

# **TOPIC: ANIMAL KINGDOM PART-V:PHYLUMS:** **ECHINODERMATA AND CHORDATA**

LECTURE NO:11

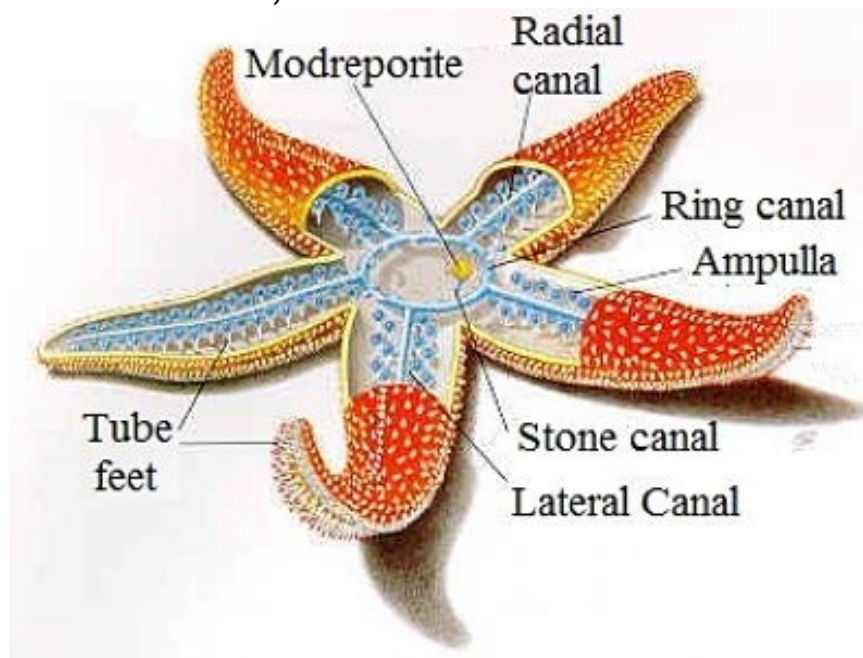
CLASS:XI

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## **Phylum Echinodermata**

(i) The term “Echinodermata” means spiny skin (Gr., *echinos* = spiny + *dermatos* = skin).



### **Salient features:**

- (1) Echinoderms are exclusively marine beings.
- (2) They are triploblastic and coelomate animals.
- (3) They have radially symmetrical body.
- (4) They have organ system grade of organization.

- (5) They have well developed
- (6) They have a water-vascular system with tube-feet for locomotion, feeding and respiration.
- (7) Circulatory system is of the open-type.
- (8) The sensory organs are poorly developed.
- (9) The excretory organs are absent.
- (10) They have pedicellariae.
- (11) Development is indirect.
- (12) The larval forms are bilaterally symmetrical.

### **Classification of Echinodermata**

#### **Subphylum I - Eleutherozoa : Free-living echinoderms**

##### **Class 1 - Asteroidea**

- Starfishes or sea stars.
- Arms 5 or more and not sharply marked off from the central disc.
- Tube feet in orally placed ambulacral grooves; with suckers.
- Anus and madreporite aboral.
- Pedicellariae present.
- Free-living, slow-creeping, predaceous and scavengerous.

##### **Class 2 - Ophiuroidea**

- Brittle-stars and allies.
- Body star-like with arms sharply marked off from the central disc.
- Pedicellariae absent.
- Stomach sac-like; no anus.
- Ambulacral grooves absent or covered by ossicles; tube feet without suckers.

- Madreporite oral.

### **Class 3 - Echinoidea**

- Body not divided into arms; globular (sea urchins), or flattened disc-like (sea-cakes).
- Mouth at lower pole, covered by 5 strong and sharp teeth, forming a biting and chewing apparatus called "Aristotle's Lantern".
- Tube-feet slender with suckers.
- Skin ossicles fused to form a rigid globular, disc like, or heart-shaped shell or test with movable spines.
- 3-jawed pedicellariae present in skin.
- Gut long, slender and coiled.
- Larval forms pluteus and Echinopluteus.
- Examples – Sea urchins and sand dollars etc.

### **Class 4 - Holothuroidea**

- Body massive, long and cylindrical like a cucumber
- Mouth at anterior and anus at posterior ends.
- Mouth surrounded by many hollow retractile tentacles.
- Tube feet usually present; sucker-like.
- Skin leathery, but relatively soft, without spines or pedicellariae; may have an endoskeleton of minute calcareous ossicles.
- Respiration and excretion by two long and highly branched tubes (= respiratory tree) extending into coelom from cloaca.
- Larval form Auricularia.
- Examples – Holothuria, Cucumaria etc.
- Subphylum II - Pelmatozoa: Stalked, sedentary echinoderms.

### **Class 5 - Crinoidea**

- Body flattened and pentamerous.

- Disc enclosed in a hard, cup-shaped calyx formed of calcareous plates.
- Mouth in middle and anus excentral upon a cone, both upon oral surface.
- Tube feet sucker-like; restricted to central disc; can help in food-collection.
- Some forms (sea-lilies) permanently sessile and attached to sea-bottom by a long stalk; others (feather stars) free-swimming.
- Spines and pedicellariae absent in skin.
- Examples – Sea lilies and Feather stars (Antedon)

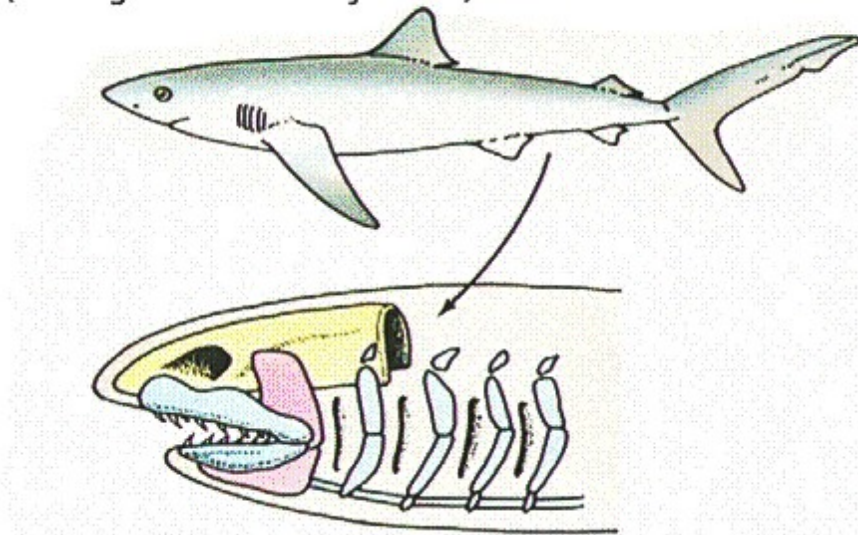
## **Phylum Chordata**

### **Superclass Pisces**

#### **Class 1 - Chondrichthyes (Cartilaginous Fishes)**

##### **➤ General characters:-**

Modern jawed fishes  
(cartilaginous and bony fishes)

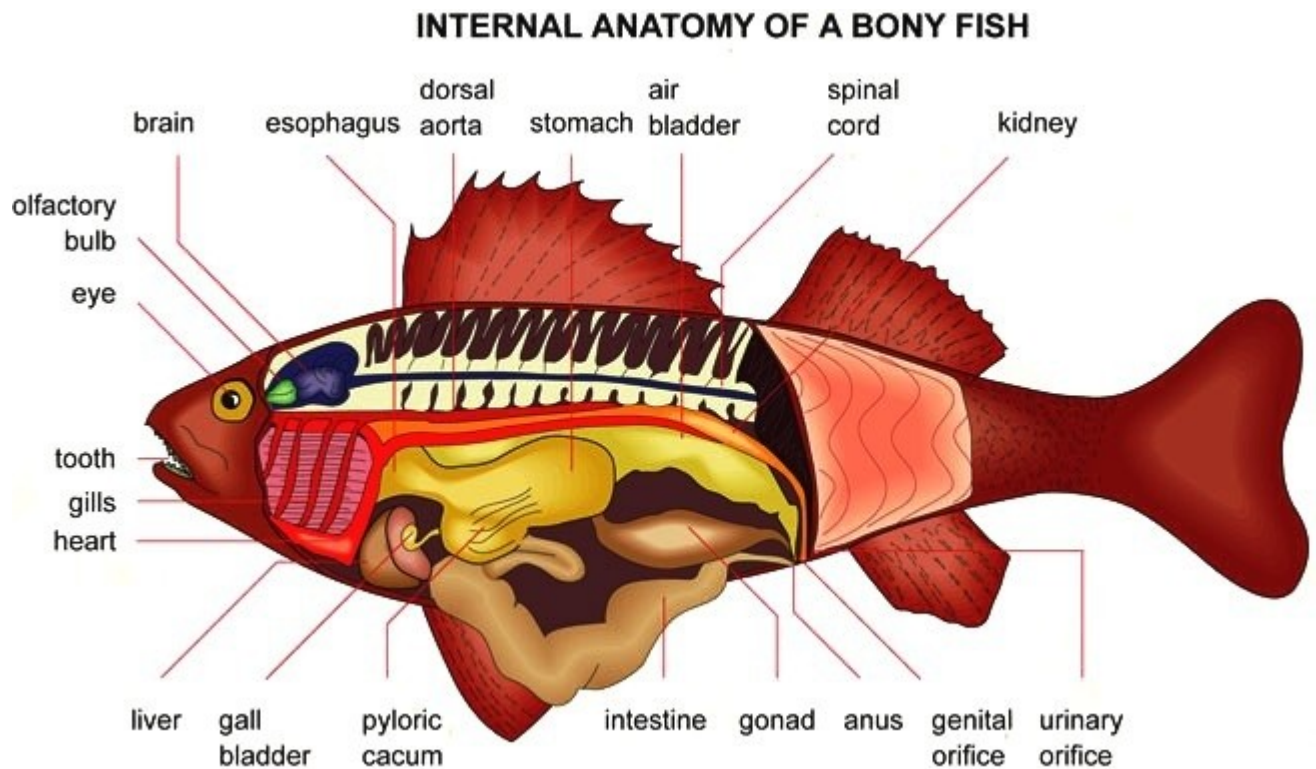


- (1) Mostly marine and predaceous.
- (2) Body fusiform or spindle shaped.
- (3) Fins both median and paired, all supported by fin rays.
- (4) Skin tough containing minute placoid scales and mucous glands.
- (5) Endoskeleton entirely cartilaginous, without true bones
- (6) Notochord persistent.
- (7) Respiration by 5 to 7 pairs of gills.
- (8) Heart 2-chambered (1 auricle and 1 ventricle).
- (9) Kidneys opisthonephric. Excretion is ureotelic.
- (10) Brain with large olfactory lobes and cerebellum. Cranial nerves 10 pairs.

## **Class 2 - Osteichthyes (Bony fishes)**

### **General Characters:-**

- (1) Inhabit all sorts of water-fresh, brackish or salt; warm or cold.
- (2) Body spindle-shaped and streamlined.
- (3) Fins both median and paired, supported by fin rays of cartilage or bone.
- (4) Skin with many mucous glands, usually with embedded dermal scales of 3 types; ganoid, cycloid or ctenoid.
- (5) Endoskeleton chiefly of bone.



- (6) Respiration by 4 pairs of gills on body gill arches
- (7) Ventral heart 2-chambered (1 auricle + 1 ventricle).
- (8) Adult kidneys mesonephric. Excretion is ureotelic.
- (9) Brain with very small olfactory lobes, small cerebrum and well developed optic lobes and cerebellum.
- (10) Well developed lateral line system.

## **Class Amphibia**

### **General characters:-**

- (1) Aquatic or semi aquatic (freshwater), air and water breathing, carnivorous, cold-blooded, oviparous, tetrapod vertebrates.
- (2) Head distinct, trunk elongated. Neck and tail may be present or absent.
- (3) Pigment cells (chromatophores) present.



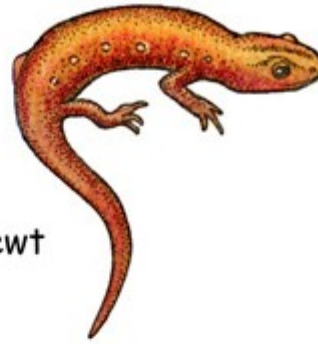
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Exoskeleton

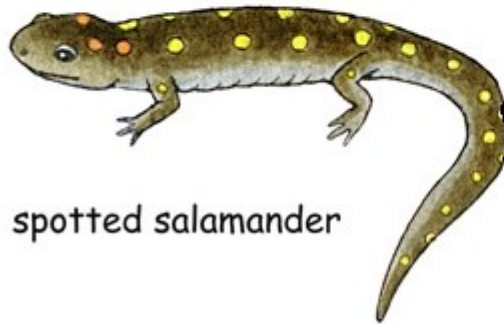
absent.



bullfrog



newt



spotted salamander



toad

(5) Endoskeleton mostly bony. Notochord does not persist. Skull with 2 occipital condyles.

(6) Respiration by lungs, skin and mouth lining.

(7) Heart 3-chambered (2 auricles + 1 ventricle).

(8) Kidneys mesonephric. Excretion is ureotelic.

(9) Brain poorly developed. Cranial nerves 10 pairs.

(10) Nostrils connected to buccal cavity.

## Class Reptilia

### General characters:-

(1) Predominantly terrestrial, creeping or burrowing.

(2) Body bilaterally symmetrical and divisible into 4 regions- head, neck, trunk and tail.

(3) Limbs 2 pairs, pentadactyle.

(4) Exoskeleton of horny epidermal scales, shields, plates and scutes.

(5) Skin dry, cornified and devoid of glands.

(6) Alimentary canal terminates into a cloacal aperture.

- (7) Endoskeleton bony. Skull is with one occipital condyle (monocondylar).
- (8) Heart usually 3-chambered, 4-chambered in crocodiles.
- (9) Respiration by lungs throughout life.
- (10) Kidney metanephric. Excretion is uricotelic.

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