture of lipids and steroids
- Release of energy
- Manufacture of hormones and digestive enzymes
- Production of spindle fibres in cell division
- Endo and exocytosis?

OR

Describe cilia and flagella of eukaryotic cell. How are flagella of eukaryotes different from those of prokaryotic cell?

Solution

Section A

1.
(d) Fossils
Explanation: Dead remains of plants or animals or their impressions are called fossils. Fossils help in classification of an organism that evolved in the different interval of time in history.
2.
(c) Distal convoluted tubule
Explanation: Each nephron consists of Bowman's cup, tubules, and loops of Henle's. The filtration of blood occurs in glomerulus cells present in Bowman's cup. Some materials are added to the initial filtrate in the distal convoluted tubule.
3.
(b) Two ends
Explanation: Two ends - the carboxyl and amino-terminal.
4.
(b) Cutinized epidermal wall, conjoint vascular bundle, and narrow cortex
Explanation: The stem shows the epidermis covered with a thin layer of cuticle, narrow cuticle, and each vascular bundle is conjoint, open, and is endarch protoxylem.
5.
(c) Medulla oblongata and pons
Explanation: A specialized centre present in the medulla region of the brain called respiratory rhythm centre is primarily responsible for this regulation. In the pons region of the brain called pneumotaxic centre can moderate the functions of the respiratory rhythm centre.
6.
(b) C₄ plants
Explanation: Chloroplast dimorphism is a characteristic feature of C₄ plants. These plants contain two kinds of chloroplast in their leaves, bundle sheath cells contain chloroplast in which grana is absent and mesophyll cells without stroma.
7.
(d) Neurohypophysis
Explanation: An excessive loss of fluid from the body can activate receptors that stimulate the hypothalamus to release antidiuretic hormone (ADH) or vasopressin from the neurohypophysis.
8.
(b) Ureotelic
Explanation: Excretion of urea as metabolic waste is known as Ureotelism. Animals secreting urea are called ureotelic. Frog is ureotelic.
9.
(a) Gibberellins
Explanation: Gibberellins are growth hormones that stimulate cell elongation and cause plants to grow taller. Gibberellins also have a role in other plant processes, such as stem elongation, germination, flowering, and fruit ripening.
10.
(c) Lower part of capsule
Explanation: The sporophyte of moss is differentiated into three parts - foot, seta, and capsule. The capsule, in turn, is differentiated into 3 regions.
 - i. Apophysis - the sterile basal portion of the capsule, it is in continuity with seta
 - ii. Theca or body of capsule, which is the fertile region, and
 - iii. Operculum the apical region of capsule.Apophysis is rich in chloroplast and thus the photosynthetic region of moss, it also provides nutrition to the developing sporangium.



11.

(c) All of these

Explanation: If the anaemic person suffered from massive haemorrhage, the problem he may face includes very low blood pressure, accumulation of wastes products in the body, and no glomerular filtration in the kidney.
12.

(b) Diffusion

Explanation: The main function of the respiratory system is the gaseous exchange. This refers to the process of Oxygen and Carbon Dioxide moving between the lungs and blood. Diffusion occurs when molecules move from an area of high concentration (of that molecule) to an area of low concentration. This occurs during the gaseous exchange as the blood in the capillaries surrounding the alveoli has a lower oxygen concentration of Oxygen than the air in the alveoli which has just been inhaled.
13.

(c) A is true but R is false.

Explanation: Paramecium shows presence of several noncontractile food vacuoles. They differ in shape and size according to the nature of ingested food particles, but mostly they are rounded in form. The food vacuoles are meant for intracellular digestion.
14.

(b) Both A and R are true but R is not the correct explanation of A.

Explanation: If a person first inspires with his utmost effort and then expires also with maximum effort the volume of air breathed out is called the vital capacity. An athlete requires more oxygen during exercise on a regular basis. Due to this, amount of oxygen taken in and gases taken out by him is greater than others. This gradual effort of an athlete to meet his oxygen demand ultimately increases the vital capacity.
15.

(c) A is true but R is false.

Explanation: Cyanide inhibits the activity of cytochrome oxidase by combining it with its metallic ions. It has no structural similarity with the substrate of the enzyme, namely cytochrome C. Cytochrome oxidase is a respiratory enzyme. In its inhibition, the animal is unable to perform respiration properly and gets killed.
16.

(a) Both A and R are true and R is the correct explanation of A.

Explanation: Vocal cords are the folds of mucous membrane stretching across the lumen of larynx. They vibrate when air is blown through the larynx. This produces voice. In human beings, pharynx cavity, mouth cavity and nasal cavity work as resonators. The amplitude of vibrations and the volume and force of air current control the loudness and intensity of the voice, whereas, the length, tightness and frequency of vibration of the vocal cords control the pitch of the voice. The voice in women and children is generally high-pitched because the vocal cords are short. On the contrary, in men the vocal cords are longer (due to male sex hormones) and therefore their voice is lower-pitched and deeper.

Section B

17. In dicot stems, the cells of cambium present between the primary xylem and primary phloem are the intrafascicular cambium. The cells of medullary rays, adjoining this intrafascicular cambium become meristematic and form the interfascicular cambium. Interfascicular and intrafascicular cambium together form a ring of cambium called cambium ring.
18. Difference between Kinocilia and Stereocilia:

Kinocilia	Stereocilia
i. These are motile in nature.	These are non-motile in nature.
ii. These arise from a cytoplasmic basal granule.	These are evaginations of the plasma membrane.
iii. These are present on epithelial cells of respiratory and genital tracts.	These are present in the epithelial cells of epididymis and vasa deferentia of man.
19.

a. **Exocrine glands.** These glands have ducts. They secrete their secretions through ducts.

b. **Endocrine glands.** Endocrine glands do not have ducts. They directly secrete their secretions.

c. **Hormone.** Hormones are non-nutrient chemicals which act as intercellular messengers and are produced in trace amounts.
20. **Need for Biological Classification:**

To study and include each organism along with its identification and habitat.

- To establish the relationship among different organisms and to know about their evolution.

21. i. Photorespiration.
- ii. Yes, because by consuming oxygen at a higher temperature, it protects the chlorophyll from photo-oxidation.

OR

In case of C_3 pathways, carbon is fixed into a 3-carbon compound, i.e. 3-PGA. On the other hand, in case of C_4 pathways, carbon is fixed into a 4-carbon compound, i.e. oxaloacetic acid. Thus, a number of carbon atoms in the end product are the basis for designating C_3 and C_4 pathways of photosynthesis.

Section C

22. Main characteristics of pteridophytes:

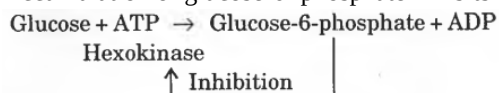
- i. Fern plant is a **sporophyte**.
- ii. It is divided into **root, stem, and leaves**.
- iii. They have **vascular tissues** xylem and phloem.
- iv. Sporangia are formed in the leaves. The **sporangia** bear **spores** which are haploid.
- v. Spores germinate and form gametophyte which is known as **prothallus**.
- vi. Prothallus possesses sex organs archegonia and antheridia.
- vii. They do not form seeds.
- viii. **Alternation of generation** is an important feature.
- ix. **Examples** are Ferns, Dryopteris (a garden fern), Pteris and Nephrolepis, etc.

23. Main features of class reptilia are:

- i. They are the **first truly terrestrial vertebrates**.
- ii. They have **dry skin** covered with scales.
- iii. They are **tetrapods** and **pentadactyl**.
- iv. The hands and feet **have claws**.
- v. **Lungs** are well-developed and reptiles never breathe by gills.
- vi. There is no larval stage in its development.
- vii. The ventricle of the heart is partially divided into two by an incomplete septum but this division is complete in the crocodiles.

24. **Feed-back inhibition:** It is called **Reversible inhibition**. The end products accumulate in the cell after their enzymatic action and these inhibit their own production. It is called **allosteric modulation or negative feedback**. So the inhibition is due to the production of the reaction. It is the regulation of the metabolic activity by stopping the excess formation of the product. It **binds** to some other site except the active site. **Inhibitor** shows no resemblance to the substrate and is a product of a metabolic pathway.

Accumulation of glucose-6- phosphate inhibits the activity of **hexokinase enzyme** in glycolysis:



25. The **major sites of gibberellin production** in plants are **embryos, roots and young leaves near the shoot tip**.

Two functions of gibberellins are:

- i. **Delays Senescence-** Gibberellins can delay the ripening of fruits such as Citrus fruits, apples, etc. This can also be used for safe and prolonged storage of the fruits.
- ii. **Malting Process-** The process of malting in the brewing industry can be speeded up by the use of GA_3 .

26. **Ribs in Humans:** There are 12 pairs of ribs in humans. They support the sides of the thoracic cavity. They fall into 3 groups.

- i. **True ribs:** Upper 7 pairs of ribs attached directly to the sternum.
- ii. **False ribs (Vertebrochondral ribs):** Next three pairs of ribs joined to the ribs above. They are 8th, 9th and 10th ribs.
- iii. **Floating ribs:** Lower two pairs of ribs free in front (11th and 12th) are called floating ribs.

Thoracic vertebrae, ribs as well as sternum form rib cage. **Vertebral** and **sternal** are two parts of the rib.

27. It is the hardening of **arteries** and **arterioles** due to the thickening of the fibres tissue and the consequent loss of elasticity. It is often referred to as **atherosclerosis**. This mainly affects the vessels, which are mainly responsible for supplying blood to the heart muscle. It seems to occur due to deposition of calcium, fat cholesterol, and fibrous tissues, making the lumen of arteries narrower.

OR

Tricuspid valve	Bicuspid valve
There are no extra flaps in it.	Called Mitral valve, maybe many small flaps in it.
It is guarded by 3-flaps that are different in size.	It is guarded by two flaps only almost equal in size.



Right AV aperture is guarded by tricuspid valve, it checks backflow of deoxygenated blood into the right auricle.	Left AV aperture is guarded by a bicuspid valve, it checks backflow of oxygenated blood into the left auricle.
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28. It is called so because it can be compared to the transmission of a message through a telephone cable. It travels **very fast** just like an electric current. Though its speed is not as much fast as that of electric current through a wire. Thus the passage of a stimulus in a nerve is an electrical process.

Section D

29. i. Flagellated protozoans are either free-living or parasitic protozoans that have flagella. Sleeping sickness is caused by parasitic versions of the parasite. Trypanosoma is a good example.
- ii. • Locomotion
- Protozoan are eukaryotic having different shapes and sizes. Some are ciliated flagellated or both may be absent.
- iii. a. Cilia
- b. Flagella
- c. Pseudopodia

OR

Ciliata has two nuclei, macronucleus, and micronucleus.

Ciliates are characterized as organisms propelled by rows of cilia and possessing two types of nuclei. They are a large macronucleus involved in vegetative functions of the organism, and a small micronucleus involved in sexuality.

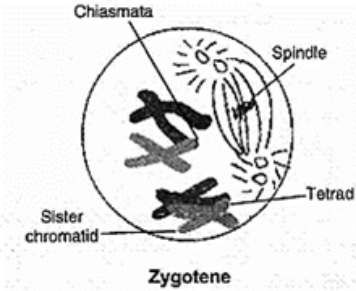
30. i. • Rhizome - Ginger, turmeric.Banana
- Bulb - Tulips, Lilies, Daffodils, Onion, Garlic
- Corm - Colocasia, Yam, Saffron
- Tuber - Potato, Artichokes
- ii. It has nodes and internodes. Such nodes and internodes are not found in the roots.
- iii. Modified stem in the potato is underground and it becomes swollen because food gets accumulated to form tubers.

OR

No. Many different parts of plants, like the stem, leaves and fruits, get modified to act as underground structures that can perform functions other than those of roots.

Section E

31. i. During zygotene of prophase I of meiosis homologous chromosomes pair together. This pairing is called synapsis.



- ii. **Bivalent:** The complex formed by homologous chromosomes during zygotene is called a bivalent. They are also known as tetrad
- iii. **Chiasmata:** During diplotene, the paired chromosomes make a X-shaped structure. This is called chiasmata. It is a site where two non-sister chromatids of homologous chromosomes have crossed over.

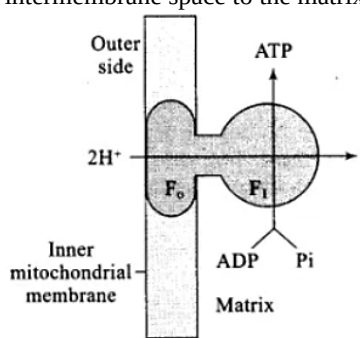
OR

Anaphase of mitosis	Anaphase I of meiosis
The centomere of every chromosome divides.	The centomere does not divide.
Separation of sister chromatids takes place.	Homologous chromosomes are separated.
Only one chromatid of every chromosome moves to the pole. The number and types of chromosomes at each pole is the same as in the parent nucleus. Chromosomes are single-stranded	Each homologous pair of chromosomes moves to the pole with both the chromatids.chromosomes are double-stranded
The chromatids moving to one pole are genetically identical to those moving to the opposite pole.	The chromosomes moving to one pole are not genetically identical to those moving to the opposite pole.

- 32.
- The metabolic pathway through which the electron passes from one carrier to another, is called the electron transport system (ETS) and it is present in the inner mitochondrial membrane.
 - The energy stored in $\text{NADH} + \text{H}^+$ and FADH_2 is used as they move through ETS. This is accomplished when they are oxidized through the electron transport system and the electrons are passed on to O_2 resulting in the formation of H_2O .
 - Electrons from NADH produced in the mitochondrial matrix during citric acid cycle are oxidised by an NADH dehydrogenase (complex I), and electrons are then transferred to ubiquinone located within the inner membrane. Ubiquinone also receives reducing equivalents via FADH_2 (complex II) that is generated during oxidation of succinate in the citric acid cycle.
 - The reduced ubiquinone is then oxidised with the transfer of electrons to cytochrome c via cytochrome bc1 complex (complex III).
 - Cytochrome c acts as a mobile carrier for transfer of electrons between complex III and IV. Complex IV refers to cytochrome c oxidase complex containing cytochromes a and a^3 , and two copper centres.
 - When the electrons pass from one carrier to another via complex I to IV in the electron transport chain, they are coupled to ATP synthase (complex V) for the production of ATP from ADP and inorganic phosphate. The number of ATP molecules synthesized depends on the nature of the electron donor.
 - Oxidation of one molecule of NADH gives rise to 3 molecules of ATP, while that of one molecule of FADH_2 produces 2 molecules of ATP. The presence of oxygen is vital, since it drives the whole process by removing hydrogen from the system. Oxygen acts as the final hydrogen acceptor.
 - Unlike photophosphorylation where it is the light energy that is utilized for the production of proton gradient required for phosphorylation, in respiration it is the energy of oxidation-reduction utilized for the same process. It is for this reason that the process is called oxidative phosphorylation.
 - The energy released during the electron transport system is utilized in synthesizing ATP with the help of ATP synthase (complex V). This complex consists of two major components, F_1 and F_0 . The F_1 headpiece is a peripheral membrane protein complex and contains the site for synthesis of ATP from ADP and inorganic phosphate. F_0 is an integral membrane protein complex that forms the channel through which protons cross the inner membrane. The passage of protons through the channel is coupled to the catalytic site of the F_1 component for the production of ATP. For each ATP produced, 2H^+ passes through F_0 from the inter membrane space to the matrix down the electrochemical proton gradient.

OR

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Diagrammatic presentation of ATP synthesis in mitochondria

33. Structures responsible are

- Smooth endoplasmic Reticulum (SER)** is responsible for the manufacture of lipids and steroids.
- Mitochondrion** is responsible for the release of energy.
- Ribosomes** are responsible for the production of hormones and digestive enzymes.
- Centrioles** are responsible for production of spindle fibres.
- Plasma membrane** is responsible for endo and exocytosis.

OR



Cilia and flagella are hair like outgrowths of the cell membrane. Cilia are small structures which work like cars, causing the movement of either the cell or the surrounding fluid. Flagella are comparatively longer and responsible for cell movement.

Structure:

- The electron microscopic study of a cilium or the flagellum shows that they are covered with plasma membrane.
- Their core called the axoneme, possesses a number of microtubules running parallel to the long axis. The axoneme has nine pairs of doublets of radially arranged peripheral microtubules, and a pair of centrally located microtubules.
- Such an arrangement of axonemal microtubules is referred to as the 9 + 2 array.
- The central tubules are connected by bridges and are also enclosed by a central sheath, which is connected to one of the tubules of each peripheral couplet by a radial spoke. Thus, there are nine radial spokes. The peripheral doublets are also interconnected by linkers.
- Both the cilium and flagellum emerge from centriole like structure called the basal bodies.

Difference between Flagella of Prokaryotes and Eukaryotes

- Flagella of prokaryotes are arising from the plasma membrane, while those of eukaryotes are arising from centrioles.
- Flagella of prokaryotes are not membrane bound, while those of eukaryotes are membrane bound.
- Flagella of prokaryotes are simple in structures, while those of eukaryotes are complex in structure.

