PHYLUM: CHORDATA

General Characters and Out-Line Classification

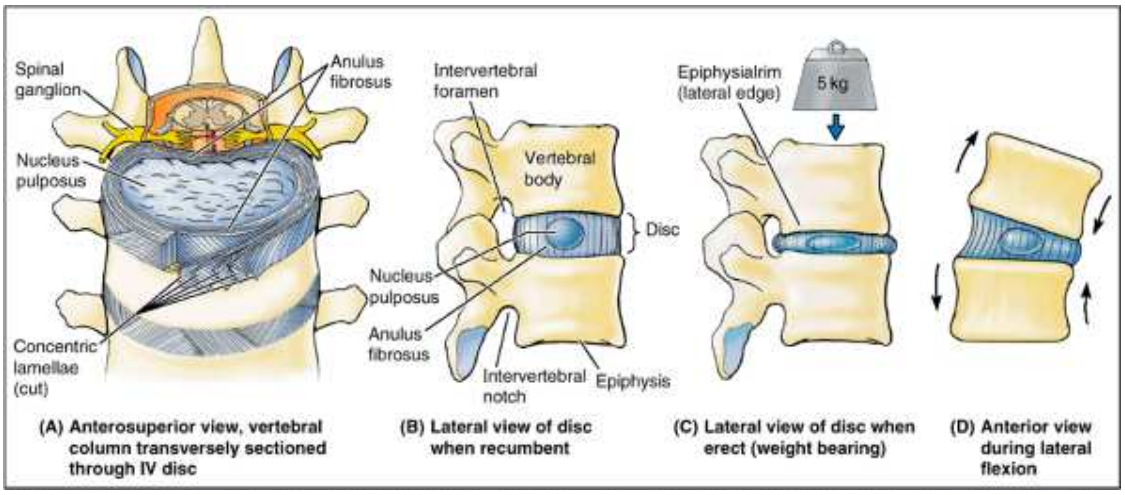
Very Short Answer Questions

1. What is the function of Notochord?

Ans. Notochord is a stiff, elastic, and rod like structure present mid dorsally.
Notochord is derived from chordamesoderm
Notochord gives support to the body. It provides space for attachment of the muscles.

2. What are nuclei pulposi?

Ans. Notochord is represented as remnants called nuclei pulposi in adult mammals.
These are present as a small core of gel-like material within each intervertebral disc in the vertebral column of mammals.



3. Mention two embryological similarities in deuterostomes?

Ans. Embryonic similarities in deuterostomes are

a) Radial and Indeterminate cleavage
b) Formation of coelom from archenteron as mesodermal pouches
c) Blastopore becomes anus. Formation of mouth secondarily.

4. What is paedomorphosis?

Ans. The retention of evolutionary juvenile or larval features in the adult animal is called paedomorphosis.
Larvaceans of Urochoradata exhibit paedomorphosis.

5. What is the unique feature of the heart of tunicates?

Ans. In tunicates (Urochordates), the pulsation of the heart is peculiar and periodical reversal of the blood-flow.
So the heart of the tunicates alternately functions as systemic heart and branchial heart.

6. What is endostyle? What is its function?

Ans. Endostyle is a glandular ciliated groove present on the floor of the pharynx in Protochordates.
Endostyle helps in filter feeding.
The thyroid gland is evolved from the endostyle.

7. Name the bioluminescent tunicate. To which class does it belongs?

Ans. *Pyrosoma* is the bioluminescent tunicate.

Pyrosoma emits the strongest light among the marine organisms.

It belongs to the class Thaliacea of subphylum Urochordata.



Pyrosoma

8. Name the class that includes tunicates without atrium. Give an example.

Ans. The members of class Thaliacea are without atrium among tunicates.

*Oikopleura i*s an example.

9. What is anadromous migration? Give an example.

Ans. Migration of animals from seawater to river for spawning during breeding seasons is called anadromous migration.

*Petromyzon (*lamprey) of the class Cyclostomata shows anadromous migration.

10**. Distinguish between amniotes and anamniotes.?**

Ans. Terrestrial vertebrates possess sac-like membrane called amnion and fluid filled called amniotic fluid to protects the embryos.

Eg.,Reptilia, Aves & Mammalia.

Vertebrates whose embryos do not have an amnion are called anamniotes.

Eg. Fishes and amphibians.

11. Name the class that includes extinct jawless vertebrates. Give an example.

Ans. Jawless extinct vertebrates belong to the class Ostracodermi

Ex. *Cephalaspis.*

12. Distinguish between Ichthyopsida and Sauropsida.

Ichthyopsida	**Sauropsida**
1. These are first tetrapods .	These are bipedal animals.
2. Their early development is in water.	Their development is terrestrial.
3. In larval stages, breathing occurs by gills and in adult stages lung breathing.	Lung breathing
4. Amphibians and fishes	Birds and reptiles

13. Name the class that includes extant jawless vertebrates. Give an example.

Ans. Jawless extant vertebrates belong to the class Cyclostomata .

Eg. *Petromyzon. Myxine.*

14. Distinguish between Acraniata and Craniata.?

Ans.

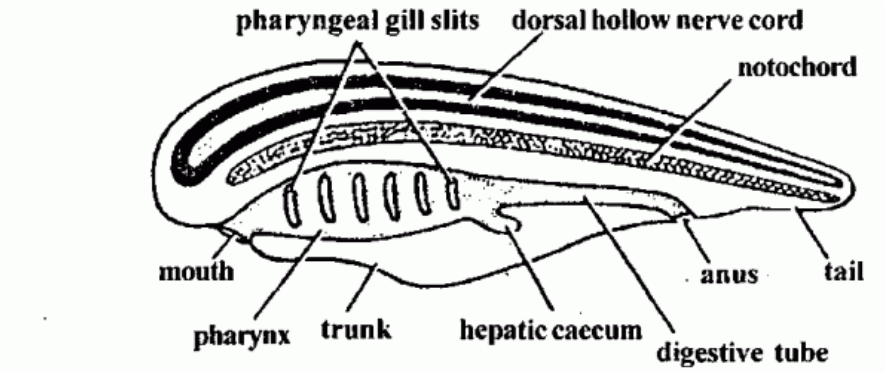
Acraniata	Craniata
1. It includes Cephalochordata.	1. It is also known as vertebrata.
2. Notochord extends into head up to rostrum.	2. Notochord is replaced by vertebral column.
3. Heart is absent.	3. Heart is chambered.
4. cranium.	4. Brain is covered by cranium.
5. Excretory organs are protonephredia.	5. Extretory organs are Mesonephric or Metanephric kidneys.
6. Locomotion by fins.	6. Locomotion by fins or limbs.

Short Answer Questions

1. Explain the fundamental chordate characters.

Ans. Animals with notochord are considered as chordates.

All the chordates show four fundamental features. Notochord, dorsal tubular nerve cord, pharyngeal gills slits and post-anal tail.



1) Notochord or Chorda Dorsalis :

- It is a stiff-elastic rod like structure present between the dorsal tubular nerve cord and alimentary canal.
- It is derived from chorda mesoderm.
- It is made by vacuolated cells which are covered by two sheaths.
- The outer sheath is elastic connective tissue.
- The inner sheath is fibrous connective tissue.
- In all chordates it is present in embryonic stages.
- In lower chordates like *Amphioxus* the notochord persists throughout life. In vertebrates the notochord is replaced by vertebral column.
- In adult mammals remnants of notochord appear as 'Nuclei pulposi'. Nucleus pulposus is a small core of gel-like material with in each intervertebral disc in the vertebral column.

2) Dorsal Tubular Nerve Cord :

- It is dorsal to notochord outside the coelom. It is derived from neural ectoderm.
- It is single, dorsal, tubular, fluid-filled and nonganglionated.
- It is degenerate in adult urochordates.

3) Pharyngeal Gill slits or Branchial Clefts:

- They are a series of paired perforations present on the wall of the pharynx.
- They help in filter feeding mainly in protochordates.
- In higher aquatic chordates, the walls of these slits bear vascular gills and serve for respiration.
- Pharyngeal slits are present throughout the life in protochordates, fishes and some amphibians.
- In reptiles, aves and mammals some pharyngeal pouches form transitory slits during development.

The out lining of gill is ectodermal in while its core is endodermal in origin.

4) Post-anal Tail:

- Tail is post-anal. Tail has no coelom and viscera, but having muscles, nerve cord and notochord.

2. Discuss the ancestry of chordates.

Ans. Several theories attempted to explain the origin of chordates.

1) Echinoderm Ancestry :

- According to Garstang, chordates have evolved from the auricularia larva of Holothuroidea in the phylum Echonodermata.
- Echonodermata shows many similarities with chordates such as radial and indeterminate cleavage, fate of balstopore, coelom formation, mesodermal endoskeleton etc.
- Adoral band of feeding cilia near the mouth of auricularia larva develops into an endostyle.
- Circumoral band of cilia present across the body surface is useful in locomotion of larva. The right and left halves of circumoral ciliated band were brought dorsally where they met together with nerve tract and form a dorsal nerve cord.
- This larval has undergone neoteny and evolved into a chrodate.

2) Common Ancestry for Deuterostomes :

- According to many zoologists, echinoderms, hemichordates and chordates show similarities in their proteins, cleavages, fate of balstopore, coelom formation etc.
- Bipinnaria larva of certain echinoderms is similar to Tornaria larva of Hemichordates.
- Hemichordates and some echinoderms have Phosphorcreatine in addition to phosphoarginine is usually present in non-chordates. All these features suggest a common ancestry for all the deuterostomes.

3. Discuss the ancestry of vertebrates.

Ans. According to Garstang, N.J. Berrill and Romer the adult ascidians reflect the primitive filter-feeding condition of ancestral chordates. Larva of Tunicates had undergone neoteny and produced paedomorphic adult. The sessile adult stage was lost and a new group of free-swimming animals appeared.

Evollution of vertebrates occurred in three major steps:

1) Prevertebrate : It is suspension feeder where cilia are used to produce water current .
2) Agnathan : Jaws were absent but producing water current by muscular pharynx for food collection.
3) Gnathostome : Jaws and snatched the prey form surrounding water .

4. Mention important general characters of Urochordata. ? *****

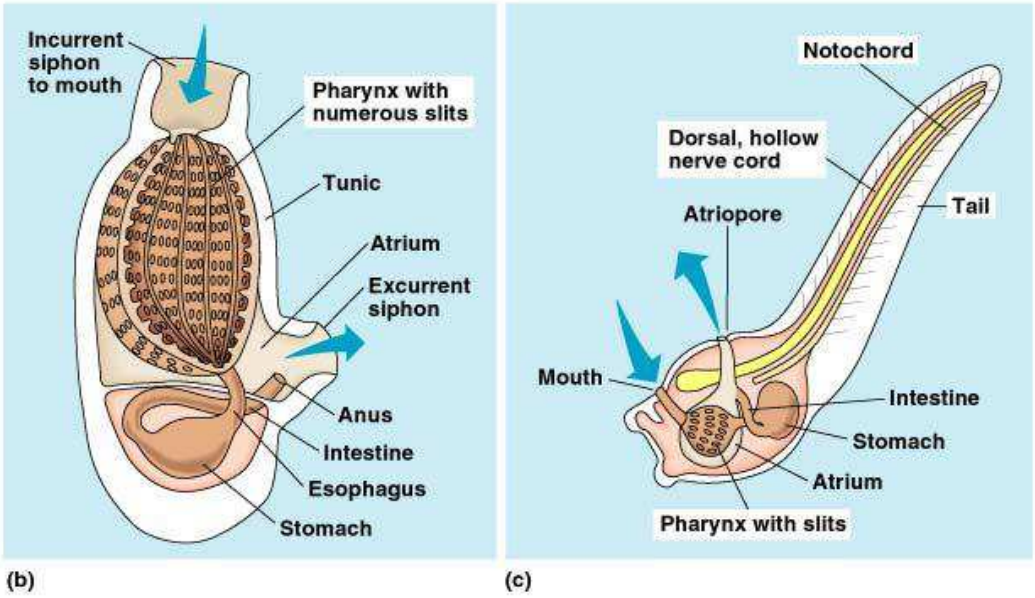
Ans.

- These are marine, sedentary or pelagic marine animals.
- The body is covered by tunic or test with tunicin similar of cellulose.
- Adults are degenerated. Notochord is present only in the tail of larva but absent in the adult. Dorsal nerve cord is reduced to dorsal ganglion in adults.
- Endostyle present on the ventral wall of the pharynx helps in filter-feeding.
- Circulatory system is of open type .
- Heart is tubular and show reversal flow of blood periodically and thus the heart functions alternately as systemic heart and branchial heart.
- Vandocytes are the blood corpuslces with vanadium chromogen with vanadium extracted from seawater.
- Excretions are by neural gland, nephrocytes.
- These are hermaphrodites. Fertilization is cross and usually external.
- Development usually includes a tailed larval stage that under goes retrogressive metamorphosis.

5. Explain the classification of Urochordata upto classes.

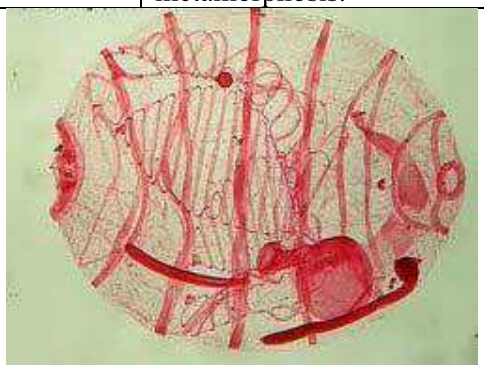
Ans. Urochordata classified into three classes.

1. Ascidiacea, 2. Thaliacea and 3. Larvacea.

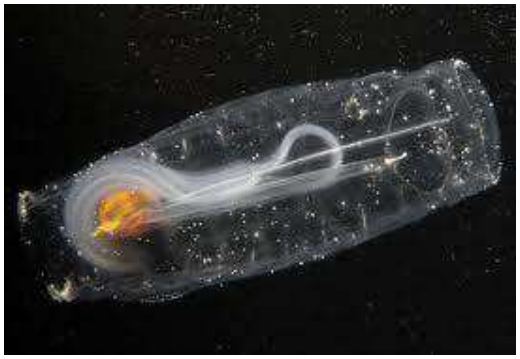


CHARCTER	ASCIDIACEA	THALIACEA	LARVACEA
1.General name	Sea squirts --*Botryllus ...Ascidia,Herdmania*,	*Salpa, Doliolum, Pyrosoma* (bioluminescent)	*Oikopleura*
2. Nature	Sessile	Pelagic	Pelagic
3. Habitat	Solitary (*Ascidia,Herdmania)* Colonial (*Botryllus)*	Solitary (*Salpa*, *Doliolum*) Colonial (*Pyrosoma*)	All are solitary
4. Test	Permanent test	Permanent & transparent	True test is absent. A loose gelatinous house (temporary)

5.Apertures	Branchial aperture is anterior. Atrial aperture is dorsal	Branchial aperture at anterior. Atrial aperture is at posterior end	Atrium and atrial aperture are absent.
6.Pharynx & gill-slits	Large pharynx with numerous gill-slits	Smaller ..fewer gill slits	Two pharyngeal gill-slits
7.Development	Tailed larval stage Shows Retrogressive metamorphosis.	Alternation of generations shown by *Salpa* and *Doliolum*	Paedomorphic.



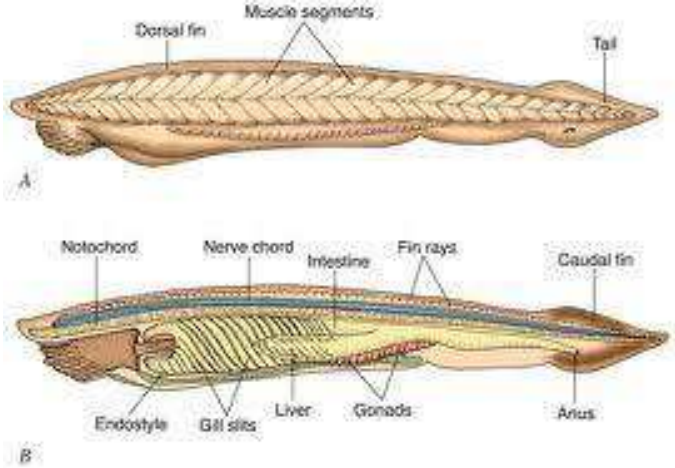
Doliolum



SALPA

6. Mention the general characters of Cephalochordata.?

Ans. 1.Cephalochordata are small fish-like animals.
2. Median fins are present. But paired fins are absent.
3. The notochord extends the entire length of the body to the tip of the snout (Hence Cephalochordata).
4. They have a dorsal, tubular neural tube without a defined brain.
5. Pharynx has an endostyle concerned with ciliary feeding.
6. Enterocoelom in present.
7. Excretory organs are paired protonephredia with solenocytes .
8. Unisexual. Many pairs of gonads but without gonoducts.
9. Fertiization is external. Development is indirect with ciliated larva.
E.g. *Branchiostoma (= Amphioxus), Asymmetron.*



BRANCHIOSTOMA

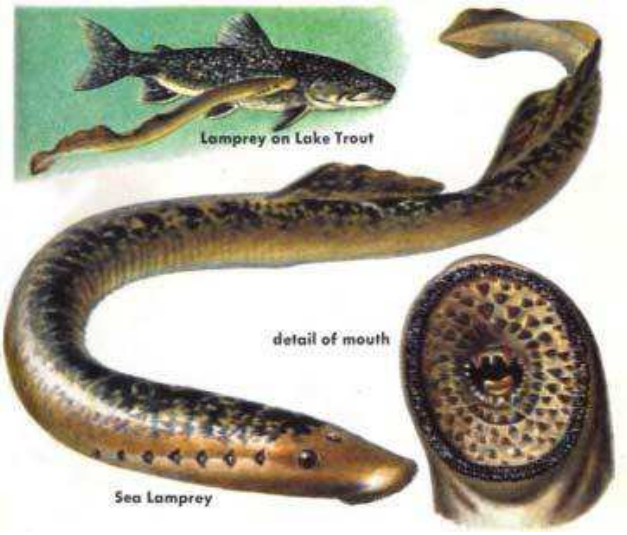
7. Mention the general characters of Cyclostomata. Give two examples.

1. These are extant jawless vertebrates.
2. Body is long and eel like.

3. The suctorial mouth is ventral and round.
4. Skin is scale less and contains unicellular mucous glands.
5. Endoskeleton is cartilaginous.
6. Notochord persists through out the life.
7. They have 5-16 pairs of internal gills.
8. Heart is two chambered, having one atrium and one ventricle.
9. Renal portal system is absent.
10. Mesonephric kidneys.
11. Cranial nerves are 8 pairs in *Myxine* and 10 pairs in *Petromyzon.*
12. Gonad is single and is without gonoduct.
13. Development is direct or indirect.

E.g. a) *Petromyzon,:* It is Lamprey. Its larva is ammocoete which resembles *Branchiostoma* of cephalochordate.
Petromyzon exhibits anadromous migration (migration from sea water to rivers for spawning.

b)*Myxine (*Hag fish or slime eel)



PETROMYZON



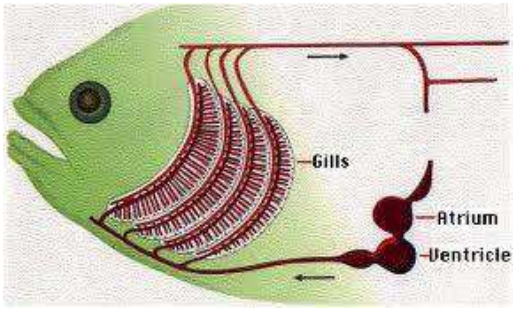
MYXINE

Pisces

Very Short Answer Questions

1. What is branchial heart? Name the gnathostomes with branchial heart.

Ans. Heart in fishes sends blood always towards the gills. So this type of heart is called branchial heart.



Ex. Pisces or fishes are the gnathostomes with branchial heart.

2. What are neuromast organs of fishes? What is their function?

Ans. Lateral line sense organs or neuromast organs in fishes are present in lateral line canals which open at intervals by pores. They are rheoreceptos and sensitive to water currents.

3. In which period did placoderms originate? Given an example.

Ans. Placoderms originated from Ostracoderms during Silurian period.
Placoderms are considered as ancestors of Chondrichthyes.
Ex. *Bothryolepis* and *Dunkelosteus.*

4. What are claspers? Name the class of fishes in which claspers are present?

Ans. In some male fishes, Pelvic fins are provided with claspers. These are useful for copulation.
Chondrichthyes is the class in fishes with claspers.

5. Write two differences between the gills of cartilaginous and bony fishes.?

Ans. **Cartilaginous fishes:** Five to seven pairs of gill-slits are usually present.
Gills are not covered by operculum.
Spiracles often occur in front of gill-slits.

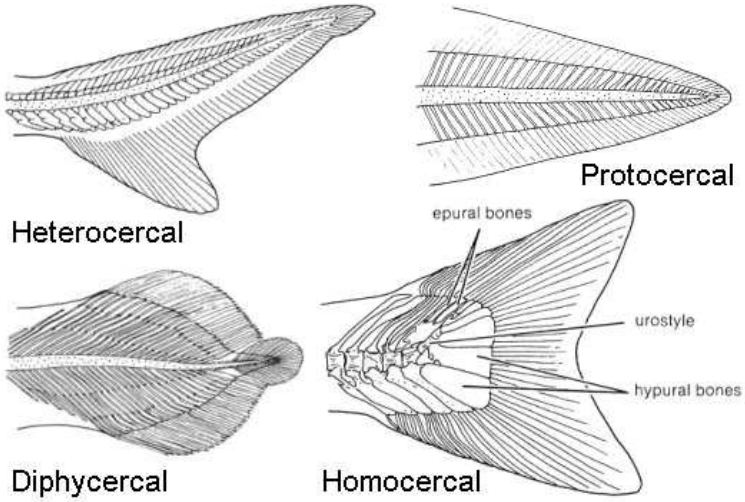
Bony fishes: Four pairs of filiform(thread like) gills are present.
Gill-slits are covered by operculum.
Spiracles are absent.

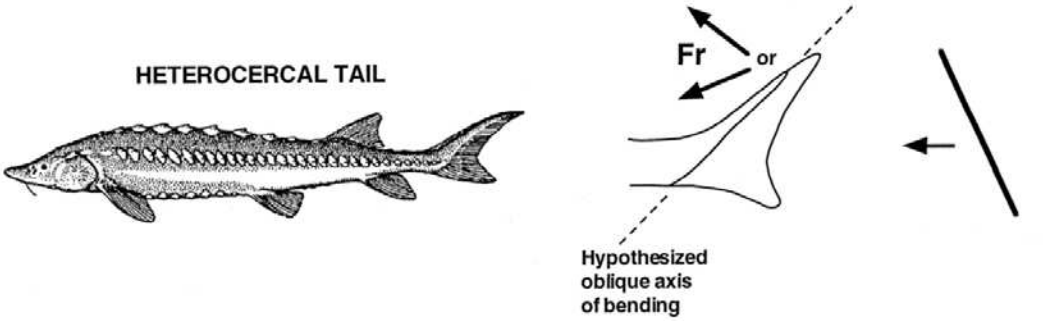
6. Distinguish between homocercal and heterocercal caudal fins.

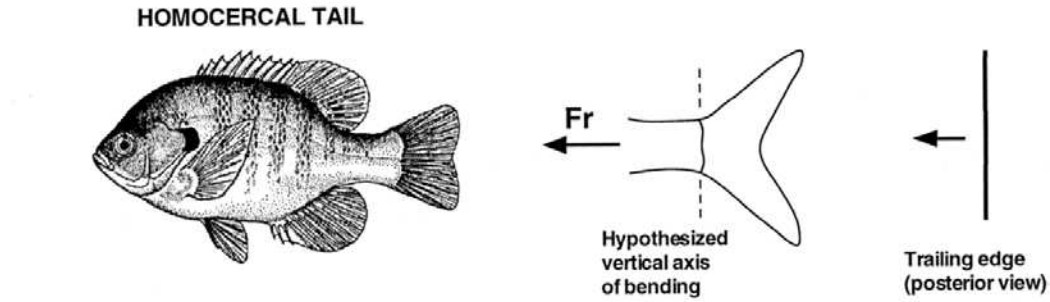
Ans. **Homocercal :** Caudal fin is equally divided into upper and lower lobes externally. But unequal internally due to the extension of vertebral column into the upper lobe.
Ex. Teleosts.

Heterocercal: Tail fin is asymmetrical consisting of a large upper lobe and a small lower lobe.

It is asymmetrical internally also as the vertebral column extends into large upper lobe. Ex. Chondrichthyes.







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7. Mention the generic name of electric ray. Name the structures that are modified into electric organs in it

Ans. *Torpedo* is the generic name of electric ray.

Dorsal muscles are modified into electric organs.

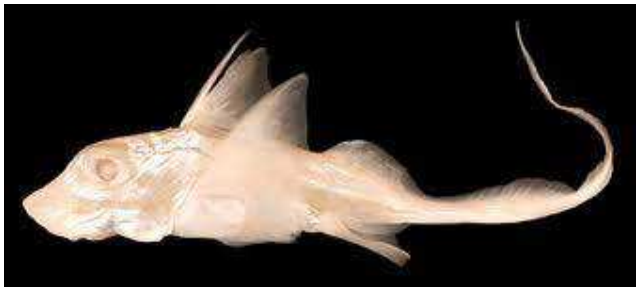
8. Distinguish between pleurotrematic and hypotrematic elasmobranches.

Pleurotrematic elasmobranchs	**Hypotrematic elasmobranchs**
Lateral gill slits are present e.g., Sharks of Elasmobranch fishes Spiracles are small	Ventral gill slits are present. Rays and skates of Elasmobronchii Spircles are larger and dorsal.

9. What is the other name for Holocephali? Give an example for Holocephali?

Ans. Bradyodonti is the other name of Holocephali.

Ex. *Chimaera* (rat-fish),



10. Why Acanthodii got that name? Give an example for Acanthodii.

Ans. These are the oldest known gnathostomes fishes.

Fins are supported by large spines. So they are called Acanthodii (acanthus = spines).

They became extinct in Permian period.

Ex. *Climatius* , *Diplacanthus.*

11. Name the subclass of Osteichthyes to which the oldest know gnathostomes belong. Give an example.

Ans. The oldest gnathostomates belong to the subclass of Acanthodii in the class Osteichthyes.

Ex. *Climatius.*



12. What is living fossil? Name the fish that is considered a living fossil.

Ans. *Latimeria chalumnae* (Coeloacanth fish) is considered as living fossil.

It is described as a living fossil as it has been persisting since Jurassic period with vey little evolutionary changes.



13. Which fishes are called uncles of Amphibia? Why?

Ans. According to Romer, Dipnoi (lung fishes) fishes are the uncles of Amphibia.
Reason: Dipnoi fishes are closely related to the ancestors of amphibians, i.e. Osteolepids

14. Which infraclass includes primitive ray-finned fishes? Name the type of caudal fin present in them.

Ans. Chondrostei (Chondros = cartilage, osteon = bone) is the infraclass includes primitive ray-finned fishes.
Heterocercal caudal fin is present in them. But Bichir has diphycercal type.
Ex. *Polypterus (*bichir) and *Acipencer* (sturgeon).

15. Which infraclass includes intermediate ray-fined fishes? Name the type of caudal fin present in them.

Ans. Holostei (holos = whole, osteon = bone) is the infraclass includes intermediate ray-finned fishes .Caudal fin is abbreviated heterocercal.
Ex. *Amia* (bowfish), *Lepisosteus* (garpike).

16. Which infraclass includes advanced ray-finned fishes? Name the type of caudal fin present in them.

Ans. Teleostei (telos = end, osteon = bone) is the infraclass includes advanced ray-finned fishes.
Homocercal type of caudal fin present in them.
Ex. *Exocoetus* (flying fish), *Hippocampus* (sea horse), *Echeneis* (sucker fish)

17. What is catadromous migration? Give an example you have studied.

Ans. Fishes which live in fresh water and go to sea for the purpose of breeing are called catadromous fishes and the migration is called catadromous migration.
Ex. *Anguilla* (fresh water eel).

18. Mention the generic name of suckerfish. Which structure is modified into sucker in it?

Ans. *Echeneis* is the generic name of suckerfish. It lives as ectocommensal on sharks.
First dorsal fin is modified into sucker.

Short Answer Questions

1. Mention eight important general characters of Pisces.

Ans.
1. Fishes are poikilothermi, aquatic vertebrates.
2. Body is streamlined and without neck.
3. The exoskeleton consists of dermal scales and bony plates. Scales are different types like placoid, cycloid, ctenoid and ganoid .
4. Dorsal, ventral and caudal fins are unpaired or median. Paired fins or lateral fins are pectoral and pelvic fins.
6. The skeleton is made up of cartilage or bone. Vertebrae are of amphicoelous type. Ribs are present. Sternum is absent. Pectoral and pelvic girdles give support to fins.
7. Lateral line sense organs or neuromast organs are present on the body. They are sensitive to water currents and known as Rheoreceptors.
8. Respiration is performed by 4 to 7 pairs of gills.
9. Heart is two chambered. The heart contains deoxygenated blood and hence it is known as venous heart and shows single circulation. Heart is branchial type as it sends blood always to gills.

10. Functional adult kidney is mesonephros.
11. Brain and spinal cord are covered by single meninx, Meninx primitiva. Cranial nerves are 10 pairs.
12. Development is direct in viviparous and indirect in oviparous. Anamniotes.

2. Mention the general characters of Chondrichthyes.

Ans. 1. Their endoskeleton is entirely cartilaginous and known as cartilaginous fishes.
2. Mouth and nostrils are ventral.
3. Heterocercal caudal fin is present.
4. In intestine scroll valve or spiral valve is present.
5. Four to seven pairs of gill-slits are present. Gills are lamelliform
6. They excrete urea. Urotelic.
7. In males the pelvic fins are provided with claspers for copulation.
9. Fertilization is internal.
10. Most sharks and all a rays are viviparous with yok sac placental for nourishment of embryo.

3. Mention differences between Elasmobranchii and Holocephalii. Give example for each.?

Ans.

Elasmobranchii	**Holocephalii**
1. It includes sharks, rays and skates	1. rat fih is present
2. Placoid scales are present.	2. Skin is scale less in adult.
3. Digestive tract opens into cloaca.	3. cloaca is absent.
4 Spiracles may be present.	4. Spiracles are absent.
5. Five to seven pairs of gill slits are present.	5. Four pairs of gill slits are present.
6. Operculum is absent.	6. Gills are covered by operculum.
7 Male usually has claspers for copulation,	7. Males with claspers.
e.g., *Scoliodon, Myliobatis, Torpedo*	*E.g., Chimaera* (rat-fish)

4. Write notes on Elasmobranchii.?

- Elasmobranchii of the class chondrichthyes includes sharks, rays.
- These are cartilaginous fishes.
- These are exclusively marine.
- A spiracle is present in front of the first gill slit.
- Mouth and nostrils are ventral in position.
- 5-7 pairs of gills are present. Operculum is absent.
- Body covered by minute Placoid scales or dermal denticles.
- Intestine has a spiral valve. Alimentary canal opens out by cloaca.
- Caudal fin is heteroceral.
- Males are provided with claspers.
- Most of sharks and all rays are viviparous.
- Sharks are pleurotrematic with lateral gill-slits while rays are hypotrematic with ventral gillslits.

5. Mention eight differences between Chondrichthyes and Osteichthyes?

Ans.

Chondrichthyes	Osteichthyes
1. Cartilaginous fishes.	1. Bony fishes.
2. Caudal fin is heterocercal.	2. Caudal fin is diphycercal or Homocerecal.
3. Skin is covered by placoid scales.	3. Skin is covered by ganoid, cycloid and ctenoid.
4. Endoskeleton is entirely cartilaginous.	4. Endoskeleton is bony in nature.
5. Mouth and nostrils on ventral side.	5. Mouth is usually terminal.
6. Digestive tract opens into cloaca.	6. Alimentary canal opens out by anus. Lung fishes have cloaca.
7. Gill-slits are naked without operculum.	7. Gill-slits are covered by operculum.
8. Spiracles are present in front of gills.	8. Spiracles are often absent.
9. Air bladder is absent.	9. Air bladder or swim bladder is present.
10. 4-7 pairs of gill-slits. Gill are Lamelliform (plate like)	10. 4 pairs of gills. Gills are filiform (thread like)

6. Write the general characters of Osteichthyes.

Ans.
1. This includes bony fishes.
2. Endoskeleton is bony in nature.
3. Mouth is usually terminal.
4. Alimentary canal opens out by anus. But lung fishes have cloaca.
5. Ammonotelic.
6. Four pairs of filiform (thread like) gills are present and they are covered by a bony operculum.
7. Scales are cycloid or ctenoid or ganoid.
8. Air balder is present.
9. Tail is homocercal or diphycercal.
10. Claspers are absent.
11. Spiracles are often absent.
12. Fertilization is generally external.

7. What is a living fossil? Explain about the fish that is considered a living fossil?

- **Any animal which has been persisting since it origin with very little changes is considered as living fossil.**
- *Latimeria chalumnae* is considered a living fossil. Since it has been persisting since Jurassic period with very little changes.
- A living marine specimen was caught in 1938 in South Africa it was steel-blue colour and 1.5 m long in length.
- Its characteristic features are three-lobed diphycercal tail.

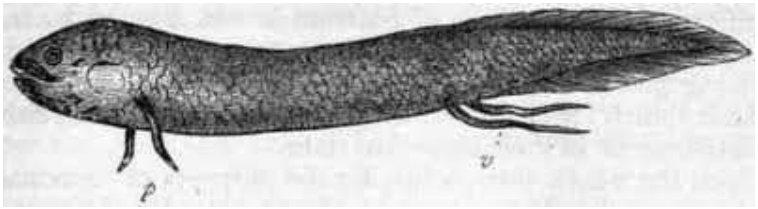
► It is viviparous..

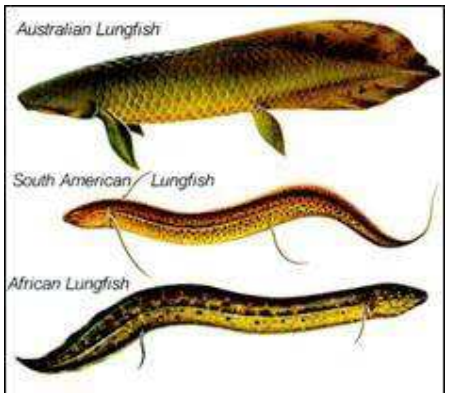
8. Write short notes on Dipnoi.

- ❖ It includes lung-fishes, which are amphibious.
- ❖ The body is covered by cycloid scales.
- ❖ Dorsal and ventral fin are confluent with caudal fin.
- ❖ Internal nares are present.
- ❖ Air bladder in these fishes is modified into one lung in *Neoceraodus* and two lungs in *Protopterus and Lepidosiren*,.
- ❖ They exhibit discontinuous distribution.
- ❖ Romer described them as "uncles of Amphibia" as they are closely related to the ancestors of amphibians i.e. Osteolepids.

Ex. a)*Neoceratodus* (Burnett and Mary rivers in Australia),
b) *Protopterus* (rivers of tropical Africa)
c) *Lepidosiren*. (rivers of tropical South America)


protopterus


Lepidosiren



9. Mention the general characters of Actinopterygii. Name the three infra-classes of Actinopterygii giving one example each.

Ans. 1. These are commonly called ray-finned fishes. Paired fins are supported by dermal rays.
2. These are bony fishes, without internal nostrils.
3. The paired fins lack fleshy lobe and are supported by dermal rays.
4. Caudal fin is homocercal.
5. The air bladders act as hydrostatic organ.

Actinopterygii are divided into three infraclasses.
(1) Chondrostei,

(2) Holostei and
(3) Teleostei.

The comparison of three infraclasses of subclass Actinoptrygii is

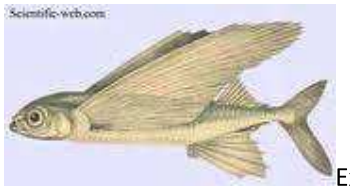
Character	Chondrosei	Holostei	Teleostei
1.Naure & habit	Primitive. freshwater	Intermediate. freshwater	Advanced. All types of water
2.endoskeleton	Cartilaginous	Modertely ossified	Completely ossified
3.scales	Ganoid	Ganoid/cycloid	Cycloid/ctenoid
4.caudal fin	Heterocercal. Bichir has diphycercal	Abbrevited Heterocercal	Homocercal
5.mouth	Large	Small	Smaller
6.spiral valve in intestine	Present	Vestigial	Absent
7.spiracles	Present	Absent	Absent
8.air bladder 9. exmples	Acts as lung and connected wih gut Polypterus (bichir) Acipencer (Sturgeon)	Hydrostatic and is connected with gut Amia (bowfin) Lepisosteus (garpike)	Not connected with gut. Hydrostatic. Exocoeus (flying) Hippocampus (sea horse) Echeneis (sucker fish) Anguilla (eel)







Amia



Exocoetus



Anguilla

Amphibia

Very Short Answer Questions

1. Give two important characters of Apoda.

Ans. 1. Apodans are limbless, tailless amphibians.
2. Skin is covered by minute dermal scales.
3. Eyes are very small and nonfunctional buried beneath the skin or under skull bones.
4. In males, cloacal wall is eversible and acts as a copulatory organ.
5. Sensory tentacle between nostril and eye.

2. What are perennibranchiate Urodeles? Give an example.

Ans. Gills and gill-slits persist in adult stage is called perennibranchiate.
Ex. *Necturs* (mud puppy) and *Siren* (mud eel) , *Proteus* (cave-dwelling)



Proteus

3. What are the subclasses under which extinct amphibians are included?

Ans. The subclasses of Amphibia with extinct forms are
a)Labyrinthodontia b)Lepospondyli

4. Name the meninges in amphibians.

Ans. Amphibians have two meninges like outer duramater and an inner pia-arachnoid membrane.

5. What is columella auris in amphibians? By the modification of which structure of fishes is it formed?

Ans. Columella auris is the only ear ossicle present in the middle ear of the amphibians.
It is the modification of hyomandibular cartilage of the hyoid arch of fishes.

6. What do you mean by mesolecithal eggs? Name the vertebrae class which is characterized by mesolecitha eggs.

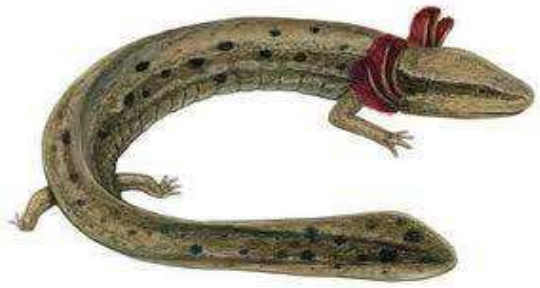
Ans. An egg with moderate amount of yolk is called mesolecithal egg. Amphibians have mesolecithal eggs.

7. Name any two orders of Labyrinthodontia. Give one example for each.

Ans. The Labyrinthodontia (folded teeth) having two orders.
1. **Order:** Ichthyostegalia. Ex. *Ichthyostega.*
2. **Order:** Temnospondyli. Ex. *Eryops.*
3. Order: Anthracosauria Ex. *Seymouria*

8. Mention the main difference between Perennibranchiata and Caducibranchiata. Give the example for each.

Ans.

Perennibranchiata	**Caducibranchiata**
1. Gills and gill-slits persist in adult.  Ex. *Necturus* and *Siren*	1. Gills are lost in adult stage.  Ex. *Amphiuma* and *Ambystoma*

9. What are opisthocoelous vertebrae? Which living group of amphibians is characterized by opisthocoelous vertebrae?

Ans. Vertebra with anterior face of centrum is convex and posterior face is concave is the opisthocoelous vertebrae.

Urodela group of amphibians are the characterized by opisthocoelous vertebrae.

10. What is paedomorphosis? Name the amphibian that exhibits paedomorphosis.

Ans. The retention of some juvenile features by an adult animal is called paedomorphosis.

The Axolotal larva of *Ambystoma mexicanum* exhibits paedomorphosis.

11. What is urostyle? Which group of living amphibians has urostyle?

Ans. Caudal vertebrae fuse to form urostyle. Anura group has urostyle.

<u>Short Answer Questions</u>

1. Mention eight important characters of Apoda.?

Ans. 1. These are caecilians or blindworms.

2. Worm like body with head and trunk.

3. Limbs and girdles are absent.

4. Skin is covered by minute dermal scales.

5. Eyes are very small and nonfunctional.

6. A blood vessel called ductus arteriosus (ductus Botalli) connects systemic and the pulmonary arches.

7. In males, cloacal wall is eversible and acts as copulatory organ.
8. Vertebrae are numerous and amphicoelous.
9. Sensory tentacles is present between nostril and eye.
10. Lungs are asymmetrical with rudimentary left lung.
11. Both the jaws have teeth.
12. Fertilization is internal.

E.g., a)*Ichthyophis* (female guards the eggs by coiling around them)


ichthophis

typhlonectes

b)*Gegenophis* (absence of scales)
c)*Typhlonectes* (aquatic and ovoviviparous)
d)*Uraeotyphlus*

2. Explain how Urodeles differ from the members of other order of Amphibia.

Ans. Urodeles differ from other order by these characters.

1. Body is lizard like with post anal tail.
2. Two pairs of week and equal sized limbs are present.
3. Sternum is poorly developed and in some animals absent.
4. Gills and gill-slits may persist in adult.
5. Vocal cards and middle ear are absent. Eyes are small.
6. Copulatory organ is absent.
7. Female picks up spermatophore, deposited by male, with the lip of her cloaca.
8. Fertilization is internal.
9. Opisthocoelous verterbrae.

3. Explain the different modifications that occurred in Ambiphia during their evolution from fishes?

Ans. 1. Fins are modified into limbs.
2. Scales are absent to help in cutaneous respiration.
3. Gill breathing fishes evolved lung-breathing Amphibians.
4. External nostrils are communicated with internal nostrils and help in lung respiration (pulmonary).
5. Formation of columella auris as ear ossicle in middle ear cavity.
6. Formation of urinary bladder from ventral wall of cloaca.
7. Three – chambered hert.
8. Apperance of Larynx.
9. Development of Harderian glands and lacrimal glands.


Rhacophorus(flyinfrog)



Hyla


Bufo