# CHAPTER 1
# Classification of Living Things and Viruses

## Classification of living things

**Classification:** **is dividing the living things into many groups according to their similarities and differences.**

**Taxonomy:** **is a branch of biology which studies classification.**

**Q/ How is classification studied?** كيف يدّرس التصنيف؟
**ANS/ The classification of living things can be studied by taxonomy.**

***NOTE:** **Biologists estimate that there are about two million kinds of organisms live today on our planet and new species continuously being discovered.**

**Q/ What does the classification of organisms provide?** ماذا يوفر تصنيف الكائنات؟
**ANS/ The classification of organisms provides:**
**1. An advantage in investigating.**
**2. Observing of organisms.**

## The History of Classification

**Q/ What did before biologists used to classify living things?** ماذا استخدم العلماء السابقون لتصنيف الكائنات الحية؟
**ANS/ Before biologists have used observation to classify living things.**

*** The Greek philosopher Aristotle (350 B.C.) was the first man who made some attempts on grouping of organisms. He Knew only a few kinds of plants and animals.**

**Q/ How did Aristotle classify the plants?**
**ANS/ He classified plants as;**
- **Herbs.**
- **Shrubs.**
- **Trees.**

**Q/ How did Aristotle classify the animals?**
**ANS/ He classified animals according to where they lived;**
- **Water.**
- **Land.**
- **Air.**

**Q/ How was the modern classification system discovered?**
**ANS/ The modern classification system was discovered by a Swedish biologist Carolus Linnaeus or Karl Von Linne (1707-1778).**

**- Carolus Linnaeus developed principles of the modern taxonomy.**

**Binominal nomenclature:** **is the system which used two Latin names for each organism (used by Linne).**

**Binominal nomenclature consists of genus and species names. For examples of human beings; Homo sapiens**
**- First name (Homo) is the genus name.**
**- Second name (sapiens) is the species name.**

**Species:** **is a group of living things which have many common properties.**

***Important Note:** **Organisms which belong to the same species can *mate* and produce *fertile* organisms. (they can reproduce too).**

**Genus:** **It consists of one or more species that show many similarities such as a house cat (Felis domestica).**

**- Felis domestica is a species which belongs to genus of Felis. Other species of the genus Felis is a lion (Felis leo).**

***NOTE:** **The genus name is spelled with capital letter, while the species name begins at a small letter.**

**Q/ What have the characteristics of same species?**
**ANS/ 1. They have many common properties.**
**2. They can mate.**
**3. They can produce fertile organisms. (they can reproduce too).**

**Q/ Give examples for genus name of organisms.**
**ANS/ 1. Pinus nigra** صنوبر اسود
**2. Populus alba** حور ابيض
**3. Rosa canina** ورد النسرين

## Classification Categories

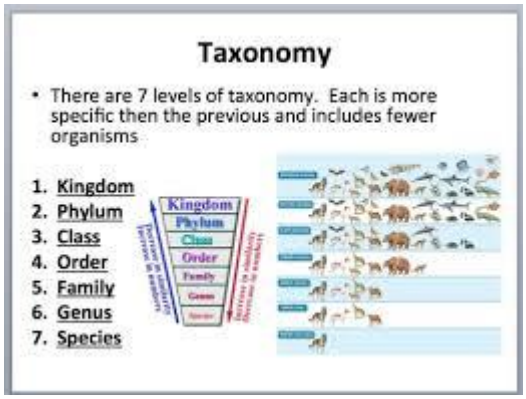
**Q/What are the taxonomists added to classification?** ماذا أضاف علماء التصنيف الى التصنيف؟
**ANS/ Taxonomists have added several categories to the classification system.**
**1- The biggest Category is a kingdom**
**2- The smallest Category is species.**

**Q/ what are the observed trends between the kingdom and species?** ماهي الاتجاهات الملحوظة بين المملكة والأنواع؟
**Ans/**
**1- Number of groups decreases.**
**2- Similarities in organisms increase.**
**3- Number of member decreases.**

**Q/ How are living things classified?** كيف تصنف الكائنات الحية؟
**Ans/ Living thing are classified according to modern Taxonomic system and they are classified into five kingdoms. They are Monera, Protista, Fungi, Plantae and Animalia.**

**Q/ How are five kingdoms are classified?** كيف يتم تصنيف الممالك الخمس؟
**Ans/ These five kingdoms are classified according to their cell properties and structures.**

**Q/ What do we use to detect a kingdom of organisms?** ماذا نستخدم للكشف عن ممالك الكائنات؟
**Ans/ We use an identification key to detect a kingdom of organisms.**



# VIRUSES

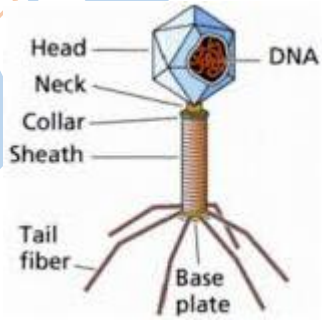
**viruses:** are tiny strands of nucleic acid that are not assigned to any of the five kingdoms.

**Q/ What are the characteristics of viruses?** ما هي خصائص الفايروسات؟
**ANS/**
1- Viruses are not true Living organisms.
2- Viruses are non-cellular structures that crystallize.
3- Viruses are classified initially on the basis of the host they infect, such as animal viruses, plant viruses, and bacterial viruses (often Called bacteria phages).
4- The virus genome consists of either DNA or RNA, but not both.
5- Some viruses (a large number of animal viruses) have an outer membranous envelope containing Lipids, proteins and traces of metals.
6- Viruses means poison in Latin and they cause different diseases in organisms.

**Q/ How are viruses classified?** كيف تصنف الفايروسات؟
**ANS/** Viruses are classified initially on the basis of the host they infect such as animal viruses, plant viruses and bacterial viruses (often called bacteriophages).

**Q/ What does the outer membranous of viruses contain?** ما الذي يحتويه الغشاء الخارجي للفايروسات؟
**ANS/** The outer membranous contains.
1- Lipids
2- Proteins
3- Traces of metals.

**Q/ Explain the structure of viruses?** وضح تركيب الفايروسات؟
**ANS/**
1. The Viruses are consisting of genetic material which is DNA or RNA, but not both and contain protein coat.
3. Viruses don't have nucleus neither organelles nor cytoplasm.
4. They can reproduce only in a host.
5. They have projections on surface to attack the host.




**Q/What is the function of the projections (tail fibers) in virus's structure?** ما هي وظيفة الفايروسات في تركيب الفايروس؟
**ANS/** To attach the host.

## Some Important viral Diseases:

### 1. AIDS (Acquired Immune Deficiency Syndrome)

**Q/ What are the characteristics of (AIDS) disease?** ما هي خصائص مرض الايدز؟
**ANS/**
1. The immunity deficiency is a final stage of infection with virus which causes this disease.
2. The incubation period of ATDS may be Ten years note (The infected person may Look heal thy for many years)
3. During this period the Patient has ability to transfer the infection to other people.
4. This disease starts by action of virus which causes this disease it attacks and destroys the body cells which are responsible for defense against the diseases.
5.This effect leads to the weakening of the natural immune system of the body.

**Q/Why is this virus called (AIDS) or Acquired Immune Deficiency Syndrome?**
**Ans: Because this disease starts by action of virus it attacks and destroys the body cells which are responsible for defense against the diseases. So, it leads to the weakening of the natural immune system of the body.**

### 2. Swine Flu

**Q/ When does influenza occur?**
**ANS/** influenza occurs when a new strain of the influenza virus is transmitted to humans from another animal species.
**Q/ What are the influenza species that are important in the emergence of new human strain?**
**ANS/** A new species is:
1. Pigs. 2. Chickens. 3. Ducks.

**Q/What are the characteristic or categories of Swine Flu?**
**ANS/**
**1- These novel strains are unaffected by any immunity people may have to older strains of human influenza.**
**2- Can therefore spread extremely rapidly.**
**3- Infect very large numbers of people.**
**4- Influenza viruses can occasionally be transmitted from wild birds to other species causing outbreak in domestic poultry.**
**5- Give rise to human influenza pandemics.**
**6- The propagation of influenza viruses throughout the world is thought in part to be by:**
**a- Bird migrations.**
**b- Though commercial shipments of live bird products might also be implicated.**
**c- as well as human travel patterns.**

**Q/ What are the ways of spreading a virus of swine flu?**
**ANS/**
**1- Birds migrations**
**2- Commercial shipments of live bird's products might also be implicated.**
**3- Human travel patterns.**

## 3. Bird Flu

**Q/ To what the phrase refers to bird flu?**
**ANS/ Bird flu, or any flu like human Flu, horse Flu in that refers to an illness Caused by any of many different strains of influenza viruses that have adapted to specific host.**

**Q/ What kind of virus species does it cause bird flu?**
**ANS/ All viruses that cause influenza in birds belong to the species influenza (A) virus.**

***NOTE:** Strains of influenza viruses are adapted to multiple species, though may be preferential towards a particular host.**

## 4. Hepatitis

**Hepatitis:** **is a medical condition defined by inflammation of the liver.**

**Q/ How to characterize a disease Hepatitis?**
**ANS: Characterized by the presence of inflammatory cells in the tissue of the organ.**

***Note:** Hepatitis may occur with Limited or no symptoms.**

**Q/ When does hepatitis occur acute?**
**ANS: Hepatitis is acute when it lasts less than six months.**

**Q/ When does Hepatitis are occurring chronic?**
**ANS: When it persists longer more than six months.**

**Q/ What is the common type of virus that causes hepatitis?**
**ANS: Type (A) group of viruses is known as the hepatitis viruses cause most cases of hepatitis worldwide.**

**Q/ What are the ways of spreading hepatitis disease?**
**ANS/ We have many ways:**
**(a) Hepatitis viruses cause most of hepatitis worldwide.**
**(b) Hepatitis can also be caused by toxic substances (notably alcohol, certain medication, some industrial organic solvents and plants).**

## 5- Polio

**Polio: is an acute, viral and infectious disease spread from person to person via the fecal-oral route.**

**Q/ What are the characteristics or categories of polio disease?**
**ANS/**
**1. Acute disease.**
**2. viral.**
**3. infectious disease spread from person to person via the fecal-oral route.**

**Q/ What is the way of spreading polio disease?**
**ANS/ Spread from person to person by the fecal-oral route.**

***Note: Although approximately 90% of polio infections cause no symptoms.**

**Q/ When symptoms of polio appear?**
**ANS/ Affected individuals can exhibit a range of symptoms if the virus enters the enters the blood stream.**

***Note: In about 1% of cases, the virus enters the central nervous system.**

**Q/ What is the effect of damage to motor neurons by polio or paralysis?**
**ANS/ Infecting and destroying motor neurons leading to:**
**1. Muscle weakness. 2. Acute flaccid paralysis.**

**Q/ What symptoms depend on a patient with polio or paralysis?**
**ANS/ Depending on the nerves involved.**

**Q/ What is the common type of viral paralysis?**
**ANS/ Spinal polio is the most common form.**

**Q/What is the characterized of the spinal polio?**
**ANS/ Characterized by asymmetric paralysis that most often involves the legs.**

## 6. Measles

**Measles: is an infection of the respiratory system caused by a virus.**

**Q/ How does Measles disease spread?**
**Ans/ It spreads through respiration by contact with fluids from an infected person's nose and mouth either directly or indirectly by aerosol transmission.**

***Notes:**
**1. Measles is highly contagious. 90% of people without immunity sharing living space with an infected person will catch it.**
**2. There is no specific treatment for measles.**

**Q/ How to cure measles?**
**ANS/ Most patients with uncomplicated Measles will recover with rest and supportive treatment.**

## 7. Common influenza

**Common influenza: the common cold is a viral infectious disease of the upper respiratory tract which affects primarily the nose.**

**Q/What are the symptoms of common flu?**
**ANS/**
**1. Coughing. 2. Sore throat. 3. Runny nose. 4. Sneezing. 5. Fever.**

**Q/What is the period of healing of in influenza?**
**ANS/ Usually resolve in seven-ten days but with some symptoms lasting up to three weeks.**

# SELF CHECK

## B. Review Questions:

**1. Give two examples for viral diseases.** أعط مثالين للأمراض الفايروسية.
**ANS/**
1. **AIDS (Acquired Immune Deficiency syndrome).**
2. **Hepatitis.**

**ملاحظة:** الأمراض الفايروسية عددها سبعة في المنهج الدراسي، ممكن أن تختار أي اثنين منها للإجابة على السؤال في أعلاه.

**2. List the categories of classification in order.** عدّد فئات التصنيف بالترتيب.
**ANS/**
**Kingdom**
**Phylum**
**Class**
**Order**
**Family**
**Genus**
**Species**

**3. How did Carl Von Linne classified organisms?** كيف صنف (كارل فون لنّ) الكائنات؟
**ANS/ Linne used two Latin names for each organism in his system which is known (binominal nomenclature) for example Homo sapiens (name of human being**
**The first name Genus (Homo) and the second name is species (sapiens).**

**4. List the characteristics of viruses.** عدّد خصائص (مميزات) الفايروسات.
**ANS/**
**1. Viruses are not true Living organisms.**
**2. Viruses are non-Cellular structures that crystallize.**
**3. Viruses are classified initially on the basis of the host they infect, such as animal viruses, plant viruses and bacterial viruses (often Called bacteriophage).**
**4. The virus genome consists of either DNA or RNA but not both.**
**5. some viruses (large number of animal viruses) have an outer membranous envelope containing Lipids, Proteins and Traces of metals.**
**6. Virus means poison in Latin and they cause different diseases in organisms.**

**5. Draw the structure of bacteriophage.** الرسم موجود في الصفحة 9 من الكتاب

## C. Fill in the blanks:

**1. The five kingdoms are *Monera*, *Protista*, *Fungi*, *Plantae* and *Animalia*.**
**2. Virus genome consists of *DNA* or *RNA*.**
**3. The biggest category is kingdom and the smallest Category is *species*.**
**4. Hepatitis in the inflammation of *liver*.**

## D. True or False:

**1. Measles is viral disease.** True
**2. Viruses are completely Living things.** False (non living things)
**3. From kingdom to species number of members increase.** False (decrease)
**4. Horse and monkey are same species.** False (are same genus)
**5. Viruses are one of the kingdoms.** False (are not belong of any kingdoms)

## E. Multiple choice:

**1. C**
**2. B**
**3. B & C**

**ملاحظة:**
ربما كان هناك خطأ مطبعي في صياغة النقطة الثالثة (فرع B) من السؤال،
ربما كان المقصود {B) They have DNA and RNA} وبهذا تصبح الإجابة الصحيحة للنقطة الثالثة هي C.

# CHAPTER 2
# BACTERIA

## MONERA

**Q/ What are the characteristics of Monera kingdom?** ماهي مميزات مملكة البدائيات؟
**ANS/**

- **This group is mostly unicellular, but some are multicellular in appearance.**
- **They do not have cell organelles such as nuclear membrane, mitochondria, plastids … etc.**
- **Bacteria and algae members of this kingdom.**

## BACTERIA

**Bacteria: are microscopic living organisms which they are mostly useful organisms despite some pathogenic species.**

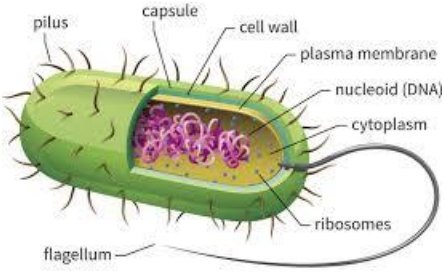
- **Bacteria are the most numerous organisms in the world and found almost everywhere.**
- **They can live 5m below ground, in all water kinds and in the body of any living organism.**

**Q/ what are the characteristics of Bacteria?** ما هي مميزات البكتريا؟
**ANS/**
**1. They are prokaryotic organism and unicellular organisms.**
**2. They are photosynthetic, heterotrophic or chemosynthetic organisms.**
**3. Reproduction is asexual, generally by binary fission.**
**4. Motility is provided by cytoplasmic flow, flagella, or gliding.**
**5. Some of them pathogenic and some of them are useful for human.**

**Q/ What is the type of reproduction in bacteria?**
**ANS/ Reproduction is asexual, generally by binary fission.** الانشطار الثنائي

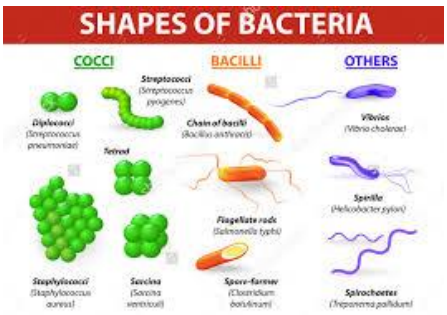
**Q/ How do the bacteria motility?**
**ANS/ Motility is provided by:**
**1. Cytoplasm flow.** تدفق سايتوبلازمي
**2. Flagella.** أسواط
**3. Gliding.** انزلاق

## Structure of Bacteria




**Q/ What are the properties of bacteria structure?** ما هي خصائص تركيب البكتيريا؟
**ANS/**
**1. They have no nuclear membrane, mitochondria, and chloroplasts.**
**2. The cytoplasm there are only the ribosomes peculiar to bacteria.**
**3. The cytoplasm is coated with a membrane. Outside the membrane there is (cell wall) different from the cell wall of plants.**

**4. Many bacteria have extensions called flagella and the functions of flagella are:**
**a) Movement. b) signal recognition.**
**5. Bacteria are usually one of three main shapes: a) bacilli. b) cocci. c) spirilla.**
**6. Cytoplasmic membranes of some bacteria carry respiration enzymes, photosynthetic enzyme and receptor proteins.**




**Q/ What are the shapes of the bacteria?**
**ANS/ Bacteria are usually one of three main shapes:**
**a) bacilli. b) cocci. c) spirilla.**

**Q/ What does carry the cytoplasmic membranes of some bacteria?**
**ANS/ Cytoplasmic membranes of some bacteria carry respiration enzymes, photosynthetic enzyme and receptor proteins.**

**Q/ What are the functions of flagella? ما هي وظيفة الأسواط؟**
**ANS/ The functions of flagella are: a) Movement. b) signal recognition.**

## Reproduction in Bacteria

**Q/ What the type of reproduction in the Bacteria? ما هي أنواع التكاثر في البكتريا؟**
**ANS/ Bacteria reproduce by the process called binary fission.**

**Binary fission: is reproduction in bacteria that is one single-celled organism splits into two single-celled organisms.**

## Endospore Formation

**Q/ What is the appropriate places to live of Bacteria? ما هو المكان المناسب لمعيشة البكتريا؟**
**ANS/ Most species of bacteria do well in warm, moist places.**

**Q/ What happens to Bacteria in inappropriate conditions? ماذا يحدث للبكتريا في الظروف غير المناسبة**
**ANS/ In dry or cold surroundings, some species of Bacteria will die. In these conditions other Bacteria become inactive and form endospores.**

**Endospore: is an asexual spore developed within the cell especially in bacteria which contains genetic material and proteins and covered by a thick, protective coat.**

- **Many endospores can survive in hot, cold, and very dry places.**

**Q/ What happens to endospores when conditions improve? ماذا يحدث للاندوسبور عندما تتحسن الظروف؟**
**ANS/ When conditions improve, the endospores break open and the Bacteria become active again.**

**Q/ What happens to the endospores when moistened in the laboratory?**
**ماذا يحدث عندما تتعرض الاندوسبورات للرطوبة في المختبر؟**
**ANS/ When the endospores were moistened in a laboratory, Bacteria began to grow.**

**Q/ What is the characteristic of bacterial DNA during binary fission?**
**ما هي مميزات DNA البكتريا خلال الانشطار الثنائي؟**
**ANS/ In bacteria, the DNA is single stranded and circular.**

**Q/ what happen to the DNA and cytoplasm during cell division?**
ماذا يحدث للـ DNA والسايتوبلازم اثناء انشطار الخلية؟

**ANS/ During cell division the DNA replicate itself while attach to the cell membrane, the cytoplasm furrows and division is completed.**

## Bacteria's role in nature دور البكتريا في الطبيعة

### 1. Nitrogen fixation

**Q/ Why plants need nitrogen fixation?**
**ANS/ plants need nitrogen to grow, so plants need nitrogen fixation.**

- **Most plants cannot use nitrogen directly from air.**

**Q/ How did the nitrogen fixing by the bacteria?** كيف يتم تثبيت النتروجين بواسطة البكتريا؟
**ANS/ Bacteria take in nitrogen from the air and change it to a form that plants can use.**

### 2. Recycling

**Q/ How can the bacteria recycle the dead leaves and twigs in the forest floor?**
كيف تتمكن البكتريا من تدوير الأوراق والاغصان الميتة في الغابة؟

**ANS/ These leaves and twigs are recycled over time with the help of bacteria.**

### 3. Cleaning up

**Q/ What do we use to fight pollution?** ماذا نستخدم لمحاربة التلوث؟
**ANS/ Bacteria and other microorganisms used do fight pollution, this process called "Bioremediation".**

**Bioremediation: It means using microorganisms to change harmful chemicals into harmless ones.**

### 4. Bacteria in your food

**Q/Give examples of the food contain live bacteria.** أعط أمثلة لأطعمة تحتوي على البكتريا.
**ANS/ cheese, yogurt, butter milk and sour cream.**

- **people raise bacteria in our food like cheese.**

### 5. Making Medicines

**Q/What's the best way to fight disease causing bacteria?**
ما هي أفضل الطرق لمحاربة الامراض التي تسببها البكتريا؟

**ANS/ By using other bacteria.**

**Antibiotics: Are medicines used to kill bacteria and other microorganisms and many antibiotics are made by bacteria.**

**pathogenic bacteria: are bacteria that can cause diseases such as Cholera, Tetanus and Tuberculosis.**
**Q/Give example of diseases caused by bacteria.** أعط أمثلة لأمراض تسببها البكتريا.
**ANS/ Cholera, Tetanus, Tuberculosis are some diseases caused by bacteria.**

## Preparation of bacteria culture.

**Medium:** is a substance that will nourish the bacteria is prepared in the lab conditions.

**Q/ Numerate type of medium.**
**ANS/** The medium can be: 1. Broth. 2. Agar.

**Q/ What happen if we open a sterile test tube of broth and wait a few days?**
**ANS/** We will observe turbulence in the tube.

**Q/ Why we will observe turbulence in the tube?**
**ANS/** Serial dilution can give an idea about the number of bacteria.

**Q/ How can we observe the effect of antibiotics on bacteria?**
**ANS/** we will observe some colored spots. These spots showed the existence of bacteria.

**Q/ What does it mean spots in Petri dish?**
**ANS/** These spots show the existence of bacteria.

**Q/ What medium do we use usually to nourish the bacteria?**
**ANS/** The most common used medium for bacteria is agar.

**Agar:** is a gelatin-like substance that dissolved in water at 90C and solidifies at 40C.

**Q/ Give a reason; necessary nutrients are adding to the agar during preparation.**
**ANS/** Because the nutrients are necessary for the bacteria to be grown.

**Q/ Why is inoculated agar with bacteria?**
**ANS/** the agar is inoculated with bacteria to form pure colonies.

**Q/ Why do we add antibiotics to cultures?**
**ANS/** To these culture antibiotics is added to see how bacteria are affected.

**Q/ What happens if the antibiotics affected in culture?**
**ANS/** When affected, no colony forms.

**Q/ What happens if the antibiotics didn't effect on the bacteria?**
**ANS/** bacteria survive; they are demonstrated to be resistance to antibiotic.

**Q/ How can we see the bacteria?**
**ANS/** we can see bacteria under microscope.

**Q/ What are the tools we use to prepare bacteria?**
**ANS/**
1- Bacterial culture.
2- Physiological water.
3- Inoculating loop.
4- A slide.
5- A cover slip.
6- Bunsen burner.

**Q/ How to prepare bacteria on slide?**
**Q/list the steps to prepare the bacteria on slide.**
**ANS/**

1- First sterilize the slide by holding it over flame.
2- Put a drop of water on the slide.
3- Put the specimen
4- Dry the slide in air.
5- Stain the slide.
6- We can use an oil immersion objective to observe our bacterial culture.

# SELF CHECK

## B. Review Questions

**1. List the important characteristics of bacteria?** الجواب في الصفحة الأولى في أعلاه.

**2. Draw the structure of Bacteria?** الرسم في ص 14 من الكتاب.

**3. Write the steps of binary fission?**

**ANS/**

1- DNA sticks to the cell membrane.
2- DNA replicates itself.
3- Cell membrane stretches and pulls the DNA to the poles.
4- Cell membrane pitches off
5- Cell divides in to two new cells form.

**4. Explain the nitrogen Fixing bacteria?**

Nitrogen fixing bacteria take in Nitrogen from the air and change it to a form that plants can use.

**5. Write the roles of bacteria in nature?**

1- Nitrogen Fixation.
2- Recycling.
3- Cleaning up.
4- Bacteria in your food.
5- Making Medicines.

## C. True or false

1. Yogurt is formed by help of bacteria. True
2. Bacteria are eukaryotic organism. False
3. Some bacteria are pathogenic. True
4. Bacteria have different shapes. True
5. Some bacteria move by flagella. True

## D. Fill in Blanks

1. Bacteria hare three different shapes ***bacilli***, ***Cocci*** and ***spirilla***.
2. Bacteria reproduce asexual by ***Binary Fission.***
3. Bacteria form ***endospores*** in dry or Cold conditions.
4. ***Antibiotics*** are medicine use to kill bacteria.
5. Bacteria are ***prokaryotic*** and ***unicellular*** organisms.

## E- Multiple choice

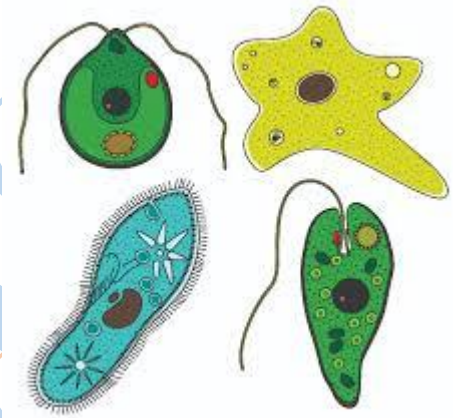
1. D/ Binary fission. 2. D/ Producing penicillin. 3. C/ Flagella.

# CHAPTER 3
# PROTISTS

**Protists: is a kingdom has various sizes, shapes, methods of feeding and reproducing and different histories.**

- **Their features are obviously different from those of monerans, there are several ways that some protists resemble plants and fungi.**
- **size is generally microscopic, but some examples reach 60 meters in length.**

## Common Characteristics of protists:



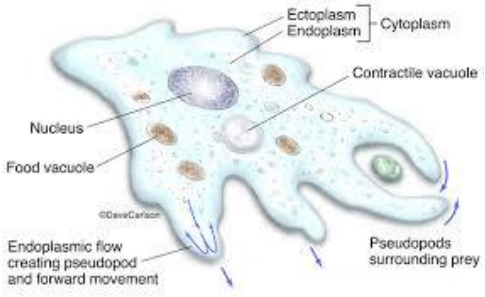
1. **They may be unicellular, colonial, or even multicellular, in which a primitive structure is observed while tissue level organization is absent.**
2. **Protists are found floating freely or attached to a surface, eg. Rooks in many aquatic ecosystems. Terrestrial protists are mostly found in moist soil.**
3. **They can be autotrophs, heterotrophs, or both in some members.**
4. **Mutualistic or parasitic forms are common and parasitic can causes diseases in plants and animals.**
5. **They are motile in certain periods of their lives and locomotion is provided by cilia, pseudopodia (amoeboid movement), flagella or by contraction.**
6. **Despite the absence of specialized genitals, asexual an sexual reproduction are observed in the group.**

**Q/ What are the trophic methods of protists?** ماهي طرق التغذية في الطلائعيات؟
**ANS/ They can be autotrophs, heterotrophs, or both in some members.**

**Q/ Numerate the movement methods of protists.** عدد طرق الحركة في الطلائعيات؟
**ANS/ 1. Cilia. 2. Pseudopodia (amoeboid movement). 3. Flagella. 4. Contraction.**

## Amoeba

**Amoeba: are unicellular organisms living in soil, seas and fresh water. They are harmless in general although some are parasitic.**




- **Feeding and locomotion are provided by cytoplasmic extensions called pseudopodia.**
- **Amoeba can survive dry condition by forming a protective covering called cyst.**
- **They are found in ponds and streams.**
- **Reproductive is asexual through binary fission.**

**Pseudopodia: are cytoplasmic extensions which provided feeding and locomotion for amoeba.**

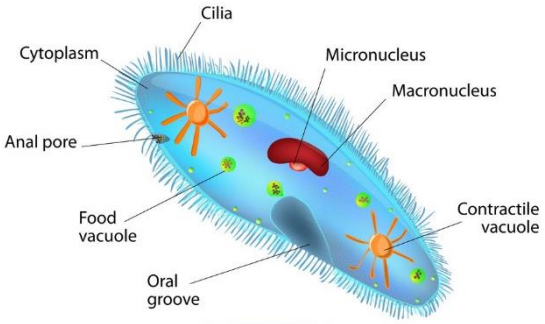
**Q/ Give reason; Amoeba can survive dry conditions.** أعط سبباً (علل)؛ تستطيع الاميبا النجاة في ظروف الجفاف؟
**ANS/ Amoeba can survive dry conditions by forming a protective covering called cyst.**

**Q/ What are the reproduction methods of amoeba?** ما هي طرق التكاثر في الأميبا؟
**ANS/ Asexual through binary fission.**

**Q/ Where are amoeba found?** أين تتواجد الأميبا؟
**ANS/ Amoeba are found in ponds and streams.**

**Q/ Give reason; Amoeba don't have a fixed shape.**
**ANS/ Because it is enclosed with a stiff layer around the plasma membrane.**

## Paramecium




- **They are the most advanced group of unicellular organisms.**
- **The hard outer of the cell, called the pellicle, bears cilia and contains trichocysts that are discharged during defense and predation.**
- **There are two nuclei; the macronucleus (used in metabolism) and the micronucleus (used in reproduction).**
- **There also a cytostome (mouth) which open to the cytopharynx (cell pharynx), a cytostome (cell anus), vacuoles, and two contractile vacuoles. These vacuoles provide osmoregulation within the cell by discharging excess water.**
- **Waste products are removed through excretory vacuoles.**
- **Reproduction is usually asexually by binary fission or sexually by conjugation.**

**Q/ Define; paramecium.**
**ANS/ Paramecium: is an organism which it considers the most advanced group of unicellular organisms.**

**Q/ What do the vacuoles of paramecium do?** ما هو عمل الفجوات في البراميسيوم؟
**ANS/ They provide osmoregulation within the cell by discharging excess water.**

**Q/ How do the waste products of paramecium removed?** كيف يتم إزالة الفضلات في البراميسيوم؟
**ANS/ Waste products are removed through excretory vacuoles.**

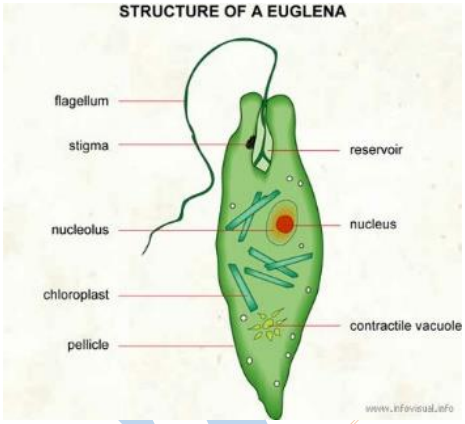
**Q/ How many nuclei in the paramecium? And what did they do?** كم عدد الأنوية في البراميسيوم؟ وما هو عملهم؟
**ANS/ There are two nuclei;**

- **The macronucleus used in metabolism.**
- **The micronucleus used in reproduction.**

**Q/ How does paramecium reproduce?**
**ANS/ Reproduction is usually asexually by binary fission or sexually by conjugation.**

**Q/ Give reason; Paramecium have a definite shape.** علل؛ البراميسيوم لديها شكل محدد.
**ANS/ Because the cell surface has not flexible.**

## Euglena




- These are unicellular organisms with chloroplasts and are photosynthetic in the presence of light. At night they obtain nutrients heterotrophically.
- Carbohydrates are stored as paramylon, a type of poly-saccharide.
- The organism shows both animal and plant characteristics.
- Locomotion is made possible by flagella situated at one end of the cell. Next to the flagella there is a contractile vacuole and stigma (eye spot).
- The pellicle, a protect layer that gives a definite shape to the cell, covers the outer surface.
- It reproduces asexually by binary fission.

**Q/ How does store carbohydrates in euglena?** كيف يتم تخزين الكربوهيدرات في اليوغلينا؟
**ANS/** Carbohydrates are stored as paramylon, a type of poly-saccharide.

**Q/ Give a reason; there is a definite shape of euglena.** علل؛ هناك شكل ثابت (محدد) لليوغلينا.
**ANS/** The pellicle, a protect layer that gives a definite shape to the cell.

## How do trypanosomes are useful for human?

**Q/ How does Euglena effect human?**
**ANS/** By helping to keep our ponds and lakes clean for our use.

**Q/ How does Euglena keep our ponds and lakes clean?**
**ANS/** They fight off the germs and other pollutants that are found in our water sources.

**Q/Give example for Euglena species that cause diseases.**
**ANS/** Trypanosoma brucei: cause of "African sleeping sickness" in human.

**Q/How do observe Trypanosoma brucei in insect? And where?**
**ANS/** The electron microscope shows (T. brucei) as it occurs in the salivary gland of the tsetse fly ready to pe injected into mammalian host when the fly bites.

- (African sleeping sickness) occurs regularly in some regions of sub-Saharan Africa with the population at risk being about 70 million in 36 countries.
- As of 2010 it caused around 9.000 deaths, down from 34.000 in 1990. An estimated 30.000 people are currently infected with 7.000 new infections in 2012. More than 80% of these cases are the Democratic Republic of the Congo.

## Malaria

**Plasmodium:** is the parasite organism that lives inside the erythrocytes and epithelial cells of humans. It causes disease called (malaria).

**Q/ Who is the vector (definitive host) of the plasmodium parasite?** من هو الناقل لطفيلي بلاسموديوم؟
**ANS/** The vector of this parasite is the Anopheles mosquito (definitive host).
**Q/ Who are the intermediate hosts of the plasmodium?** من هم المضائف النهائية للبلاسموديوم؟
**ANS/** The intermediate hosts are humans and other mammals.

**Q/Where is the more common places of the malaria disease?** أين الأماكن الأكثر شيوعا لمرض الملاريا؟
**ANS/** The disease is more common around swamps. المستنقعات

**Q/ How does the female mosquito feed?** كيف تتغذى انثى البعوض؟
**ANS/ The female Anopheles sucks blood from warm-blooded animals and transmits malaria parasites from one to another.**

**Q/what does the male Anopheles mosquito feed?** ماذا يتغذى ذكر البعوض؟
**ANS/ The male mosquito feeds only on plant juices.**

**Q/ What does malaria cause to erythrocytes?** ماذا تسبب الملاريا لكريات الدم الحمر؟
**ANS/ Destroying erythrocytes, they cause hemolysis and anemia. (Destruction of (30-50) % of the erythrocytes causes death).**

**Q/ What are the symptoms of the patients with malaria?**
**ANS/**
**1- The spleen is enlarged.**
**2- The Liver becomes tender which Lead to cirrhosis.**
**3- Swelling of belly.**
**4- Anemia is observed.**
**5- Shock.**
**6- Bleeding occurs when capillaries are blocked by diseased erythrocytes.**

**Q/ When does bleeding occur in malaria disease?**
**ANS/ Bleeding occurs when capillaries are blocked by diseased erythrocytes.**

**Q/ What are the typical malaria attacks?**
**ANS/**
**1. Cold shaking stages (1/2 – 2 hours): There is consistent shivering and feeling of cold. Headache and nausea may be present.**
**2. Fever stage (ca. – 24 hours): The fever may be as high as 40-41C, accompanied by nausea, vomiting and cold sore on the lips.**
**3. Wet stage: Body temperature, spleen size, and sleep all become normal, and sweating begins. The normal period continues until the next cycle of paroxysms begins.**

**Q/What are the symptoms of cold stage?**
**ANS/**
**1. Shivering.**
**2. Feeling of cold.**
**3. Headache.**
**4. Nausea may be present.**

**Q/ What are the symptoms of fever stage?**
**ANS/**
**1. Fever may be as high as 40-41C.**
**2. Accompanied by nausea.**
**3. Vomiting.**
**4. Headache.**
**5. Cold Sore on the Lips.**

**Q/ Where is the best environment to live for parasites rivers, lakes or sea? Why?**
**ANS/ Lakes, because the water of lakes is still not running like rivers or seas.**

**Q/ what are the symptoms of wet stage?**
**ANS/**
**1. Body temperature, spleen size and sleep all become normal.**
**2. Sweating begins.**

**Q/ Where can malaria be observed besides humans?**
**ANS/ Malaria is also seen in reptiles, birds and other mammals besides humans.**

**Q/ What does plasmodium species Cause?**
**ANS/ Plasmodium species causes different types of malaria, for examples plasmodium falciparum.**

**Q/ What does plasmodium falciparum species Cause?**
**ANS/ Plasmodium falciparum causes malaria quartana.**

# SELF CHECK

## B. Review Question

**1. How do protests move?**
**ANS/ There are motile in certain period of their lives and Locomotion is provided by:**
**1. Cilia. 2. Pseudopodia (amoeboid movement). 3. Flagella. 4. Contraction.**

**2. What is the function of pseudopodia?**
**ANS/ it is cytoplasmic extensions and the functions are: 1. Feeding. 2. Locomotion.**

## C. True or False

**1- Amoeba reproduces asexually by binary fission. True**
**2- Some protests cause disease in human. True**
**3- Paramecium has only one nucleus. False**
**4- Euglena can produce its own food. True**

## D. Fill in the blanks

**1. Protists can be autotrophs or *heterotrophs*.**
**2. Amoeba live in *soil*, *seas* and *fresh water*.**
**3. Paramecium reproduced asexually by *binary fission*.**
**4. Paramecium has two nuclei *macronucleus* and *micronucleus*.**

## E. Multiple choice

1. **B) Amoeba.**
2. **D) Asexual and sexual reproduction is observed.**
3. **C) Contractile vacuole.**
4. **D) Virus.**
5. **C) Euglena.**

# CHAPTER 4
## Fungi

**Fungi:** are eukaryotic organisms which are filamentous or rarely unicellular generally Terrestrial, but there are many aquatics or (marine) species.

**Q/ What are the characteristics of fungi?** ما هي مميزات الفطريات؟
**ANS/**

1. Eukaryotic organism and unicellular.
2. There are Terrestrial But some of them are aquatic or (marine) species.
3. Some higher mushrooms are edible while some are poisonous.
4. In all stages of the life cycle, cells lack flagella or cilia.
5. All Fungi have chitin material in their cell wall.
6. some of them there are similarities with algae. But they are separate from all similar groups because they lack chlorophyll.
7. Fungi are exclusively either saprophytic or parasitic.
8. All fungi group except for yeast have hyphal structures and hypha are colorless slender, long filaments forming an interwoven mass called a mycelium.

*Note: The food is not stored in the form of starch but rather as lipids and glycogen.


**Q/ What are the differences between fungi and algae in nutrition?**
**ANS/** Fungi are separate from all similar groups (such as algae) because fungi lack chlorophyll.

**Q/ Why all fungi either saprophytic or parasitic?**
**ANS/** because they lack chlorophyll.

## Ecological and Economical importance of fungi:

**Q/ What is the important role of fungi in ecology?**
**ANS/** They absorb nutrients from organic matter and dead organisms.
**Q/ Give example for groups of fungi that have mutualistic live styles.**
**ANS/** Some fungi like lichens and mycorrhizae have mutualistic life styles.

*Note1: During this process (absorb nutrients) water, $CO_2$ and minerals are released back in to the environment. The absence of this work would destroy an ecosystem.

*Note2: Mycorrhizae is an association between specific fungi and plant roots.

**Q/ What is the symbiotic relationship between the plant and fungus?**
**ANS/** The symbiotic relationship the plant gets water and minerals from fungus, and in return the fungus obtains nutrients (glucose, amino acids, etc.) from the plant.

## Penicillium

**Q/ What are the characteristics of the penicillium.**
**ANS/**
**1- These live saprophytically on cheese, lemons and some other food.**
**2- Creating bluish spots.**
**3-They resemble a brush in shape.**
**4- Some species are responsible for the flavor of Roquefort.**
**5- Formerly cheese containing penicillium was given to tuberculosis patients.**
**6- Penicillium produce penicillin. The antibiotic penicillin is used in the treatment of patients suffering from:**
**a- pneumonia. b- meningitis. c- fever. d- nephritis. e- carbuncle. f- tuberculosis.**

**Q/ Why don't we give penicillin to certain patients?**
**ANS/ because some patients are allergic to penicillin so it is very dangerous.**

**Q/ What is the color of the penicilium spots that creating on chees?**
**ANS/ Creating bluish spot on chees.**

**Q/ What are the diseases that penicillin is used to treat?**
**ANS/ the treatment patients suffering from**
**1. Pneumonia. 2. Meningitis. 3. Fever. 4. Nephritis. 5. Carbuncle. 6. Tuberculosis.**

## Mushroom

**Q/ What are the characteristics of the mushroom?**
**ANS/**
1. **That is a group of club fungi.**
2. **Reproduce sexually.**
3. **Grow special hyphae that form club like structures called basidia.**
4. **Sexual spores developed on the basidia.**
5. **Spore-producing above-ground part of the organism, but most of the organisms is underground.**

***Notes:**
1. **The mass of hyphae from which mushrooms are produced may grow 35m across.**
2. **Mushrooms usually grow at the edges of the mass of hyphae.**
3. **Mushrooms often appear in circles.**

**Q/ What is the most familiar of fungi are known?**
**ANS/ the most familiar are known as gill fungi.**

**Q/ What are the characteristics of gill fungi?**
**ANS/**
1. **The basidia of these mushrooms develop in structures called gills under the mushroom cap.**
2. **Some varieties are growing commercially and solid in super markets.**
3. **Not all gill fungi are edible, for example the white destroying angel is a very poisonous fungus.**

*Note1: Simply a taste of the mushroom can be fatal. قاتلة

*Note2: Mushrooms belong to a group of fungi called (club fungi). الفطريات الهراوية او الدعامية

Q/ What are the type of reproduction of club fungi?
ANS/ Club fungi reproduce sexually (sexual spores).

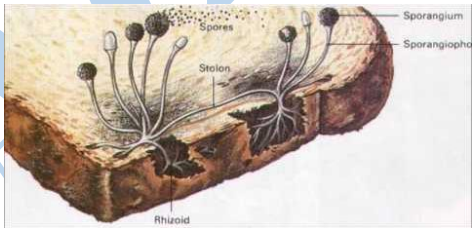
Q/ Where are the sexual spores developed?
ANS/ Sexual spores developed on the basidia structure.

## Black bread mold

Black bread mold: is Rhizopus stolonifer (black bread mold) lives on some food (bread, etc.). It reproduces by spore formation.

Spores: is an asexually reproductive cell that can grow into a complete organism without fertilization.

*Note: Spores dropped on the bread form hyphae.




Q/ What is the function of hyphae for Black bread mold?
ANS/ Hyphae get nutrients from the bread.

Sporangia: is a sac that contains spores which is formed at the tip of stalks in the black bread mold.

## Yeast

Yeast: is a group of fungi they do not have hyphae and reproduce by budding and rarely via ascospores.

Q/ What are the benefits of dried yeasts?
ANS/

1. There are economically important in baking Leavening bread.
2. Yeasts are rich in vitamin (B).

Q/ What happens during fermentation by yeasts?
ANS/ During fermentation, $CO_2$ is released which causes the sponge-like swelling of the bread.

# CHAPTER 5
## Algae

**Algae: are protist producers use the sun's energy to make food through photosynthesis and all them have the green pigment chlorophyll, which is used for photosynthesis.**

- **Most algae also have other pigment that give them a color.**
- **Almost all algae live in water.**
- **Some algae are made of many cells.**
- **Many-celled algae generally live in shallow water along the shore.**
- **Some of these algae can grow to many meters in length.**

**Q/ Where are many- celled algae living?**
**ANS/ Many-celled algae generally live in shallow water along the shore.**

**Q/ List types of Algae.**
**ANS/**
**1. Red Algae.**
**2. Brown Algae.**
**3. Green Algae.**

## Red Algae

**Q/what are the characteristics of the red Algae?**
**ANS/**
1. **Most of the world's seaweeds are red algae.**
2. **Most red algae live in tropical oceans.**
3. **Attached to rocks or to other algae.**
4. **Red Algae are usually less than (1m) in length.**
5. **There cells contain chlorophyll, but a red pigment gives them their color.**
6. **Their red pigment allows them to absorb the light that filters deep in to the clear water of the tropics.**
7. **Red algae can grow as deep as (260m) below the surface of the water.**

**Q/ What is a cause the red color of (red algae) although it contains the chlorophyll?**
**ANS/ A red pigment gives the (red algae) their color.**

**Q/ What is a function of the red pigment?**
**ANS/ The red pigment allows the red algae to absorb the light that filters deep into the clear water of the tropics.**

## Brown Algae

**Q/what are the characteristics the Brown algae?**
**ANS:**
1. **Most of the seaweeds found in cool climates.**
2. **They attach to rocks or form large floating beds in ocean waters.**
3. **Have chlorophyll and yellow-brown pigment.**

4. Many are very large (some grow 60m).
5. Only the tops of these gigantic algae are exposed to sunlight. These parts of algae make food through photosynthesis.
6. The food is transported to parts of the algae that too deep in the water to receive sunlight.

**Q/ How do receive the food to the brown algae parts that too deep in the water?**
**ANS/ The food is transported to parts of the algae that too deep in the water to receive sunlight.**

**Q/ What is a cause the brown color of (brown algae) although it contains the chlorophyll?**
**ANS/ A yellow-brown pigment gives the (brown algae) their color.**

## Green Algae

**Q/what are the characteristics of the green algae?**
**ANS/**

1. These organisms are unicellular or colonial species, as well as multicellular species that are not organized into tissue.
2. Reproduction sexual or asexual.
3. Most of them live in fresh water.
4. Many of them very important significant ecologic and economic.
5. Have chlorophyll pigments and make food by photosynthesis.
6. They store carbohydrates as starch in chloroplasts.
7. The cell walls are made of cellulose which is why algae are used in the paper industry.

**Q/ Give a reason; Green algae are not considered as multicellular organisms.**
**ANS/ Because the green algae cells are not organized into tissue. So, theses organisms are unicellular or colonial.**

**Q/ Where are green algae living?**
**ANS/ Most of them live in fresh water.**

**Q/ What is the important of green algae?**
**ANS/ Many of the green algae very important significant ecologic and economic.**

**Q/Why is green algae used in the paper industry?**
**ANS/ Because the cell walls are made from cellulose.**

## Spirogyra

**Spirogyra: are filament-shaped organisms found on the surface of fresh water.**

**Q/ What is a spirogyra produces in autumn?**
**ANS/ In autumn, Spirogyra produces a bad smell (like dead fish) in bodies of water.**

**Q/ What is a cause the foaming of fresh water?**
**ANS/ Spirogyra are responsible for the foaming of fresh water.**

## Structure of Spirogyra

**Q/What is the structure of spirogyra?**
**ANS/**

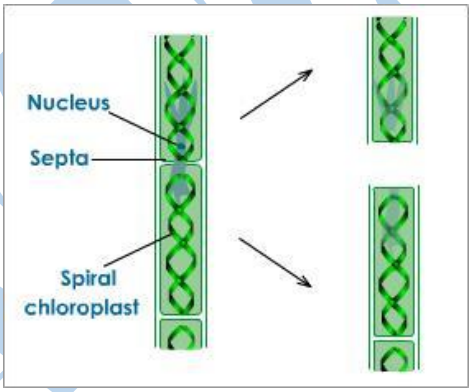
1. It is green colored and filamentous structure.
2. Consist of chain of cells that have similar (a- shape. b- structure. c- Function).
3. There is no coordination between cells.
4. Each of these cells perform its life activities in dependently.
5. There is spiral shaped chlorophyll in each cell with a nucleus.

## Reproduction in Spirogyra

### 1. Asexual reproduction

**Q/How does Asexual Reproduction occur?**
**ANS/**

1. Spirogyra reproduces asexually by fragmentation.
2. Spirogyra filaments can divide into smaller parts naturally or by different environmental factors.
3. Each of these parts grows into a complete organism by cell divisions.



Fragmentation in Spirogyra

### 2. Sexual reproduction

**Q/How does sexual Reproduction occur in spirogyra?**
**ANS/**

1. Spirogyra reproduces sexually by conjugation if environmental conditions are unavailable.
2. Conjugation takes place between two cells of same filament or two different filaments.
3. Zygote forms which is covered by a thick wall against environmental factors.
4. When environmental conditions are available thick cell wall tears and it grows into a complete organism.

**Q/What are the types of conjugation in sexual Reproduction in spirogyra?**
**ANS/**

1. Between two cells of same filament.
2. Between two cells of two different filaments.

**Q/ When does sexual reproduction occur in spirogyra?**
**ANS/** By conjugation if environmental conditions are unavailable.

**Q/ List the methods of asexual reproduction in spirogyra filaments.**
**ANS/**

1. Spirogyra filaments can divide into smaller parts naturally.
2. It can divide by different environmental factors and each part grows into a complete organism by cell divisions.

# Chapter 4&5 Review

## B- Review Questions

**1. What is advantage of red color in algae?**

**ANS/ The red pigment allows the red algae to absorb the light that filters deep into the clear water of the Tropics.**

**2. What is the importance of cellulose in algae?**

**ANS/ The cell walls in green algae are made of cellulose which is why algae are used in the paper industry.**

**3. Explain the importance of fungi?**

**ANS/**

1. **Baking of dread.**
2. **Fermentation of alcohol.**
3. **Painkilling drugs are also obtained from fungi.**
4. **Production of various antibiotics.**
5. **Some of them are production of citric acid and other chemicals.**
6. **Recently hormone production from fungi has been stared using recombinant DNA Technology.**

**4. Write the important characteristics of algae.**

**ANS/**

1. **These organisms are unicellular or colonial species, as well as multicellular species that are not organized into tissue.**
2. **Reproduction sexual or asexual.**
3. **Most of them live in fresh water.**
4. **Many of them very important significant ecologic and economic.**
5. **Have chlorophyll pigments and make food by photosynthesis.**
6. **They store carbohydrates as starch in chloroplasts.**
7. **The cell walls are made of cellulose which is why algae are used in the paper industry.**

**5. Explain the structure of spirogyra?**

**Ans:**

1. **It is green colored and filamentous structure.**
2. **Consist of chain of cells that have similar (a. shape. b. structure. c. function).**
3. **There is no coordination between cells.**
4. **Each of these cells perform its life activities independently.**
5. **There is spiral shaped chlorophyll in each cell with a nucleus.**

## C- True or False

1. All Fungi except yeast have hyphal structure. True
2. All kinds of mushrooms are eatable. False
3. Many protests are producer. True
4. Red algae live in deep of oceans. True
5. Spirogyra is unicellular organism. True

## D- Fill in the Blanks

1. Green algae Carry photosynthetic pigment as chlorophyll
2. Most of sea weeds found in cool climates are brown algae
3. Yeast rich in vitamin B
4. The most familiar mushrooms are known as gill fungi
5. Fungi are different from algae because they lack chlorophyll pigment

## E- Multiple choices

1. B) Mold.
2. A) Budding.
3. D) They are photosynthetic.
4. C) Mushroom.
5. C) Spirogyra.

*ملاحظة/ في طبعة 2018 تم تغيير النقطة الرابعة في السؤال الثاني وأصبحت كالآتي:

**4. Write the important characteristics of fungi.**

**ANS/**

1. Eukaryotic organism and unicellular.
2. There are Terrestrial but some of them are aquatic or (marine) species.
3. Some higher mushrooms are edible while some are poisonous.
4. In all stages of the life cycle, cells lack flagella or cilia.
5. All Fungi have chitin material in their cell wall.
6. some of them there are similarities with algae. But they are separate from all similar groups because they lack chlorophyll.
7. Fungi are exclusively either saprophytic or parasitic.
8. All fungi group except for yeast have hyphal structures and hypha are colorless slender, long filaments forming an interwoven mass called a mycelium.

# CHAPTER 6
# PLANT CLASSIFICATION

## 1. The Nonvascular plants

**The nonvascular plants: are plants that don't have a vascular tissue. They are simpler than vascular plants.**

**Q/ What are the characteristics of nonvascular plants?**
**ANS/**

1. **Nonvascular plants do not have true roots, stems or leaves. instead, they have simple parts.**
2. **Nonvascular plants are relatively short plants.**
3. **They usually grow in areas where there is an abundant supply of water.**
4. **They reproduce asexually and sexually.**

**Q/ What is the best place to grow nonvascular plant?**
**ANS/ They usually grow in areas where there is an abundant supply of water.**

## Mosses

**Q/ What are the characteristics of mosses?**
**ANS/**

1. **Mosses are the most common and familiar nonvascular plants.**
2. **They usually grow in a mat formation, which consists of many plants growing in a tight pack to hold one another up.**
3. **The mat usually has a spongy quality which enables it to retain water, thus aiding in reproduction and preventing the plant from drying out.**
4. **Mosses possess multicellular, rootlike structures known as rhizoids which they use for attachment and water absorption.**
5. **All mosses consist of "stems", either branched or unbranched, that bear leaflike structures. It is important to note that these "stems", "roots" and " leaves" are different from those from those of vascular plants.**

**Q/ Why does mosses' mat have a spongy quality?**
**ANS/ because:**

1. **Enables it to retain water thus aiding in reproduction**
2. **Preventing the plant from drying out.**

**Rhizoids: are rootlike structures which they use for attachment and water absorption.**

**Q/ What are the functions of rhizoids?**
**ANS/ 1. Use for attachment.**
**2. Water absorption.**

## 2. The Vascular plants

**vascular tissue: is a system of tube-like cells that carry materials throughout a plant.**

**Phloem: is a vascular tissue which carries food.**

**Xylem: is a vascular tissue which carries water and dissolved minerals.**

- **The vascular tissues (phloem and xylem) is the transport system of plant.**

**Q/ Numerate the type of vascular tissue?**
**ANS/**

1. **Vascular tissue that carry food (phloem).**
2. **Vascular tissue that carry water and dissolved minerals (xylem).**

**Q/ Give an example of vascular plants.**
**ANS/**

1. **Ferns.**
2. **Pine tree.**
3. **Sun flower.**
4. **Grass.**
5. **Onion.**

**Q/ What are the characteristics of vascular plants?**
**ANS/**

1. **Vascular plants have a root, a stem and leaves.**
2. **Most of them live on land.**
3. **They are more complex than nonvascular plants.**
4. **Their size ranges from 1cm to 100 meters.**

## Ferns

**Ferns: are the green vascular plants some groups are very wide spread in wet areas.**

**Q/ Where can the ferns live?**
**ANS/ They can live in: 1. Rock cliffs. 2. The tops of trees.**

**Q/ Why are ferns important to germinate some plants?**
**ANS/ Because decomposed ferns can mix with the rock, providing valuable soil for other plants to germinate in.**

**Q/ What are the characteristics of the ferns?**
**ANS/**

1. **Members of ferns are spore- dispersing plants.**
2. **Water is required for reproduction of these plants.**
3. **Their stems are green and do photosynthesis.**
4. **Ferns are vascular plants that reproduce by spores and do not require seeds or flowers.**
5. **They have a historical role in the ecosystem as well as their scientific, design and culinary value.**

**Q/Why ferns are important for birds and small organisms (creatures)?**
**ANS/ Because ferns provide natural vegetation to birds and small organisms.**

**Q/What is the use of fronds of ferns for some animals?**
**ANS/ Various animals use the fronds as food while birds and small creatures (organisms) use the plant for cover.**

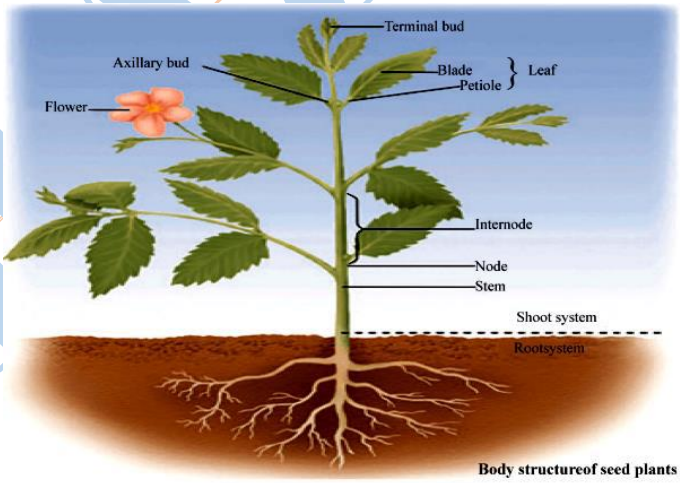
**Q/Why do not ferns need seed or flowers when reproducing?**
**ANS/ Because ferns are plants that reproduce by spores and do not require seeds or flowers.**

## Seed vascular plants

**Spermatophytes, which means "seed plants", are some of the most important plant on the earth.**
**Life on land as we know it is shaped largely by the activities of seed plants.**

**Q/ What are the characteristics of spermatophytes?**
**ANS/**

1. **Seed plants are the most complex group of plants.**
2. **They have a root, a stem, leaves and cones or flower.**
3. **They reproduce sexually and asexually.**
4. **They produce seeds.**
5. **Their size ranges from a few millimeters to (100) meters?**
6. **There are 260.000existing species which belong to spermatophyte.**



Body structureof seed plants

**Q/ List the types of spermatophyte.**
**ANS/ There are two types of spermatophyte:**

1. **Gymnosperms.**
2. **Angiosperms.**

## 1. Gymnosperms

**Gymnosperms means "naked seed".**

**Q/ Why are gymnosperms called by naked seed?**
**ANS/ Because the seeds do not develop enclosed within an ovary but are exposed on the surfaces of reproductive structures, such as cones.**

- **Gymnosperms have seeds but not fruits or flowers.**
- **This group includes all the conifers, such as pines.**

**Q/What are the characteristics of Gymnosperms.**
**ANS/**

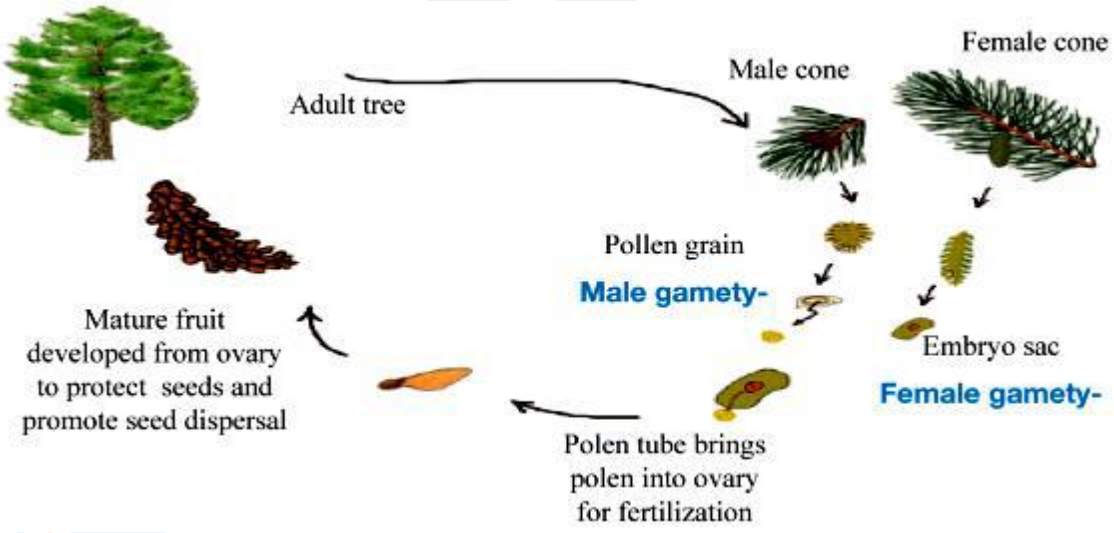
1. **Gymnosperms produce seeds that developing cones instead of a flower.**
2. **Most of them have needle-like leaves.**
3. **They are evergreen.**
4. **Gymnosperms are woody plants.**

## Pine

**Pine: is a popular group consists of evergreen trees and shrubs that have great decorative and commercial value.**

**Q/ What are the characteristics of pine?**
**ANS/**

1. **Most of them grow in cold regions, but some are only found in warm or subtropical climates.**
2. **Pine leaves are arranged in clusters containing from 2 to 5 needles.**
3. **Male and female cones grow on the same tree in spring or early summer.**
4. **The female flowers are usually reddish colored, they look like tiny cones.**


## 2. Angiosperms (Flowering plants)

**Angiosperms: are vascular flowering plants which they have stems, roots and leaves. All flowering plants produce flower.**

**NOTES:**

- **Angiosperms comprise about go percent of the kingdom Plantae (90%)**
- **Pollen cannot reach the ovary directly.**

**Q/ How does the pollen reach the egg for the fertilization process?**
**ANS/ The pollen forms a pollen tube; the pollen reaches the ovum (egg) through the pollen tube and fertilizes the egg.**

**Q/ List of types of the Angiosperms.**
**ANS/**

1. **Monocotyledons (monocots).**
2. **Dicotyledons (dicots).**

## 1. Monocots

**Q/ What are the characteristics of Monocots?**
**ANS/**

1. **Monocots have a single cotyledon (seedling leaf).**
2. **Monocots have veins which run parallel to the length of the leaf.**
3. **The monocots also have vascular bundles that are scattered.**
4. **The monocots have developed an adventitious root structure.**
5. **Monocots have lost their ability to increase their diameter through secondary growth. This also makes monocots lack wood, except palms and agaves.**
6. **Monocots have underground storage organs such as the bulbs present in irises.**
7. **Example of monocots (The Date palm tree).**

### The Date palm tree

**Q/ What are the characteristics of Date palm tree?**
**ANS/**

1. **This tree grows throughout middle east, especially in Iraq.**
2. **It grows in hot climates and need less amount of water.**
3. **It is abundant in south and middle of Iraq.**
4. **The best quality dates grow in Basra.**
5. **Date tree share same family with coconut and it is monoic.**
6. **Pollination naturally performed by wind but to guarantee the pollination human pollinates it artificially.**
7. **It has a non-branched main stem with 5m length.**

**Q/ What is the suitable climate for palm growing?**
**ANS/ In hot climates and need less am out of water.**

**Q/ Why are palm tree growing in middle and southern Iraq?**
**ANS/ Because the suitable climate for palm growing in middle and southern Iraq (hot climates) and need less amount of water.**

**Q/ Where can we find the best quality dates?**
**ANS/ We find the best quality dates grow in Basra.**

**Q/ What are the methods or ways of pollination in palms?**
**ANS/**

1. **Naturally performed by wind.**
2. **Artificially (human pollinate).**

## 2. Dicots

**Q/ What are the characteristics of Dicots?**
**ANS/**

1. **Embryo with two cotyledons.**
2. **Pollen with three furrows or pores.**
3. **Flower parts in multiples of four or five.**
4. **Major leaf veins reticulated.**
5. **Stem vascular bundles in a ring.**
6. **Roots develop from radicle.**
7. **Secondary growth often present.**

**Q/ Compare between the monocot and Dicot plants.**
**ANS/**

| Monocots | Dicots |
|---|---|
| 1. Flower floral parts are in 3s.<br>2. Seed Mono cotyledon.<br>3. Stem scattered vascular bundles.<br>4. Fibrous root.<br>5. Leaf (Parallel veined leaves are common)<br>Ex: Date palm | 1. Floral parts are in 4-5s.<br>2. Dicotyledon.<br>3. Vascular bundles are arranged in circle.<br>4.Tap root.<br>5. Net veined Leaves are common.<br>Ex: Beans |

# SELF CHECK
## PLANT CLASSIFICATION

## B. Review Questions

**1. Give two examples for monocot and dicot plants?**
**Ans:**

**Monocot plants:** 1. Date palm tree. 2. Rice.
**Dicot plants:** 1. Peens. 2. Orange, Apple.

**2. Explain the date palm tree.**
**Ans:**

1. This tree grows throughout middle east, especially in Iraq.
2. It grows in hot climates and need less amount of water.
3. It is abundant in south and middle of Iraq.
4. The best quality dates grow in Basra.
5. Date tree share same family with coconut and it is monoic.
6. Pollination naturally performed by wind but to guarantee the pollination human pollinates it artificially.
7. It has a non-branched main stem with 5m length.

**3. What are the characteristics of non-vacuolar plants?**
**Ans:**

1- Non-vascular plants do not have true roots, stems or Leaves. instead, they have simple parts.
2- Nonvascular plants are relatively short plants.
3- They usually grow in areas where there is an abundant supply of water.
4- They reproduce asexually and sexually.

**4. Compare the monocot and dicot plants.**
**ANS/**

المقارنة بين نباتات ذوات الفلقة وذوات الفلقتين موجودة في أعلاه (في نهاية الفصل)، فراجع.

**5. Compare the vascular and non-vascular plants.**
**ANS/**

| Non-vascular plants | Vascular plants |
|---|---|
| 1. They don't have vascular tissue.<br>2. They don't have true roots, stems and leaves.<br>3. Are relatively short plants.<br>4. Usually grow in area an abundant supply of water.<br>5. Ex. Mosses. | 1. They have vascular tissue have phloem and xylem.<br>2. They have true root, stems and leaves.<br>3. May be short and Long plant their size (1cm – 100m)<br>4. They don't need this area.<br>5. Ex. Ferns. |

## C. True or False

1. Date palm is a monocot plant. True
2. Ferns reproduce by seed. False
3. Gymnosperm is evergreen plant. True
4. Water melon is a dicot plant. True
5. Monocot generally have tap root. False

## D. Fill in the blanks

1. Flowering plants are divided in to two groups they are monocotyledons (monocot) and dicotyledons (dicot).
2. Non-vascular plants don't have true roots, stems or leaves.
3. Vascular tissue is the vascular system of plants.
4. Ferns reproduce by alternation of generation.
5. Examples for vascular plants are ferns and pine tree.

## E. Multiple choice

1. B
2. B
3. C
4. C

# CHAPTER 7
# PLANT ANATOMY

## Structure of Dicot plants

### The shoot system:

**Q/ What are the parts of structures of dicot plants?**
**ANS/ 1. Shoot system. 2. Root system.**

**Q/ Where is the root system of the dicot plants?**
**ANS/ The root system is generally the below ground portion.**

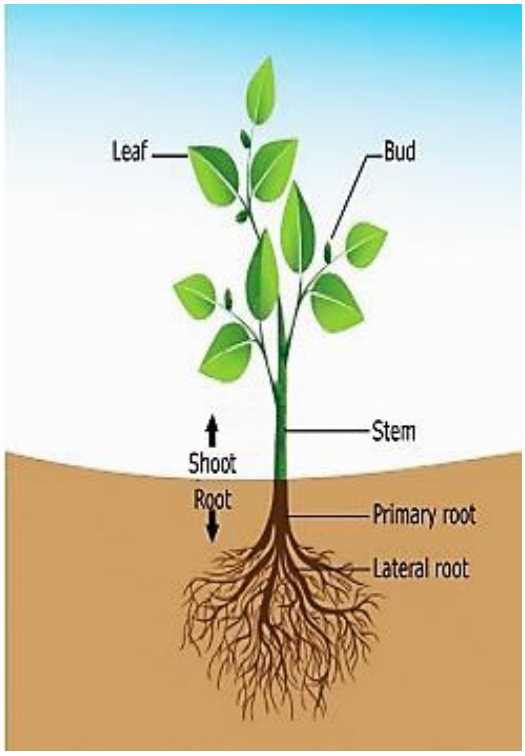
**Q/ What is the shoot system of dicot plants consisting?**
**ANS/ The shoot system consists of vertical stem which bears leaves, flowers and fruits containing seeds.**

**Q/ What are the functions of shoot system?**
**ANS/**

1. **Photosynthesis.**
2. **Reproduction.**
3. **Storage**
4. **Transport.**
5. **Hormones.**

**Q/ What are the functions of root system?**
**ANS/**

1. **Anchorage.**
2. **Absorption.**
3. **Storage.**
4. **Transport.**
5. **Hormones.**



# Root

**Q/ What are the functions of root?**
**ANS/ The functions of root are:**

1. **Absorb water and minerals from the soil.**
2. **Anchor the plant in the ground.**
3. **Store food in some plants, such as carrots.**

**Q/ What are the basic types of roots?**
**ANS/ There are two basic types:**

1. **Tap root.**
2. **Fibrous roots.**

**Tap root: is a type of roots consists of one main root with many smaller lateral roots coming out of it.**

**Q/ What is the characteristic of tap root in dicots and gymnosperms plants?**
**ANS/ The tap root consists from main root with many smaller lateral roots coming out of it.**

**Q/ Give examples of tap root dicot plants?**
**ANS/ 1. Radish. 2. Carrot.**

**Q/ What is the characteristic of fibrous root?**
**ANS/ The fibrous root has several to many roots of the same size developing from the end of the stem with smaller lateral roots branching off these roots.**

**Q/ Give examples of fibrous root?**
**ANS/ 1. Onion. 2. Crabgrass.**
**Also other monocots have fibrous root.**

**Q/ What are distinguishes or characteristics of typical root?**
**ANS/ In typical root structure, the tip root is rounded and covered with a protective structure called the root cap.**

**Root cap: is a protective structure surrounded and covered the tip root.**

***NOTE: Beneath the root cup are dividing cells which provide root growth.**

**root hairs: are tiny projections growing out from the root, its function absorbs water and minerals.**

**Q/ What is the function of root hairs?**
**ANS/ Absorb water and minerals.**

**Q/ What are the functions of vascular organs?**
**ANS/ The vascular organs, xylem and phloem transport water, minerals and food.**

# Stem

**Stem: is the organ which connects the root and leaves. it transports materials between the leaves and root.**

**Q/ What are the Difference between the stems in herbaceous and woody plants?**
**ANS/**

1. **Herbaceous stems are soft and photosynthetic. Ex: Beans, wheat, and Tomatoes.**
2. **Woody stems are hard and not photosynthetic. Ex: Pine, oak and red wood.**

**Both herbaceous and wood stems have vascular organs (xylem and phloem) vessels.**

**Q/ What are the transport system in plant?**
**ANS/ The transport system in plant are:**

1. **Xylem vessels.**
2. **phloem vessels.**

**Q/ What are the functions of xylem and phloem vessels?**
**ANS/**

1. **Xylem vessels: are transport water and minerals from the root to the other parts of plants.**
2. **phloem vessels: are transport photosynthetic products between the leaves and root.**

**Bark: is an outer layer in woody stem which it supportive structure. This layer helps to protect the inner layers.**

- **The phloem is located beneath the bark.**
- **Inside the phloem is a layer called cambium whose cells divide to form new xylem and phloem vessels.**
- **Inside the cambium, the xylem vessel is found.**
- **At the core of the stem, the heart wood is found.**

**Q/ What is the location of cambium layer in woody stem?**
**ANS/ Cambium layer is found inside the phloem.**
**Q/ What are the function of cambium?**
**ANS/ Cambium cells divide to form new xylem and new phloem vessels.**

**Cambium: is a layer located inside the phloem whose cells divide to form new xylem and phloem vessels.**

**Annual rings: are many concentric circles in stump of a tree and each pair of them represents one year of plant growth.**

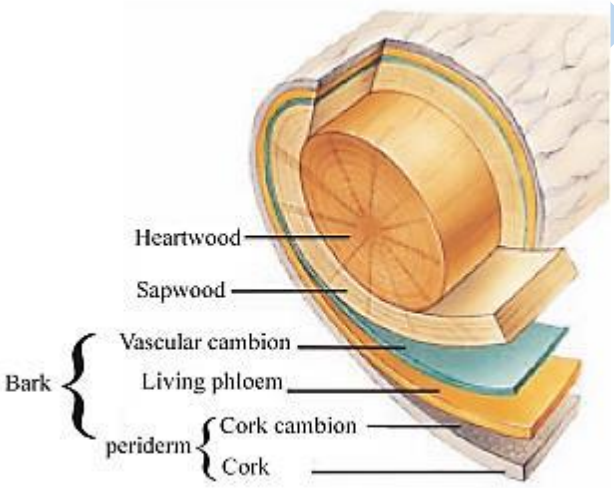
# Growth in stem

**Q/ What is the type of growth in the stems of plants?**
**ANS/ Growing in plants is unlimited which can be longitudinally and laterally.**

**Q/ What are the characteristics of growing in grasses?**
**ANS/ Growing in grasses it is a seasonal growth new cells added to the tip of the plant or laterally in form of buds.**

**Q/ What are the characteristic of Growing in perennial plants?**
**ANS/ Dicots contain cambium cells which provide:**

1. **Secondary growth (growth in diameter).**
2. **Grow longitudinally.**




# Leaf

**Leaves: are structures which develop from lateral buds on the stem of a plant.**

**Q/ What are the characteristic of leaf in dicots plants?**
**ANS/**

1. **Consists of a leaf stalk and leaf blade.**
2. **The wide surface area of the leaf blade is important for the efficient absorption of sunlight.**
3. **In some plants leaves are ribbon like straight-sided with parallel veins, net-veined and rough sided.**

**Q/ What is the benefit of wide surface area of the leaf blade?**
**ANS/ The wide surface area of the leaf blade is important for the efficient absorption of sun light.**

# The Anatomical structure of the leaf

**Q/ What layers can be observed under a light microscope when a leaf cut in cross-section?**
**ANS/**

1. **Cuticle layer.**
2. **Epidermal layers.**
3. **Mesophyll layer.**
4. **Vascular bundles.**

**The cuticle layer: is a waxy material which covers the leave surface and prevents water loss, and the cuticle layer is transport therefore sunlight can pass through it but water loss is prevented.**

**Epidermal layers: are form the upper and lower surfaces of the leaf and comprises a single layer of epidermal cells.**

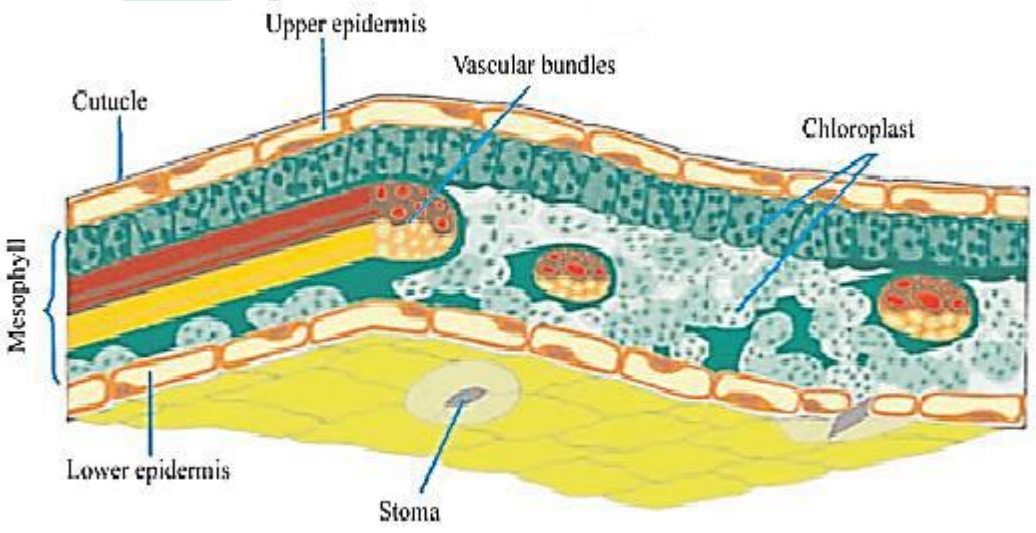
**Q/ What are the characteristics of epidermal layers in leaf?**
**ANS/**

1. **Single layer.**
2. **Epidermal cells lack chloroplasts and consequently non-photosynthetic.**
3. **The holes in the epidermis or stomata give it a rough appearance.**
4. **The stomata provide the pathways for gas exchange and water regulation in the plant.**

**Stomata: are the holes in the epidermal layer give it a rough appearance. And they provide the pathways for gas exchange and water regulation in the plant.**

**Q/ What are the functions of stomata?**
**ANS/**

1. **Provide pathways for gas exchange.**
2. **Water regulation in the plant (transpiration).** النتح



**The mesophyll layer:** is a layer between the upper and lower epidermis. It comprises palisade and spongy parenchyma cells and the cells of this layer are photosynthetic.

**vascular bundles:** are bundles which consist of xylem and phloem vessels which transport water from root to leaf and organic materials from leaf to root.

**Q/ What happens if the cuticle layer covers total the surface of the leaf?**
**ANS/** Transpiration and gas exchange would be prevented.

***NOTE:** Stomata lack a cuticle they can open and close to carryout gas exchange and transpiration.

**Transpiration:** is an operation of removing the excess water to out of the plant through the stomata in the surface of the leaf.

## Photosynthesis

**Q/ Explain the process of photosynthesis in the plants and photosynthetic organism?**
**ANS/**

1. Plants and other photosynthetic organisms capture solar energy and convert it to chemical energy.
2. The chemical energy is stored in seeds or other parts of plants body.
3. When an animal eats plants, this energy passes from the plants to the animal's body.
4. Plants produce oxygen by photosynthesis which takes place in chloroplasts.

**Q/ Where chemical energy is stored in the plant?**
**ANS/** The chemical energy is stored in:

1. Seeds.
2. Other parts of plant body.

## Flower

**Flower:** are specialized shoots which have reproductive organs. they have different shapes and colors.

**Q/ What are the characteristics of flowers?**
**ANS/**

1. They have different shapes and colors.
2. They have reproductive organs.
3. It composed of petals which have different colors in order to attract animal pollinators.
4. They have sepals which are generally green, to protect the stamen and carpel.

**Q/ What is the function of petals?**
**ANS/** to attract animal pollinators.

**Q/ What is the functions of sepals?**
**ANS/ to protect the stamen and carpel.**

**Stamens: are the male reproductive organs which produce pollen grains. they consist of two main parts; anther and filaments.**

**Q/ What are the parts of the stamen in flower?**
**ANS/ They have two main parts: 1. Anther. 2. Filaments.**

**Anther: is a part of stamen is composed of four pollen sacs containing pollen grain. the grains are haploid and contain the meiotic ally produced male gametes.**

**Pollen grains: are the grains found in pollen sac (anther). The grains are haploid and contain the meiotically produced male gametes.**

**Filament: is a part of stamen. Its function is to raise the anther in to the air so that Its pollen can be dispersed by the wind or by an insect.**

**Q/ What is the function of filament?**
**ANS/ the function is to raise the anther in to the air.**

**Q/ What is the benefit of raise the filament of the anther in to the air?**
**ANS/ That is pollen can be dispersed by the wind and an insect.**

**Q/ What are the ways of dispersed of the pollen gran in?**
**ANS/ 1. The wind. 2. By an insect.**

**Pistil: is the female reproductive organ of a flower. It is generally composed of three structures a stigma, a style and an ovary.**

**Q/ What are the composed of the pistil in the flower?**
**ANS/ They composed of three structures: 1. A stigma. 2. A style. 3. An ovary.**

**Stigma: It is structure found in pistil and it is a specialized area located directly above the style and is the site of pollen reception and germination.**

**Q/ What are the function of stigma in flower?**
**ANS/ 1. The site of pollen reception. 2. Pollen germination.**

**Style: is a tube-like structure. It is a part of pistil that structure connecting the ovary and it stigma.**

**Q/ What is the function of style in flower?**
**ANS/ It connecting the ovary and it stigma.**

**Ovary: is a spherical structure at the base of pistil contains one or more egg (ovum) and forms fruits after fertilization.**

**Q/ What are the difference between stigma and ovary in (location and function).**
**ANS/**

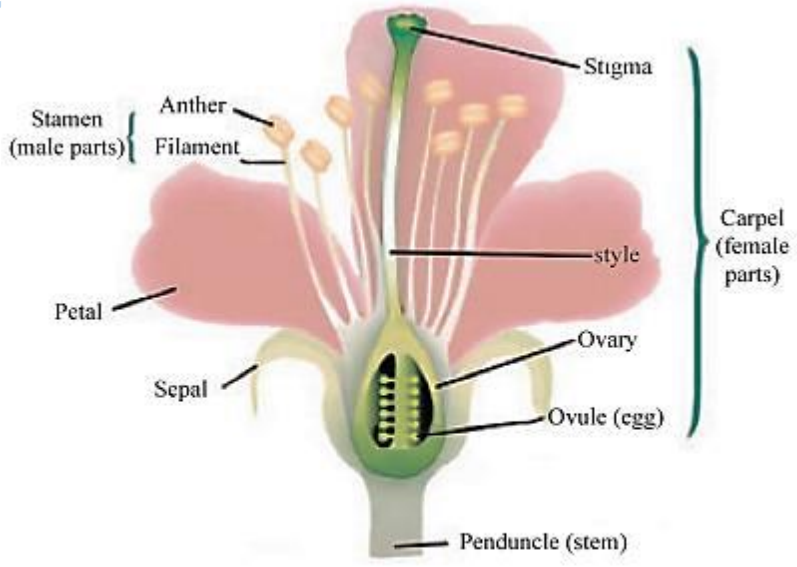
| Stigma | Ovary |
|---|---|
| 1. Location:<br>- Above the style. | 1. Location:<br>- The base of the style. |
| 2. Function:<br>a. The site of pollen reception.<br>b. Pollen germination. | 2. Function:<br>a. Contains one or more egg.<br>b. Forms fruits after fertilization to protect the seeds. |

**Receptacle: is a base of flower where all floral parts are attached, also produces nectar.**

**Q/ What are the functions of Receptacle in the flower?**
**ANS/**

1. **base of flower where all floral parts are attached.**
2. **produce nectar that provides an energy source for insects and birds.**

**Nectar: is a sugary fluid it come from the receptacle in the flower and that fluid provides an energy source for insects and birds.**




**Parts of a flower**

# CHAPTER 8
# INVERTEBRATES

**Animals:** are some of the most common organisms found from the oceans to the high mountains. Except for some animals like sponges, most animals are easily differentiated from other groups (e.g. plants or fungi).

**Q/ Why the primitive phyla the process of excretion in the diffusion?**
**ANS/** Because the primitive phyla do not have excretion organs so they use diffusion for these functions.

**invertebrates:** are animals that don't have a backbone, ex: sponges, jellyfish, insects and snails.

## Symmetry

**symmetry:** is the presence of one or more planes that divide an organism in to identical sections.

## *Notes:

1. Except for a few group, the majority of animals exhibit **bilateral symmetry** and bilateral symmetry can be divided into parts e.g. head, torso and limbs.
2. For identifying various features of such animals, the terms anterior, posterior, dorsal and ventral are used. In the same way, for understanding the inner structures, vertical, transversal, and horizontal planes (sections) are defined.

**Q/ Give examples of animals according to their symmetry?**
**ANS/**
1. Sponges are asymmetrical (or equal parts).
2. Radial symmetry: can be divided in to equal pieces by any number of planes passing through the main body axis. Ex: Cnidaria like hydra.
3. Bilaterally symmetric: animals can be divided in to two pieces by a single longitudinal medial plane, like birds and frogs.

## Animal classification

**Q/ Why there are millions of different animal species around the world?**
**ANS/** Because of this diversity, all groups have to be studied separately.

**Q/ Give examples for the Invertebrates kingdom?**
(1) sponges. (2) coelenterates. (3) Platyhelminthes. (4) nematode
(5) Annelida. (6) Arthropoda. (7) Echinodermata. (8) chordate.

**Q/What does the exploration of the great diversity of animals depend on?**
**ANS/** the great diversity of animals according to their similarities and differences.

# Invertebrates

## Phylum: Porifera (sponges)

**Q/ Why in the first time people thought that sponges were plants?**
*ANS/* Because they don't look or act like most animals we know.

**Q/ What is the common characteristic of sponges and plants?**
ANS/ Like plants adult, sponges are immobile.

## Habitat

**Q/ What is the original home of sponges?**
ANS/ They are mainly marine animals with the exception of a few fresh water groups.

**Q/ How can sponges install in water?**
ANS/ they are sessile and mostly attach themselves to hard surfaces like rocks and shells.

**Q/ What are the forms of sponges?**
ANS/ (1) flat. (2) ball. (3) vase-shaped.

## Body structure

**Q/ What is the composition of the body of sponges?**
ANS/

1. Sponges are the simplest animals.
2. They have a lot of pores on the body through which water is taken to the body cavity.
3. They don't have any specific type of tissue, system or organ.

**Q/ What is the benefit of having a lot of pores on the body of sponges?**
ANS/ Through pores which water is taken to the body cavity to have food.

**Q/ What are the supporting structures for sponge's body?**
ANS/ Sponges have an endoskeleton and differ on the basis of type of skeleton they secret.

**Q/ Explain how sponges getting food?**
ANS/

1. Moving water carries food and removes wastes.
2. They are filter feeders that filter passing through the pores to trap food particles.

**Q/ Explain how sponges getting O2?**
ANS/

1. Moving water carries food and O2.
2. O2 moves from water into the sponge`s cells by diffusion and diffusion removes waste from the sponge.

**Q/ What is the benefit of filter feeders in sponge body?**
**ANS/** That filter the water passing through the pores to trap food particles.

**Q/ How water can enter the pores of body the sponge.**
**ANS/** The water passing through pores by diffusion.

**Q/ How the process of water transfer to the body of the sponge and the discharge of waste?**
**ANS/** By diffusion.

**Osculum:** is a structure in the sponge's body and it can remove wastes from sponge`s body by diffusion (from the osculum).

**Q/ How do sponges reproduce?**
**ANS/** In porifera or sponges, reproduction is sexual or asexual.

**Q/ Explain asexual reproduction in sponges?**
**ANS/**

1. Budding or regeneration are asexual form of reproduction.
2. Budding, small new sponges grow from the sides of adult sponges.
3. Sponges have remarkable ability for regeneration when injured they can repair themselves and regenerate lost parts.
4. When the cells of sponge s separated from one another in the lab they regenerate forming a complete sponge again.

**Budding:** are small new sponges grow from the sides of adult sponges and it is process of asexual reproduction in sponges.

**Regeneration in sponges:** is process of asexual reproduction in sponges. When injured they can repair themselves and regenerate lost parts.

**Q/ What is the benefit of the regeneration when there is any injured of the sponges?**
**ANS/** When injured they can repair themselves and regenerate lost parts. When the cells of sponges are separated from one another in the lab they regenerate, forming a complete sponge again.

**Q/ Explain sexual reproduction in sponges?**
**ANS/**

1. Most sponges are hermaphroditic male and female gametes.
2. They are produced by the same sponge.
3. Some of sponges may be monoic, that is the gametes are produced by different individuals.

**Q/ What does the word hermaphroditic in sponges means?**
**ANS/** It means male and female gametes are produced by the same sponges because the female and male found it in the same sponge body.

# Phylum: Coelenterata (Cnidaria)

**Q/ What does the word coelenterate mean in Greek?**
**ANS/ It mean (Hollow) in Greek.**

**Q/ What are the characteristics of Cnidaria?**
**ANS/**

1. **There are over 10,000 species in this phylum.**
2. **Most are marine but there are a few fresh water representatives.**
3. **They live solitary or in colonies.**
4. **They have projections called as tentacles which used in feeding and movement.**

**Tentacles: are projections that found it in phylum cnidaria which used in feeding and movement example hydra.**

**Q/ What are the function of tentacles?**
**ANS/ 1. Feeding. 2. Movement.**

## Hydrozoa

**Q/ What are characteristics of Hydrozoa?**
**ANS/**

1. **Nearly 2700 mainly marine species but some fresh water.**
2. **They have Both polyp and medusa stages in many species.**
3. **Some form colonies.**

**Hydra: is the typical representative of (Cnidaria) hydra have only polyp body form (approx. 5-6mm in length) and live in streams, ponds and lakes.**

**Q/ What are the characteristics of hydra?**
**ANS/**

1. **They have only polyp body form.**
2. **Approximately 5-6 mm in length.**
3. **They live in streams, ponds and lakes.**
4. **Aboral side is attached to the substrate.**
5. **The mouth is positioned on the upper tip.**
6. **Around the mouth there are 6-8 tentacles active in movement and feeding.**
7. **The reproduce asexually by Budding but they can also reproduce sexually.**
8. **Sexual organs can be seen as small buds on the tube – shaped body.**
9. **They may be hermaphroditic or monoic.**

### Reproduction in hydra

**Q/ What are the ways or methods of reproduction of hydra?**
**ANS/ They reproduce:**

1. **Asexually by budding or regeneration.**
2. **Sexually by sexual organs.**

**Q/ What does hydra specialize in colony?**
**ANS/**

1. Some individuals of the colony specialized for feeding.
2. Some others lack tentacles and even a mouth.
3. Serving only in reproduction.

**Q/ How does free swimming medusa reproduce? And what do they form?**
**ANS/** Free swimming medusa reproduces sexually and they form zygotes.

**Q/ Explain the zygote cycle in a free-swimming medusa?**
**ANS/** Free-swimming medusa reproduce sexually and form zygotes. Zygotes develop into swimming larvae, larvae attach to some solid object and develop in to a polyp which may form a new colony.

## phylum: Platyhelminthes (flat-worms)

Platyhelminthes: are flattened, soft-bodied organisms, and are the first animals with bilateral symmetry.

**Q/ What are the characteristics of Platyhelminthes?**
**ANS/**

1. These are flattened, soft-bodied organisms.
2. They are bilateral symmetry.
3. There are 20.000 known species.
4. They are mostly aquatic (marine or fresh water), but there are some terrestrial species of moist soil.
5. Parasitic species often lack digestive and sensory organs.
6. They are mainly hermaphroditic.

### Tape worm

Tape worm: are all hermaphroditic animals. The tapeworm has an anterior region containing hooks and suckers for attachment to the intestinal wall of the host. Behind the head region there is a short neck and the along series of proglottis.

**Q/ What is the function of hooks and suckers in tape worm? and where is its location?**
**ANS/** Used for attachment to the intestinal wall of the host. And the location is an anterior region in tape worms body.

Proglottis: are body part which has full set both male and female reproductive organs.

***Note:** Proglottis have excretory canals but no digestive system.

## Life cycle of tape worm

**Q/ Where does the adult tapeworm live?**
**ANS/ The adult tape worm lives in the human intestine its body consist of head and proglottis.**

**Q/ What do proglottis produce?**
**ANS/ Proglottis produce sperm and eggs.**

**Q/ What are the characteristics of proglottis?**
**ANS/**

1. **Proglottis produce sperm and eggs.**
2. **The eggs are fertilized and stored in the proglottis.**
3. **A single proglottis may contain nearly 80.000 -100.000 fertilized eggs.**

**Q/ Where does fertilized egg go after fertilization?**
**ANS/ The fertilized egg may break away from the tapeworm and pass out of host body in feces.**

**Q/ Where can the fertilized egg deposit?**
**ANS/ The fertilized egg may be deposited on the ground and on the grass.**

**Q/ Who is the intermediate host of tape worm? And what happens inside this host?**
**ANS/ Cow`s intestine is the intermediate host of the tape worm. When cow eat the grass, fertilized eggs can pass into new host body – in the intestine, eggs develop into structures, they cross the intestine enter blood and lodge in the tissues (usually brain and muscle tissue) where they form capsule around themselves.**

**Q/ What is called the stage in which the eggs are inside a capsule?**
**ANS/ The egg where they form capsule around themselves and that stage usually in the brain tissue stage new organisms called bladder worm (8-12mmlong).**

**Q/ Where are the bladder worms found before entering the human Intestine?**
**ANS/ Meat containing bladder worm if the cow meat is not fully cooked , bladder worm will not be killed.**

**Q/ What happens when eating meal containing bladder worms? or how does tape worm infect human body?**
**ANS/ When meat containing bladder worms may be eaten by humans and if the cow meat is not fully cooked, bladder worm will not be killed. When bladder worms enter into human intestine they grow into adult tape worms and complete their life cycle.**
**Q/ What are the symptoms caused by the tape worm.**
**ANS/ 1. Cause weight loss. 2. Weakness. 3. Some other symptoms in the host.**

**Q/How to prevent the tape worm infection?**
**ANS/**

1. Prepare food properly and look after our personal hygiene, particularly around animals.
2. Wash our hands thoroughly with soap and water.
3. Before and after preparing or handling any food including raw meat or fish before eating and after using the toilet.
4. Also sensible to wash our hands after close contact with farm animals or pets.

## phylum nematode (Round worms)

**Q/what are the characteristics of Nematode?**
**ANS/**

1. Nematode have cylindrical, smooth bodies.
2. They have bilateral symmetry.
3. Their bodies are long, thin and pointed at both tips.
4. Sense organs are not well-developed.
5. There are 12.000 species.
6. They have separate sexed and internal fertilization is seen.
7. They inhabit sediment layers in water (marine and fresh water) and the abundant in soil.
8. Ecologically they are very important. Their importance comes from their major role as decomposers they provide material recycling.
9. There are many free-living species and some species plant's or animal's parasites.
10. A complete digestive system is seen in round-worms.
11. Round worm have a water proof, flexible body Covering.

**Q/ Why nematode is economically important?**
**ANS/** Because major role as Decomposer (some of nematodes). They provide material recycling.
**Q/ Why are there types of parasitic nematodes?**
**ANS/** Because parasitic round worms obtain nutrients and oxygen from their host.

## Ascaris lumbricoidies

**Ascariasis:** is a disease (infection) caused by a parasitic round worm, (Ascaris lumbricoidies).

**Q/ Where can the presence of Ascaris worm?**
**ANS/** It is found association with:
1. Poor personal hygiene.
2. Poor sanitation.
3. In places where human feces are used as fertilizer.

**Q/ How the infection is infected with Ascaris worm?**
**ANS/ Intake of food or drink contaminated with round worm (Ascaris) eggs causes infection.**

**Q/What is the life cycle of the Ascaris worm?**
**ANS/**

1. **The egg hatch and release larvae within the intestines.**
2. **The larvae then move through the bloodstream to the lungs.**
3. **Exit up through the large airways of the lungs.**
4. **They are swallowed back in to the stomach and intestines.**
5. **They mature in to adult round worms in intestines and they live in it.**

**Q/ Where does the adult worm live? And what is the lay?**
**ANS/ They live in human intestine. They lay eggs that are present in feces.**

## phylum: Mollusca (mollusks)

**Q/ What are the characteristics of Mollusca?**
**ANS/**

1. **Mollusks are soft bodies.**
2. **Bilaterally symmetrical animal.**
3. **About 50.000 living and 35.000 fossil species of mollusks are known.**
4. **Their soft bodies are usually covered dorsally with a hard shell mantle it made of caco3.**
5. **Both mantle and mantle cavity carry shell producing glands.**
6. **A flat broad, muscular foot is used for locomotion.**
7. **Mollusca have a complete digestive system.**

**Q/ Why Mollusca are covered dorsally with a hard shell mantle?**
**ANS/ Because their soft bodies they are protect them self by this shell.**

**Q/ Which is the substance of the shell mantle?**
**ANS/ The shell mantle made of CaCo3.**

**Q/ Describe shape of foot in mollusks?**
**ANS/ It is a flat broad, muscular foot.**

**Q/ What is the function of foot for mollusks?**
**ANS/ It is used for locomotion.**

**Q/ What distinguishes the digestive system in mollusks?**
**ANS/ mollusks have a complete digestive system.**

**Q/ Explain the feeding process in mollusks?**
**ANS/**

1. Food is ground in the mouth by specialized structures known as radula (it is similar to a tongue with hard teeth).
2. After mechanical digestion the food material form a cord – like structure and is transported down the esophagus to the stomach.
3. Final products of digestion are absorbed by the stomach and intestine.

**Radula:** is a specialized structure, similar to tongue with hard teeth, in this structures can mollusks food is ground in the mouth by it.

## Phylum: Arthropod

**Q/ What are the characteristics of Arthropods?**
**ANS/**

1. There are about 1,000,000 species of arthropods.
2. All Arthropods are bilaterally symmetrical.
3. Their bodies are covered with a tough exoskeleton.
4. Arthropod`s body is segmented.
5. Segments are usually arranged in groups to form; ahead, thorax and abdomen
6. Skin is Covered by a Cuticle made of chitin Polysaccharides or CaCo3 is a component.
7. Arthropods have a metamorphosis process.

**Q/ Numerate types of segments in arthropods?**
**ANS/** Segments are arranged in groups to form: a. Head. b. Thorax. c. Abdomen

**Q/ What is covered the skin of arthropod?**
**ANS/** The skin is Covered by a cuticle.

**Q/What is Cuticle made from?**
**ANS/** Cuticle made of:
1. Chitin polysaccharides.
2. CaCo3.

**Q/ What is the function of cuticle in arthropods?**
**ANS/**

1. This hard covering protects the animal.
2. Provides points of attachment for muscle cells.

**Q/ What is the unique problem in cuticle (the skin covered) in arthropods during growth?**
**ANS/** The unique problem is the cuticle is not living, so the animal during growth its cuticle cannot grow with the organism.

**Molting:** is a process that occurs in arthropod. It has grown too large for its exoskeleton, its shed and new skeleton is grow.

- Arthropods have very sensory organs in hearing.

**Q/ What are the types of respiratory systems in Arthropods?**
**ANS/** They have special respiratory systems:

a. Aquatic forms have gills for gas exchange.
b. Terrestrial forms have trachea made up of many internal tubules which carry air to the body cells.

## Grasshopper

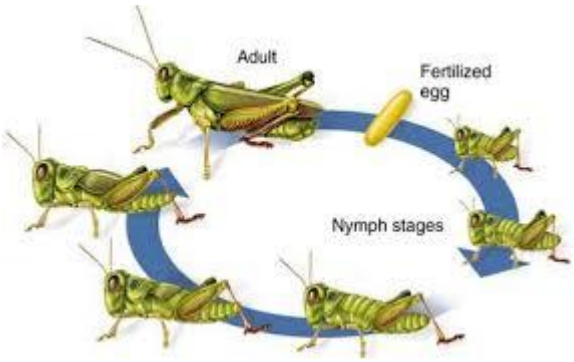
**Q/ Explain the life cycle of the Grasshopper**
**ANS/**

1. They are hermaphrodite organisms and internal fertilization is seen.
2. Female lays fertilized egg in holes in soil.
3. After a while organisms similar to the parents are seen.
4. After a series of changes (metamorphosis) complete insects are formed.

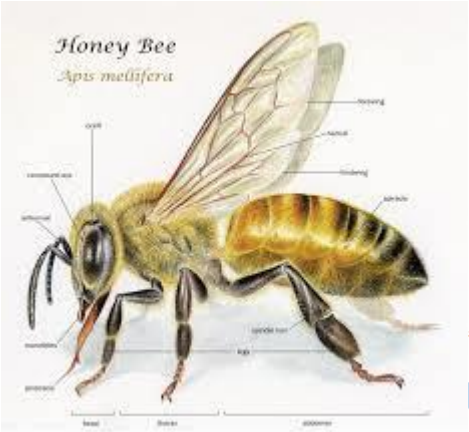
- in Arthropods we observe:

1- They have separate sexes.
2- Direct development or metamorphosis are seen.


Metamorphosis: is a series of changes as they develop from egg to adult.



# Honey bee




**Q/ What are the characteristics of honey bee?**
**ANS/**
1. Body thick, marked with yellow and brown.
2. Eyes hairy.
3. Body length (1/2 – 1) cm.

**Q/ Where does bees live?**
**ANS/** the bees live in:
- a- Manmade beehives.
- b- Hollow trees.

**Q/ What is the most important characteristic in the behavior of bees?**
**ANS/** Honey bees emit a characteristic buzz.

**Q/ What is bee food? What is bee feeding?**
**ANS/** Feed on the nectar of flowers such as clover and apple blossoms.

**Q/ What is the advantage of social order for bees?**
**ANS/** Their social order is a rigid and effective.

**Q/ Numerate the types of bees in the hive? And what is the function of their types?**
**ANS/** Each hive has:
1. **A queen:** it lays eggs and is the largest bee.
2. **Workers:** the most abundant members of the colony who harvest nectar.
3. **Drones:** who serve the queen.

**Q/ How does communication between bee types occur in the hive?**
**ANS/** Honeybees communicate through language of a dance, sound and smell.

**Q/ How can bee workers tell the others about new place to gather nectar?**
**ANS/** Through a dance:
1- He indicates the direction of the place.
2- He indicates the distance from the hive.

**Q/ How can bee workers can determine the type of flower?**
**ANS/** By smelling him.

**the Queen:** is the only sexually developed female in the hive. She is the largest bee in the colony.

**Q/ Who chooses the queen? and what do the workers rear to be the Queen?**
**ANS/** The workers choose the Queen, an old larva reared to be the Queen by the workers.

**Q/ When the Queen lays her eggs?**
**ANS/** The Queen starts to lay eggs about 10 days after mating.

**Drones:** are stout male that have no stingers. It do not collect food or pollen from flowers and If the colony is short on food drones are often kicked out of the hive.

**Q/ What happens to the drones if the colony is short on food?**
**ANS/** Drones are often kicked out of the hive.

**Q/ Why male bee (Drones) of ten are kicked out from the colony?**
**ANS/** Because the colony is short on food and the Drones do not collect food or pollen from flowers. So be kick out of the hive.

**the workers:** are the smallest bees in the colony, are Sexually undeveloped females.

**Q/ What are the characteristics of bee workers?**
**ANS/**

1- The smallest bee in the colony.
2- They are sexually undeveloped females.
3- They collect nectar to make honey.
4- The life span varies according to the time of year.
5- Her life approximately 28 to 35 gays.
6- They are reared in September and October. They can live in winter.
7- Workers can feed the queen and larvae.
8- Guard the hive entrance and help to keep the hive cool by fanning their wings.
9- They are produce wax comb.

**Q/ Why workers collect nectar flowers?**
**ANS/** To make honey.

**Q/ What are the function of workers?**
**ANS/**

1. Collect nectar flowers to make honey.
2. Feeding the Queen and larvae.
3. Produce wax comb.
4. Guard the hive entrance
5. To keep the hive cool by fanning their wings.

To produce 45g of pure honey 17.000 honey bees work about 7000 hours.

**Q/ How do the workers keep hive in cool?**
**ANS/** By fanning their wing.

## Phylum: Echinodermata (Echinoderms)

**Q/ What are the characteristics of Echinoderms?**
**ANS/**
1- They are all marine animals.
2- There are 7000 living and 13000 fossil species known.
3- Their name means (spiny-skinned), they are covered by calcified spines or plates.
4- Under this special skin there is an endoskeleton.

5- They are radially symmetrical, but some of them are bilateral symmetry characteristics.
6- The digestive system includes a mouth and anus.
7- Respiratory organs are small gills through which oxygen dissolved in water is absorbed.
8- They have no true circulatory system.
9- They have separate sexes.
10- They don't have a brain.

**Q/ What are the types of reproductions in Echinoderms?**
**ANS/**
1- Asexual reproduction is by regeneration.
2- Sexual reproduction.

## Bullinus truncates

**Q/ Give a reason; Bullinus truncates the most importance shells.**
**ANS/** Because they perform the middle host to schistosoma worm in Iraq. They found in different areas of Iraq.

**Middle host:** an individual host another living organism (parasitic) to spend part of its life cycle before settling in final host body.

# CHAPTER 9
# VERTEBRATES

**Chordata: is the animal phylum with everyone is most intimately familiar, since it includes mammals and other vertebrates.**

**Q/Why not all chordates are vertebrates?**
**ANS/ Because some chordates the dorsal cord develop or evolve and become back bones and they named vertebrates, but other chordates the dorsal cord is disappears in the Adult stage, so it not vertebrates.**

**Q/What are the characteristics of chordates?**
**ANS/**

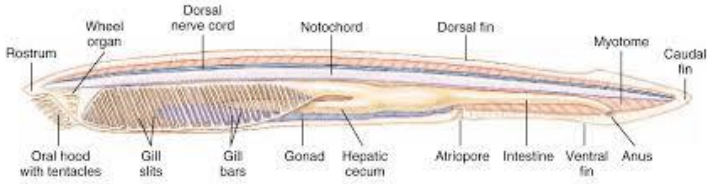
- **Bilateral symmetry, they have three germ layers and a well-developed Coelom.**
- **Segmented body, including segmented muscles.**
- **Signal, dorsal, hollow nerve cord, usually with an enlarged anterior end (brain), posterior spinal cord.**
- **Tail projecting beyond (posterior to) the anus at some stage of development.**
- **Pharyngeal pouches present at some stage of development.**
- **Ventral heart, with a closed blood system, complete digestive system.**

## Amphioxus

**Amphioxus: are Littoral, Small (5-6 cm long), translucent yellow animal.**

**Q/what are the characteristics of Amphioxus?**
**ANS/**

1. **They are littoral.**
2. **Small (5-6 cm long).**
3. **Translucent yellow animals.**
4. **Both ends are pointed.**
5. **The anterior part of the digestive tract there are gill slits in pairs.**
6. **In the area between the nerve cord and gut, is the notochord which persists in the adult.**




## Vertebrates

**Vertebrates: are animals which have developed brains and skulls (crania) and the notochord is observed only in the embryo, in the fetus and adult being replaced with vertebrae. Vertebrates have an endoskeleton.**

**Q/what are the characteristics of vertebrate?**
**ANS/**
**1- Skeleton is jointed, either cartilaginous in sharks and jawless fishes or bony all others.**
**2- They use lung, gill and skin for gas exchange, according to their habitats.**
**3- Digestive tract beings at mouth which opens to stomach, followed by intestines and ends in the anus. There are digestive glands.**
**4- Circulatory system is closed. Hemoglobin is the pigment that carries Co2 and O2 in the blood.**
**5- Blood is red, Heart Contains (2 to 4) Chambers (atria and ventricles).**
**6- Birds and mammals are warm-blooded; all other vertebrates are cold-blooded.**
**7- There are two pairs of extremities. These are fins in aquatic species and limbs in terrestrial ones. Joints attaching limbs to the vertebral column are at the Scapular arch and the sacra larch. Skeletal muscles function is movement.**
**8- Most have separate sexes; paired gonads produce germ cells released from an opening near the anus. Kidneys are the urinary organs metabolites, filtered by kidneys. And germ cells are carried through a common channel. Because of this, the system is called the urogenital system.**
**9- Well-developed nervous system with brain and Sensory organs.**

**Q/ What are the forms of endoskeleton in vertebrates?**
**ANS/ Skeleton is jointed either cartilaginous in sharks and jawless fishes or bony all others.**

**Q/ What are the ways of breathing in vertebrates? And according for what?**
**ANS/ They use lung, gill and skin for gas exchange, according to their habitats.**

**Q/ Follow the digestive system in vertebrates?**
**ANS/ mouth ⟶ stomach ⟶ intestines ⟶ anus.**

**Q/ What is the type of circulatory system in vertebrates?**
**ANS/ Circulatory system is closed system.**

**Q/ What is the blood of vertebrates containing?**
**ANS/ It contains the hemoglobin.**

**Hemoglobin: is the pigment that carries Co2 and O2 in the blood.**

**Q/What is the function of Hemoglobin?**
**ANS/ Carries Co2 and O2 in the blood.**

**Q/What is the color of the blood in vertebrates?**
**ANS/ The Blood is red.**

**Q/What contains the heart of vertebrates?**
**ANS/ Heart contains (2-4) compartments: a- atria b- ventricles.**

**Q/What are the types of blood invertebrates?**
**ANS/**
1- Warm-blooded (Birds, mammals).
2- Cold-blooded (all other vertebrates).

**Q/ How many pairs of extremities in vertebrates?**
**ANS/** There are two pairs of extremities:
a- Fins in aquatic species.
b- Limbs in terrestrial ones.

**Q/ How vertebrates could join the limbs together?**
**ANS/** Joint attaching limbs to the vertebral column are at the scapular arch and The sacral arch.

**Q/ What is the function of skeleton muscles?**
**ANS/** The function is movement.

**Q/ Why is called the urogenital system?**
**ANS/** The system is called urogenital system because the germ cells are carried through a common channel.

**Q/ What are the function of kidneys in vertebrates?**
**ANS/** kidneys are the urinary organs which their functions:
a- Metabolites
b- Filtered.

| | | | |
|---|---|---|---|
| Vertebrates | فقريات | Gut | قناة هضمية |
| Chordata | حبليات | Notochord | حبل ظهري |
| Mammals | لبائن | Persist | لا يزال قائماً |
| Germ layers | طبقات جرثومية | Adult | بالغ |
| Coelom | جوف | Skulls | جماجم |
| Dorsal | ظهر | Crania | قحف |
| Hollow nerve cord | حبل عصبي مجوف | Embryo | جنين |
| Brain | دماغ | Fetus | جنين |
| Spinal cord | حبل شوكي | Endoskeleton | هيكل داخلي |
| Tail | ذنب | Jointed | يتمفصل |
| Anus | شرج | Cartilaginous | غضروفي |
| Pharyngeal pouches | أكياس بلعومية | Lung | رئة |
| Digestive system | الجهاز الهضمي | Skin | جلد |
| Amphioxus | الرميح | Gas exchange | تبادل غازي |
| Littoral | ساحلي | Habitats | معيشة |
| Translucent | نصف شفاف | Digestive glands | غدد هضمية |
| Digestive tract | مسلك هضمي | Pigment | صبغة |
| Gill slits | شقوق خيشومية | Joints | مفاصل |
| Kidney | كلية | Extremities | اطراف |
| Intestine | أمعاء | Fins | زعانف |
| Scapular arch | القوس الكتفي | Sacral arch | قوس عجزي |
| Urogenital system | الجهاز البولي التناسلي | Sensory organs | أعضاء الحس |

# Class: Condrichthyes (cartilaginous fish)

**Q/ What are the characteristics of Condrichthyes?**
**ANS/**

1. **Condrichthyes all lack true bone and have skeleton made of cartilage.**
2. **Only their teeth, and sometimes their vertebrae, are calcified.**
3. **In cartilaginous fish, lungs or swim bladder like structures (which help to keep fish at a certain depth) are absent, So the fish must maintain its level in the sea by the muscular efforts of swimming.**
4. **Their scales are placoid (isolated structures made of dentin resembling simple teeth) That are present all over the body surface.**
5. **Sharks, skates, rays, make up the condrichthyes.**
6. **Their gas exchange is providing by gills.**
7. **They reproduce sexual with internal fertilization.**
8. **They are generally streamlined hunters.**

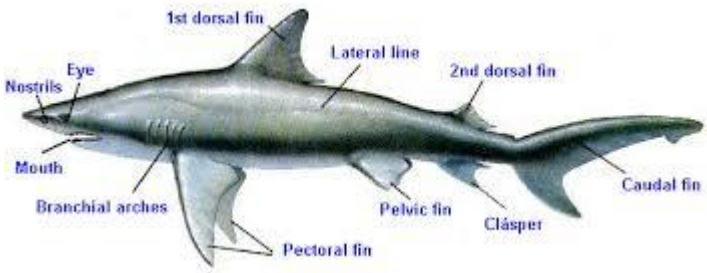
**Q/ Why is called cartilaginous fish?**
**ANS/ Because cartilaginous fish all lack true bone and have a skeleton made of cartilage.**

**Q/ Why cartilaginous fish must maintain its level in the sea by the muscular efforts of swimming?**
**ANS/ Because in cartilaginous fish, lung and swim bladder (which help to keep fish at a certain depth) are absent.**

**Q/ Give a description of fish scales?**
**ANS/ their scales are placoid (isolated structures made of dentine resembling simple teeth) that are present all over the body surface.**

**Q/ How the Cartilaginous fish gas exchanges?**
**ANS/ Their gas exchange is provided by gills.**

**Q/ What is the number of gill pairs in cartilaginous fish?**
**ANS/ There are 5-7 gill pairs.**



external body structure of cartilaginous fish

**Q/ What distinguishes gills in cartilaginous fish?**
**ANS/ No operculum (a flap that closes the gills).**

**Q/ How to reproduce at cartilaginous fish?**
**ANS/ They reproduce sexually with internal fertilization.**

# Shark

**Sharks:** are cartilaginous fishes which are chiefly marine fishes found in all seas. They are streamlined fish that swim by moving their trunk and powerful tail from side to side.

**Q/ What are the characteristics of sharks?**
**ANS/**

1. Sharks are mainly marines fished.
2. They are streamlined fish that swim moving their trunk and powerful tail from side to side.
3. They have sense organs are more complex, particularly for smell and vibration.
4. Most of them are meat eaters and active hunters.
5. They obtain food by straining microorganisms from the water.

# Class: Osteichthyes (Bony fishes)

**Q/what are the characteristics of Bony fishes (osteichthyes)?**
**ANS/**

1- They are most diverse group of vertebrates.
2- They have bony skeleton.
3- They respire by gills, but their gills are closed by operculum.
4- Bony fish they have a single loop blood circulation from heart to body organs.
5- They have a two chambered heart which contains only deoxygenated blood.
6- The nervous system of boney fish includes the: a- brain. b- spinal cord. c- nerves.
7- Sexes are separate. They reproduce sexually and external fertilization.

**Q/ How does sexual and external fertilization reproduction occur at the bony fishes?**
**ANS/** The sexual reproduction and external fertilization is seen in which sperm from the male fertilize eggs out of the female body.

**Q/ How does sexual reproduction occur at the sea horse?**
**ANS/** In the sea horses, the female gives its egg to the male. The male take care of the eggs in side of its body and offspring are born alive.

**Q/ What is the respiratory organs in bony fish?**
**ANS/** Gills are the respiratory organs in bony fish.


Internal body structure of bony fish

**Q/ What are the differences between cartilaginous fishes and bony fishes?**
**ANS/**

| Cartilaginous fishes | Bony fishes |
|---|---|
| 1. All lack true bone and have a skeleton made of cartilage.<br>2- There are (5-7) gill pairs.<br>3- The gills without operculum.<br>4- The swim bladder are absent.<br>5- They reproduce sexually with internal fertilization.<br>6- Class: condrichthyes (cartilaginous fishes).<br>Ex: shark | 1- They have true bone (bony skeleton)<br>2- There are 4 gill pairs.<br>3- The gill with operculum.<br>4- They have swim bladder.<br>5- The reproduce sexually with external fertilization.<br>6- Class: osteichthyes (bony fishes).<br><br>Ex: puffer fish |

**Swim bladder:** is a sac which it filled of gas. Its function lets a fish control its depth in the water, the swim bladder it founded in bony fishes.

**Q/ Why do bony fishes have the swim bladder but cartilaginous fishes don't?**
**ANS/** Because bones are heavier than cartilage.

**Q/ What is the function of swim bladder?**
**ANS/** Swim bladder lets a fish control its depth in the water.

**Q/ How Gas enters and exits the swim bladder and do its job?**
**ANS/** Gas from the fish's blood diffuses in to the swim bladder and fills it like a balloon. So the fish the floats higher in the water. When gas diffuses out of the swim bladder, the fish can go deeper.

## Class: Amphibia

**Q/ What does an amphibian word mean?**
**ANS/** Amphibian means double-life. Amphibians either live entirely in water or usually, then return to the water for reproduction.

**Q/ Where amphibians put their eggs?**
**ANS/** Eggs hatch in water.

**Q/ What is the life cycle to embryo until becomes adult?**
**ANS/**
1- Eggs hatch in water.
2- Embryos develop into larvae which are called tadpoles.
3- Tadpoles live in water and completely depend on gill respiration. (some Salamanders remain in this form)
4- Tadpoles undergo metamorphosis.

5- During metamorphosis some hormonal changes occur and larvae become adults.
6- Adult amphibians lose their gills, tails and caudal fins.

**Q/ What are the types of glands in Amphibians?**
**ANS/** Amphibians have mucus gland and poison glands under the skin.

**Q/ What are the benefits of skin secretion in amphibians?**
**ANS/** The benefits of skin secretions are:
1- Protect the body from bacteria
2- Retain moisture of the skin.

- **NOTE:** Amphibians are the first vertebrates with legs. Previous classes have no legs but amphibian use their legs for movement.

## The amphibian respiratory system

**Q/ What distinguishes the respiratory system in amphibian?**
**ANS/**
1- The larvae of amphibian respire by gills.
2- In the adult phase of amphibian respire and exchange gases through their skin and lungs.

**Q/ What distinguishes the lung of amphibian?**
**ANS/** The alveoli are absence in the lung of amphibian.

**Q/ Why amphibians respire by the skin with The lungs in adult phase?**
**ANS/** Because the alveoli are absence in the lungs of ambiance reduces the available respiratory surface area. they respire by skin with the lungs.

**Q/ What are the ways of respiration in amphibians?**
**ANS/** Three types of respiration are observed:
1- gills. 2- lungs. 3- skin.

## The amphibian circulatory system

**Q/ Which forms the heart of amphibians?**
**ANS/** The amphibian heart consists of two atria and a ventricle.

**Q/ What is the function of heart in amphibians?**
**ANS/** It pumps blood to both tissues and lungs.

- **NOTE:** The amphibians known as cold-blooded (poikilothermic) animals.

## Hibernation

**Hibernation:** is a period of life in some animals which decrease their life activities to the lowest level.

**Q/ Why the frogs of the animals that are hibernation?**
**ANS/ Because the frogs body temperature is not constant (cold blood animals ) so they are hibernating animals.**

**Q/ What happens during the hibernation of frogs?**
**ANS/ During this period:**
**1- They more to the deep of water and hide themselves in mud.**
**2- Close their mouth and nose and respire with skin and use stored fat in their body as source of energy.**
**3- As spring comes their body temperature increase and start an active life. After their reproductive season start.**

**Q/ What is the source of energy for frogs in hibernation?**
**ANS/ The frogs use stored fat in their body as source of energy.**

**Q/when the hibernation ends in the frogs?**
**ANS/ As spring comes their body temperature increase and start an active life.**

| | | | |
|---|---|---|---|
| Condrichthyes | الأسماك الغضروفية | Entirely | تماماً |
| Calcified | متكلسة | Hatch | يفقس |
| Swim bladder | أكياس هوائية | Tadpoles | يرقات البرمائيات |
| Certain depth | عمق معين | Aquatic plants | نباتات مائية |
| Efforts | جهود | Undergo | يخضع |
| Scales | قشور | Metamorphosis | التحول |
| Placoid | لوحية | Caudal fins | زعانف ذنبية |
| Isolated | يعزل | Mucus glands | غدد مخاطية |
| Dentine | عاج | Poison glands | غدد سمية |
| Resembling | مشابه | Moisture | رطوبة |
| Operculum | غطاء الخياشيم | Legs | اطراف |
| Streamlined hunters | صيادين ماهرين | Absence | غائب |
| Trunk | جذع | Atria | أذين |
| Particularly | خصوصاً | Ventricle | بطين |
| Vibration | اهتزاز | Cold-blooded | باردة الدم |
| Straining | تعب او اجهاد | Depend | يعتمد |
| Osteichthyes | الاسماك العظمية | Hibernation | سبات |
| Diverse | تنوع | Mud | طين |
| Respire | تنفسي | Source | مصدر |
| Deoxygenated | غير مؤكسج | | |
| Heavier | اثقل | | |
| Depth | عمق | | |
| Diffuses | ينتشر | | |
| Amphibian | برمائيات | | |

# Class: Reptilia

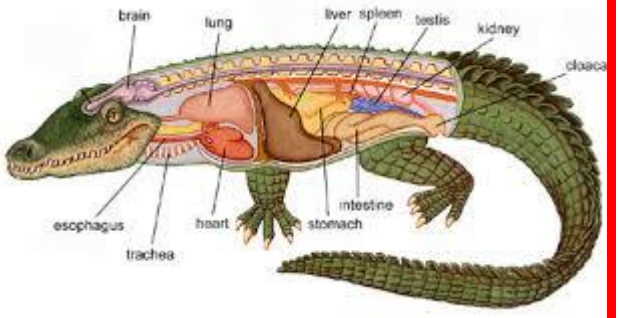
**Q/ What are the characteristics of the Reptilia?**
**ANS/**

1- They have (dry, scaly, waterproof) skin which protects the body from drying out and from predators.
2- They have some glands in their skin.
3- They cannot internally regulate their body Temperature.
4- Their body temperature depends on the ambulant temperature, Because of their scales, reptiles cannot use their skin for respiration. Therefore, reptiles have well-developed lungs.
5- Reptiles have a circulatory system with three chambered heart.
6- The nervous system of reptiles is similar to other vertebrates: Brain and spinal cord direct and coordinate body function.

**Q/ What are the function of scales in reptiles?**
**ANS/** To protects the body from:
1- drying out. 2- predators.

**Q/ What are the characteristics of reptile skin?**
**ANS/** 1- Dry. 2- Scaly. 3- Waterproof skin.

**Q/ Why the heat of reptile's body depends on the heat of the environment surrounding its body.**
**ANS/** Because they cannot internally regulate their body temperature. (Reptiles are cold-blooded animals).




**Q/ Why reptiles cannot respire from the skin?**
**ANS/** Because of their scales, reptiles cannot use their skin for respiration, so reptiles have well-developed lungs.

# Reproduction in Reptiles

**Q/ Why reptiles do not need water when reproducing?**
**ANS/** Because reptiles have reproductive organs that are adapted for internal fertilization.

**Q/ Where the female reptiles put or lays their eggs?**
**ANS/** The female then lays the egg on land.

**Q/ What are the function of shell in eggs?**
**ANS/** The functions are:
1- keeps the egg moist.
2- protects the egg from injuries.

**Q/ What characteristics the life cycle of reptiles?**
**ANS/**
1- Embryo passes its early period of development with in egg.
2- When the reptile's hatches, it can breathe on land.
3- There is no larval stage.
4- The young reptiles look like a small adult.

**Q/ What is the similarity between the reptile egg and bird egg?**
**ANS/** reptile egg and bird egg are rich in yolk.

**Q/ What is the difference between reptile's eggs and bird eggs?**
**ANS/** reptiles egg the shell is more flexible.

- **NOTE:** Reptiles are cold-blooded animals like fish and frogs.

## Snake

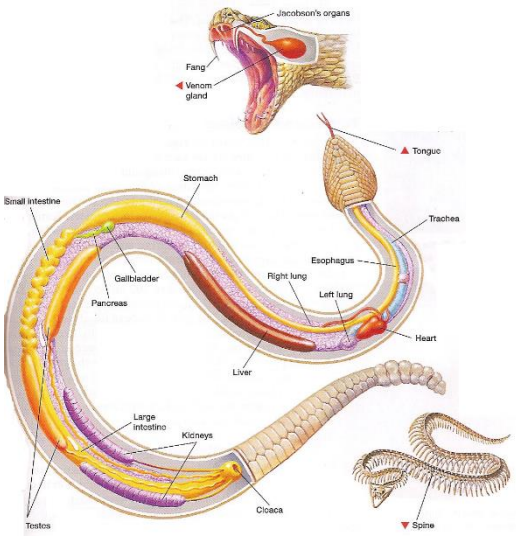
**Q/ What are the characteristics of snake?**
**ANS/**
1- All snakes have tube like body covered by scales.
2- They have no legs, so they move on their belly.
3- They have some special organs for hunting.
4- Snakes have several well – developed sense organs that help them in finding prey.
5- Snakes have an inner ear, but no external opening, it cannot hear but they can detect vibration in the ground through their lower jaw.
6- Snakes have poor vision. they do not have movable eyelids. The eyes of snakes are especially adapted to detect quick movement.
7- They have a special organ in the mouth called the Jacobson's organ. Jacob son's organ is a sense organ for smelling.

**Q/ How to move in snakes?**
**ANS/** They move on their belly.

**Q/ Why do snakes cannot hear well?**
**ANS/** Because snakes have an inner ear but no external opening, so they can detect vibration in the ground through their lower jaw.

**Q/ Snakes have poor vision. what is the function of eyes?**
**ANS/** The eyes of snakes are detecting quick movement.

Jacobson's organ: is a special organ in the mouth of snakes. and it is a sense organ for smelling.



**Pit organ:** is a thermoreceptor found it on the head of snakes between the eye and nostril. It is a heat detecting organ. By using this organ snakes can track and strike warm – blooded prey, even at night or in deep barrows.

**Q/ What is the type of nutrition in snakes?**
**ANS/** snakes are carnivores.

**Q/ Explain how the prey is swelled in snakes?**
**ANS/** Snakes swallow their food whole even when the prey is much larger than their mouth because their jaw unhinges and this structure allows the mouth to open very wide.

**Q/ What is the benefit of their jaw sun hinge of mouth in snakes?**
**ANS/** Because this structure allows the mouth to open very wide so it can swallow their food whole even the prey is much larger than their mouth.

**Q/ Why the snake body stretches?**
**ANS/** Because the ribs of snakes are unattached at one end.

**Q/ What is the benefit of snake body stretches?**
**ANS/** To make room for the food.

- **NOTE:** After a large meal, a snake may go for weeks or months without eating.

**Q/ Why snakes have a bad reputation?**
**ANS/** Because only 200 of the 2500 known species are poisonous. they produce venom.

**Q/ How can snakes kill their prey?**
**ANS/** The snakes produce venom; they kill their prey by injecting them with special teeth called fangs.

**Q/ What is the venom?**
**ANS/** Venom is the poisonous substance produced by special glands located in the head.

## Class: Aves (Birds)

**Q/ Why distribution of birds is wider than other terrestrial vertebrates?**
**ANS/** Because they can fly so they distribute is wider.

**Q/ What are the characteristics of birds?**
**ANS/**

1- They show great diversity.
2- The beaks, foot, wings and tail.
3- The bird body is covered by feathers.
4- Feathers provide insulation and prevent water loss.
5- Feathers function in flight.

6- Their tongues are hard and they have bills without teeth.
7- Their anterior extremities are wings which function in flight.
8- A rib cage protects internal organs.
9- Birds are warm-blooded they maintain a constant body temperature as result of metabolic heat.
10- Birds have no sweat glands and cannot cool the body by perspiring.
11- Eyelids are movable. they are upper, lower, and inner eyelids.

**Q/ What are the benefit of feathers in birds?**
**ANS/** 1-insulation 2- prevent water loss.

**Q/ When does feathers function?**
**ANS/** feathers function in flight.

**Q/ What distinguishes tongue and bills in birds?**
**ANS/** their tongues are hard and bills without teeth.

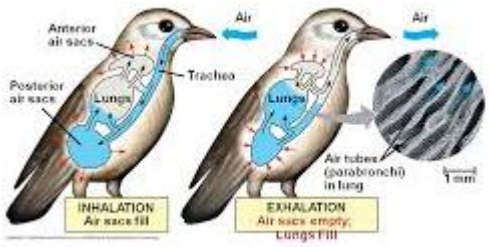
**Q/ Discuss the following statement Bird are warm – blooded.**
**ANS/** They maintain a constant body temperature as result of metabolic heat.

## Respiratory system

**Q/ Where do birds get energy?**
**ANS/** They have very complex systems to take in oxygen and transport it to their cells.

**Q/ What are the characteristics of Respiratory system.**
**ANS/**
1- Birds have very complex systems to take oxygen and transport it to their cells.
2- They have lungs and air sacs throughout their body for breathing.

- NOTE: Birds need high amounts of energy to fly.




**Q/ What is the function of air sacs in birds?**
**ANS/** These sacs cause much of the body cavity to be filled with air.

**Q/ How to breath in birds?**
**ANS/**
1- Air enters the respiratory system through the nostrils.
2- Follows in to the lungs and then to the air sacs.
3- Air sacs increase the oxygen storage capacity of birds.
4- The oxygen taken by the lungs passes to the blood and is carried to the body cells.

## Circulatory system

**Q/ What are the characteristics of heart in the birds?**
**ANS/**

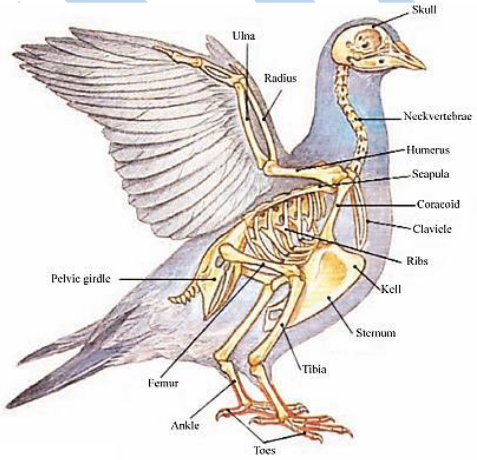
1- Birds have a four – chambered heart.
2- The heart completely separates oxygenated and deoxygenated blood.
3- These two kinds of blood do not mix.

**Q/ Why the heart in birds contains two kinds of blood, but without mixing?**
**ANS/** Because the heart in birds completely separates oxygenated and deoxygenated blood.

## Skeletal and Muscular system

**Q/ What distinguishes birds bones from other bones of other vertebrates?**
**ANS/** The bones of birds have hollow in their structures. No other vertebrates have hollow bones.

**Q/ What is the benefit being that the bones of the birds are hollow?**
**ANS/**
1- The hollow spaces are filled with air and make the bones Light.
2- The bones of birds are both strong and light.



Skeletal system of birds

## Feathers

feathers: are Light weight and flexible which they provide a body covering that protects the skin, supports the bird in flight, and provides insulation from the weather.

**Q/ What is the benefit of feathers for bird's body?**
**ANS/**

1- They provide a body covering that protects The skin.
2- Supports the birds in flight.
3- Provides insulation from the weather.

## Feeding and Digestion

**Q/ Why birds need high amount of food?**
**ANS/** To Satisfy their high energy needs.

**Q/ Why birds cannot chew their food?**
**ANS/** because birds do not have teeth so they cannot chow their food.

**Q/ How birds can take their food and pick it up?**
**ANS/** they take in food using their beaks.

**Q/ Why different shapes of beaks with different types of birds?**
**ANS/** the beaks of birds may have different adaptations according to their feeding strategy.

**Q/ Give examples for difference in bird beaks according to Nutrition?**
**ANS/**

1- Woodpeckers have long, thin, tweezer-like beaks to pull insects from cracks in the in the park of trees.
2- Ducks have wide, flat beaks to strain food from water.
3- Hawks have sharp and hooked beaks to tear the flesh of their prey.
4- The pelican uses its Long, sharp beak for catching fish.

**Q/ Why wood peckers have long, thin, tweezers like beaks?**
**ANS/** To pull insects from cracks in the park of trees.

**Q/ Why Ducks have wide, flat beaks?**
**ANS/** To strain food from water.

**Q/ why Hawks have sharp and hooked beaks?**
**ANS/** To tear the flesh of their prey.

**Q/ why the pelican uses its long, sharp beaks.**
**ANS/** For catching fish.

**Q/ How to grained the food in birds?**
**ANS/** Birds swallow their food whole and grind it down in a structure called a gizzard.

**Q/ How birds feed their offspring?**
**ANS/** They feed offspring by vomiting through their gizzard.

## Reproduction

**Q/ What are the characteristics of Reproduction in birds?**
**ANS/**

1- In birds, fertilization is internal.
2- Embryos develop inside shelled eggs.
3- Birds lay eggs with a hard shell.
4- Bird embryos need to be kept warm to develop.
5- Adult birds incubate their eggs or warm them with their bodies.

**Q/ What is the type of fertilization in birds?**
**ANS/** Is internal.

**Q/ Why birds need to be kept warm?**
**ANS/** Birds need to be kept warm to develop.

**Q/ How to keep the bird embryos warm?**
**ANS/** Adult birds incubate their eggs or worm them with their bodies.

**Q/ What is the benefit of the hard shell in the bird egg?**
**ANS/** The hard shell keeps the growing embryo from being crushed during incubation.

**Q/ What happens after a chick is completely formed?**
**ANS/** When a chick is completely formed it cracks through the shell with a special egg tooth on its beak.

**Q/ What happens to the egg tooth on its beak in chick after the chick hatches?**
**ANS/** This tooth falls off soon after the chick hatches?

**Q/ How to cover the chick after hatches?**
**ANS/** When birds hatch, they are covered only by down feathers and are completely helpless.

**Q/ What are the characteristics of chick after hatches?**
**ANS/** When most birds hatch.
1- they are covered only by down feathers.
2- they are completely helpless.

**Q/ Who is feeding chick birds after hatches and keep them warm.**
**ANS/** their parents keep them warm and bring them food until they are ready to leave the nest.

**Q/ Why do parents feed chick birds when they hatch?**
**ANS/** Because the chick is completely helpless.

## Migration

**Migration:** one of the most interesting behavior of birds, is the instinctive movement of animals, between their wintering grounds and their breeding seasons.

**Q/ How birds find their way?**
**ANS/**

1- Some birds seem to steer by star patterns.
2- Some birds by the angle of the sun.
3- Some birds can detect ultraviolet radiation or the magnetic field of the earth.

| | | | |
|---|---|---|---|
| Reptilia | زواحف | Deep burrows | جحور عميقة |
| Waterproof skin | جلد مانع لمرور الماء | Carnivores | آكلة اللحوم |
| Predators | المفترسات | Bad reputation | سمعة سيئة |
| Coordinate | ينسق | Fangs | انياب |
| Adapted | يتكيف | Aves | طيور |
| Injuries | إصابات | Beaks | مناقير |
| Early period | فترة مبكرة | Feathers | ريش |
| Yolk | مح | Satisfy | يعوض |
| Flexible | مرن | Gizzard | قانصة |
| Their belly | بطنها | Pelican | بجع |
| Prey | فريسة | Helpless | عاجز |
| Snake | افعى | Steer | توجيه |
| Inner ear | اذن داخلية | Trackless | غير مطروقة |

# Class: Mammalian

**Q/ What distinguishes mammalian species from other species?**
**ANS/**

1. Mammary glands (in females)
2. hair covered bodies are characteristics of mammals.

**Q/ What are the characteristics of mammalian?**
**ANS/**

1. Mammary glands (in females).
2. Hair cover the skin and hair originates from the epidermis while hair follicles are in the dermis.
3. They are warm-blooded.
4. Their hearts have two atria and two ventricles.
5. Respiratory system is well-developed.
6. Most have placenta and give birth to Live young.
7. Fertilization is internal but their young developed in different ways.
8. Female mammals have mammary glands which produce milk. They feed their young with milk.
9. Brain function and mobility are developed.
10. Mammal's range in size from 5 cm – 30 meters.

**Q/ What covers the skin in mammals?**
**ANS/** hair covers the skin.

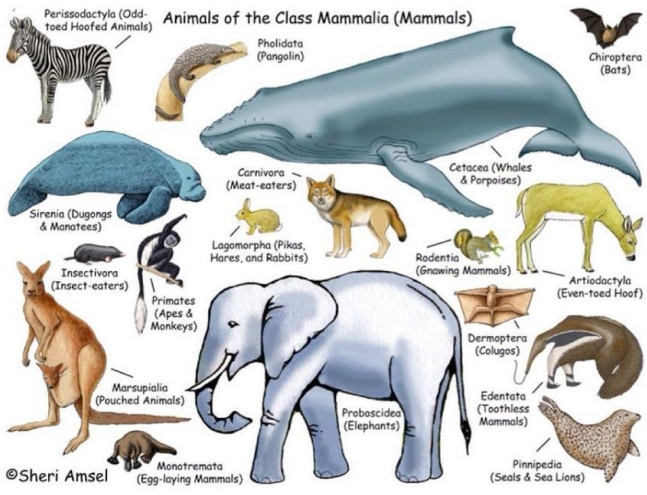
**Q/ What the origin of hair in mammals?**
**ANS/** Hair originates from the epidermis.

**Q/ What is the origin of hair follicle mammals?**
**ANS/** Hair follicle are the dermis.

**Q/ What produces mammary glands in females?**
**ANS/** Mammary glands produce milk.

**Q/ What the benefit of milk produced from mammary glands?**
**ANS/** They feed their young with milk.

**Q/ What is the benefit of placenta in mammalian?**
**ANS/** Give birth to live young.



## Egg-Laying mammals


**Q/what are the characteristics of egg – Laying mammals?**

**ANS/**

1. **They are doing not have a placenta.**
2. **The urogenital opening is cloaca in to the large intestine, the urinary and genital ducts open. They are shared this characteristic with reptiles and birds.**
3. **They are egg-Laying animals.**
4. **They are feed their young with milk produced by mammary glands.**

## Marsupial

**Q/ Why the mother's pouch is the only environment in which it could survive to youngster?**

**ANS/ because the youngster is so tiny at birth that its mother's pouch is effectively. The only environment in which it could survive.**

**Q/ Explain the birth (newborn) marsupials?**

**ANS/**

1. **At birth new born from their mother's reproductive tract.**
2. **Crawl immediately and instinctively in to her pouch.**
3. **Using their forelimbs, young pull themselves along mother's belly by grasping hairs.**
4. **Begin to suckle from her nipples.**

## Tasmanian Devils

**Q/ What are the characteristics of Tasmanian devils?**

**ANS/**

**1- They are large, meat-eating marsupials.**
**2- They are large powerful jaws and teeth.**
**3- They are black in color with a white band.**
**4- They are hairless pink ear.**
**5- Females have aback word opening pouch.**
**6- They are found only in Tasmanian habitats, including:**
**a- Rain forests.**
**b- Eucalyptus forests.**
**c- Farmlands.**
**d- Outer city suburbs.**

7- Nocturnal, spending the daytime sleeping in dens made in:
a- Hollow logs. b- Caves. c- Old wombat burrows which they line with grass and leaves.

## Placental mammals

**Q/ What are the main rules that the placenta plays?**
**ANS/**

1. The transfer of nutrient from the mother to the embryo.
2. In excretion.

**Q/ What is the function of placenta?**
**ANS/**

1. The embryo receives food and oxygen from its mother.
2. Removes waste materials before birth.

Placenta: is a structure found it in placental mammals by which the embryo receives food and oxygen from its mother and removes waste materials before birth.

**Q/ What happens to the young after born?**
**ANS/** after the young are born, females supply their young with milk.

**Q/ According for what grouped the placenta?**
**ANS/** According to:
1- How they eat. 2- How they move. 3- Where they live.

## Flesh eating mammals

**Q/ What are the characteristics of carnivores?**
**ANS/**
1- Flesh-eating mammals.
2- They are predators
3- Most carnivores have sharp, pointed teeth called canines.
4- They have developed sense of smell.
5- They have very strong muscular legs.

**Q/ What is the function of canines in carnivores?**
**ANS/** That they use for tearing meat.

**Q/ What is the number of canines in each decomposition at the base?**
**ANS/** They have canines two in the top set of teeth and two at the bottom.

**Q/ What is the function of powerful jaws and large claws in carnivores?**
**ANS/** To help them on hunting.
**Q/ What is the function of strong muscular legs in carnivores?**
**ANS/** To help them chase other animals.

## Flying mammals

**Bats:** are only flying mammals. They have skin stretched over their arms and fingers, so they form wings.

- There are two types of bats:

1- Fruit eaters. 2- Insect eaters.

**Q/ What are the habitat of fruit-eating bats?**
**ANS/** Fruit-eating bats are found in Tropical areas such as Africa, Australia, India and Asian countries.

**Q/ What is the habitat of insect-eating bats?**
**ANS/** Insect-eating bats live almost everywhere.

**Q/ What is the habitat of vampire bat?**
**ANS/** Found in central and south America.

**Q/ What is the main food for vampire bat?**
**ANS/** Hunts mainly cattle.
**Q/ How the vampire bat feed on cattle?**
**ANS/** Vampire bat bunts mainly cattle. To option blood, the bat bites off a small piece of skin and them laps up the blood.

## Hoofed mammals

**Q/ What do sheep, camels, horses, and rhinoceroses have in common?**
**ANS/** The feet of these animals end in hooves.

**Q/ What are the kind of hooves and give examples of that?**
**ANS/**
1- One kind of hoof has an even number of toes such as deer, hippopotamus, llama, camels, goats, cows and giraffes.
2- Other kind of hoop has an odd number of toes such as horses, rhinoceroses, zebras, and tapirs.

## Mammals with trunks

**Q/ What are the characteristics of mammals with Trunks?**
**ANS/**
1- This group includes only elephants.
2- They are the largest land animals.
3- The trunk is the distinguishing feature of all elephants. It is powerful enough to tear branches from trees.
5- Elephant trunks are capable of such delicate movements.

**Q/ What is the quantity that the elephant can hold it?**
**ANS/** This trunk can hold about 4L of water.

## Aquatic mammals

**Q/ What are the characteristics of Aquatic mammals?**
**ANS/**
1- There are 78 known species of aquatic mammals, like dolphin, whales and dugongs.
2- Whales and dolphin spend their entire lives in ocean and cannot survive on land they can remain under water for long period of time.
3- Dugongs live in shallow water often rivers and canals.
4- Aquatic mammals give birth to live young, which are fed with milk.
5- They are air breathers like other mammals.

**Q/ What is the difference between whales and dolphins and the dugongs in terms of living in water?**
**ANS/**
1- Dolphin and whales spend their entire lives in ocean and cannot survive on land.
2- Dugongs live in shallow water often in rivers and canals.

Whales: are huge aquatic mammals. They Live in ocean. They have lungs like other mammals. They breathe air through a single nostril on the top of the head.

### Dolphin

**Q/ What are the characteristics of dolphin?**
**ANS/**
1- Breath through a blowhole at the top of the head.
2- They are superbly streamlined and can sustain speeds of up to 30 km/h.
3- They dive to depths of more than 300m.
4- They are intelligent. They are able to learn and perform complex tasks in captivity.

- NOTE: some investigations suggest that the animals might be capable of earning a true language and communicating with human beings.

## Primates

**Q/ Give examples for primates?**
**ANS/** Baboon, lemur, gibbon, chimpanzee, orangutan, monkey and gorilla.

**Q/ What are the characteristics of primates?**
**ANS/**
1- The primates have five fingers on each hand.
2- They have five toes on each foot.
3- The fingers are capable of very complicated movement especially grasping objects.
4- Their fingers and toes have flat nails instead of claws.

**Q/where primates live?**
**ANS/**
1- Most primates live in trees.
2- Gorillas and baboon which live in ground.

**Q/ What are the primates feeding?**
**ANS/** Primates eat both plants and meat.

**Q/ How primates move or walk?**
**ANS/** Monkeys and apes walk on all four limbs, but may run upright using only their hind legs.

## Interesting facts about cats

**Q/ Why can`t cats climb head first down a tree?**
**ANS/** Because every claw on cat's paw points the same way.

**Q/ Some cats have survived falls of over 20m?**
**ANS/** Due largely to their (righting reflex). The eyes and balance oranges in the inner ear tell it where it is in space so the cat land on its feet.

**Q/ Why cats hate the water?**
**ANS/** Because their fur does not insulate well when it's wet.

**Q/ Give example for cats likes swimming**
**ANS/** The Turkish van, is one cat that like swimming.

**Q/ Why cat can't chew Large chunks of food?**
**ANS/** Because cats jaw can't move sideways.

**Q/ Why cat can fit through any opening the size of its head?**
**ANS/** Because cat has no collarbone.

# SELF-CHECK
# CHAPTER 9

## B. Review Questions

**1. Give an examples for each group of mammals?**

1- Egg-Lying mammals: The duck-billed platypus, spiny anteater.
2- Marsupial mammals: Marsupial.
3- Tasmanian devils: Tasmanian devils.
4- Placental mammals
   a. (Flesh eating mammals): Lion, tiger.
   b. Flying mammals: Bats
   c. Hoofed mammals: Sheep, Camels.
   d. Mammals with Trunks: Elephant.
   e. Aquatic mammals: Dolphin.
   f. Primates: Baboon, monkey.

**2. Explain the respiratory system of birds.**

a. Birds have very complex system to hake oxygen and transport it to their cells.
b. They have lungs and air sacs throughout their body for breathing.
c. These sacs much of the body cavity to be filled with air.
d. Air enters the respiratory system through The nostril and flows in to the lungs and Then to the air sacs.
e. Dir sacs increase the oxygen storage capacity of birds. The oxygen taken by the lungs passes to the blood and is carried to the body cells.

**4. Explain what frogs do during hibernation.**

- They move to the deep of water and hide themselves in mud.
- Close their mouth and nose and respire with skin and use stored fat in their body as source of energy.
- As spring comes their body temperature increase and start an active life. After their reproductive season start.

## C. True or False

1- When gas diffuses into swim bladder fishes can go deeper. False
2- Adult frog respire by skin. True
3- Reptiles have 4 chambered heart. False
4- Bird are warm blooded animals. True
5- Bats are only flying animals. False

## D. Fill in the blanks

1- Flesh eating mammals are called as carnivores.
2- Embryo receives food and oxygen from its mother by placenta in placental mammals.
3- In bird's embryo grows in shelled egg.
4- Air sacs increase the oxygen storage capacity of birds.
5- Reptiles are cold – blooded animals like snake and crocodile.

## E. Multiple choice

1. Which of the following is false for vertebrates? B: Most of them hermaphrodite.
2. which of the following is a hoofed mammal? D: Zebra.
3. amphibian have three kinds of respiration in their life cycle, which of the following in not one of them? C: Lungs.
4. which one is false for reptiles? C: They do skin respiration.
5. The beaks of birds have different types according to. C: Feeding strategy.

# CHAPTER 10
# INTERACTIONS OF LIVING ORGANISMS

## Ecology

**Ecology:** is the study of the interactions between organisms and their environment.

**ecosystem:** is all the living and nonliving factors that surround an organisms and includes the biotic (living) Community, together with the associated a biotic (nonliving) Components.

**Consumers:** are hetero trophic organisms that cannot produce their own food.

- **Four types of consumer can be identified according to their food source:**

1. **Herbivores:** they called primary consumers such as a sheep, they eat plants directly.
2. **Carnivores:** are secondary or tertiary consumers, such as lions, feed on other animals.
3. **Omnivores:** are feed on both plants and animals, such as humans.
4. **Decomposers:** are organisms of decay such as Bacteria, fungi.

**Interaction:** is a key idea in ecology. No organisms are completely self-sufficient. Organisms depend upon other organisms and upon the environment for survival.

## Food Chain

**Food chain:** is the series of steps through which energy is transferred from the sun to organisms (producers, consumers, decomposers) in an ecosystem.

**Q/what is the main source of energy?**
**ANS/** The main source of energy is the radiant energy from the sun.

**Q/ What plants represent in the food chain?**
**ANS/** Plants and other photosynthetic organisms produce food and oxygen.

**Q/ What animals and fungi represent in the food chain?**
**ANS/** Animals, fungi and other non-photosynthetic organisms must consume other organisms for food.

**Q/ Explain how birds relate to the environment Through the food chain?**
**ANS/**

1. Birds in a forest interacts with plants it eats.
2. Birds interacts with predators that eat it.
3. Birds interact with plants it uses for cover or shelter.
4. Birds interact with insects that share its nest.
5. Birds interacts with other animals that use its abandoned nest for shelter.
6. Birds interacts with the bacteria that live on its skin.

## Extinction

**Q/ What is the reason for changing the structure of the ecological and changing the ecological balance in the world?**
**ANS/ Human activities day after day change the ecological balance in the world and changing the ecological balance in the world.**

**Q/ What is the result of the change in environmental balance and the result of human activity?**
**ANS/ Reduces the natural habitat of many wild animals.**

**Q/ What is the behavior of wild animals after environmental changes?**
**ANS/ Some animals can migrate to other places, but many other plants and animals cannot.**

**Q/ What is the result of the survival of plants and animals in an unbalanced environment?**
**ANS/ Remaining in the same place leads to their extinction.**

**Q/ When there is a reduction in the biological diversity of worldwide?**
**ANS/ When the last member of species dies, that species becomes extinct.**

**Q/ When called wild being extinct?**
**ANS/ When the last member of species dies, that species becomes extinct.**

**Q/ What do we mean by a threatened species?**
**ANS/ When extinction is less eminent but the population is quite low, a species is called a threatened species.**

## Greenhouse effect

**Q/what is the effect of the production of atmospheric pollutants?**
**ANS/**

1. **Traps solar heat in the atmosphere.**
2. **Affect the earth's climate.**

**Q/ What is the effect carbon dioxide in the air and the earth?**
**ANS/ Carbon dioxide ($CO_2$) and other greenhouse gases cause the air to retain heat, which warms the earth.**

**Q/ What is the effect of increasing the CO2 and other greenhouse gases in the atmosphere?**
**ANS/ Is causing concerns about major climate changes that occur during the next century.**

**Q/ What are the products of fossil fuel combustion?**
**ANS/ The combustion of fossil fuels produces pollutants**
**1- $CO_2$**
**2- Other greenhouse gases like Methane, Nitrogen oxide, CFCs and Ozone.**

**Q/ Give examples for greenhouse gases?**
**ANS/**
**1- $CO_2$ 2- Methane. 3- Nitrogen oxide. 4- CFCs 5- Ozone.**

## Effects of global warming

**Q/ What are the effects of global warming?**
**ANS/**
**1- Rise in sea level, changes in precipitation patterns.**
**2- The death forests.**
**3- The extinction of animals and plants.**
**4- Problems in agriculture.**

**Q/ What is the result of the effects of global warming on peoples?**
**ANS/ It could result in the displacement of thousands or millions of people.**

# SELF-CHECK
# CHAPTER 10

## B. Review Questions

**1. Draw a simple food web.**

**2. Explain why organisms not completely self-sufficient.**
**ANS/ Because organisms (consumers) are heterotrophic organisms that cannot produce their own food. So these organisms depend upon other organisms and upon the environment for survival.**

**3. Explain environmental problems.**
**ANS/ The balance of environmental system contains the continuity of living and nonliving components there was a balance between input matter and output matter like gases, water, salts, energy and various wastes. Human activities increase the manufactured substance that pollute our environment. there are many types of environmental pollution.**

**4. Explain how organisms become extinct.**
**ANS/ When the last member of a species dies that species become extinct.**

## C. True or False

**1- sheep is a carnivore organism. False**
**2- Oxygen and other greenhouse gases cause warm the earth. False**
**3- Global warming may cause arise in sea level. True**
**4- A reduction in biological diversity occurring worldwide. True**
**5- the main source of energy is sun. True**

## D. Fill in the blanks

1- Carnivores are animals like lions.
2- Interaction is a key idea in ecology.
3- Decomposers are organisms of decay.
4- $CO_2$ and other gases like methane, nitrogen oxide, are greenhouse gases.

## E. Multiple choice

1. C
2. C
3. C
4. B

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