FREE NOTES · NCERT + NEET LEVEL

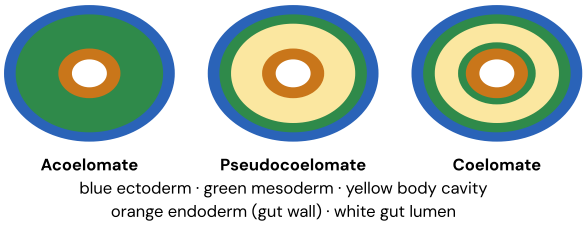
Animal Kingdom

Basis of classification (organisation, symmetry, germ layers, coelom, segmentation, notochord) and all phyla from Porifera to Chordata with key features and examples.

01 Basis of classification
02 Overview of animal groups
03 Porifera to Aschelminthes
04 Annelida to Mollusca
05 Echinodermata & Hemichordata
06 Chordata: features & fishes
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08 Extra + tricks
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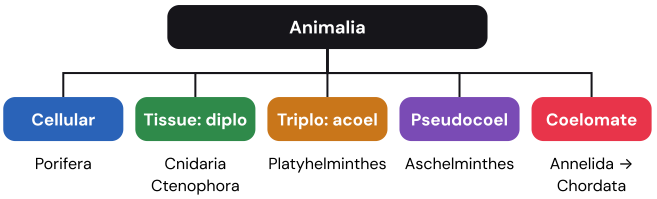
01 Basis of classification

Feature	Types	Examples
Level of organisation	Cellular / tissue / organ / organ-system	Sponges / Cnidaria / Platyhelminthes / Annelida onwards
Circulation	Open / closed	Arthropods, molluscs / annelids, chordates
Symmetry	Asymmetrical / radial / bilateral	Sponges / Cnidaria, Ctenophora, adult echinoderms / rest
Germ layers	Diploblastic / triploblastic	Cnidaria, Ctenophora (mesoglea) / Platyhelminthes onwards
Coelom	Acoelomate / pseudo / coelomate	Platyhelminthes / Aschelminthes / Annelida onwards
Segmentation	Metameric	Earthworm
Notochord	Present / absent	Chordates / non-chordates



Body cavity types (cross-section)

02 Overview of animal groups



Broad classification by organisation and body cavity

Coelomates include Annelida, Arthropoda, Mollusca, Echinodermata, Hemichordata and Chordata.

03 Porifera to Aschelminthes

Phylum	Key features	Examples
Porifera (sponges)	Pores (ostia), water canal system, choanocytes, spicules/spongin; hermaphrodite; internal fertilisation; indirect development	*Sycon*, *Spongilla*, *Euspongia*
Cnidaria (Coelenterata)	Cnidoblasts (stinging), gastrovascular cavity, polyp & medusa (metagenesis in *Obelia*); corals have $CaCO_3$ skeleton	*Physalia*, *Adamsia*, *Pennatula*, *Gorgonia*, *Meandrina*, *Aurelia*
Ctenophora (comb jellies)	8 comb plates for locomotion, bioluminescence, marine, external fertilisation	*Pleurobrachia*, *Ctenoplana*
Platyhelminthes (flatworms)	Dorso-ventrally flat, flame cells, hooks/suckers in parasites; *Planaria* regenerates	*Taenia*, *Fasciola*
Aschelminthes (roundworms)	Circular cross-section, complete gut with muscular pharynx, sexes separate (female longer)	*Ascaris*, *Wuchereria*, *Ancylostoma*

04 Annelida to Mollusca

Phylum	Key features	Examples
Annelida	Metameric segmentation, closed circulation, nephridia, longitudinal + circular muscles; *Nereis* has parapodia, sexes separate; earthworm and leech are monoecious	*Nereis*, *Pheretima*, *Hirudinaria*
Arthropoda (largest phylum, ~2/3 of species)	Chitinous exoskeleton, jointed appendages, open circulation; respiration by gills, book gills, book lungs, tracheae; Malpighian tubules; compound eyes, statocysts	*Apis*, *Bombyx*, *Laccifer*, *Anopheles*, *Culex*, *Aedes*, *Locusta*, *Limulus* (living fossil)
Mollusca (2nd largest)	Soft body, calcareous shell, head-foot-visceral hump, mantle, feather-like gills, radula (rasping tongue)	*Pila*, *Pinctada*, *Sepia*, *Loligo*, *Octopus*, *Aplysia*, *Dentalium*, *Chaetopleura*

05 Echinodermata & Hemichordata

- **Echinodermata**: spiny skin (calcareous ossicles), all marine, adults radial (pentamerous), larvae bilateral; **water vascular system** (locomotion, food capture, respiration); no excretory system.
- Examples: *Asterias* (star fish), *Echinus* (sea urchin), *Antedon* (sea lily), *Cucumaria* (sea cucumber), *Ophiura* (brittle star).
- **Hemichordata**: worm-like, body = proboscis, collar, trunk; stomochord (not true notochord); proboscis gland for excretion. Examples: *Balanoglossus*, *Saccoglossus*.

06 Chordata: features & fishes

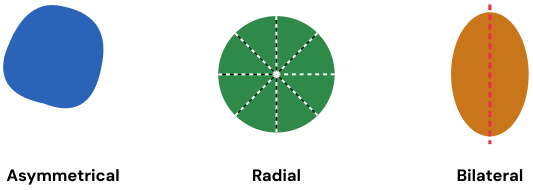
Four fundamental features: **notochord**, **dorsal hollow nerve cord**, **pharyngeal gill slits**, **post-anal tail**. Subphyla: Urochordata (notochord only in larval tail: *Ascidia*, *Salpa*, *Doliolum*), Cephalochordata (head to tail, throughout life: *Branchiostoma*/Amphioxus), Vertebrata (notochord replaced by vertebral column). *All vertebrates are chordates but not all chordates are vertebrates.*

Class	Key features	Examples
Cyclostomata	Jawless, circular sucking mouth, 6–15 pairs gill slits, ectoparasites, migrate to fresh water to spawn	*Petromyzon*, *Myxine*
Chondrichthyes	Cartilaginous, ventral mouth, placoid scales, no air bladder (keep swimming), 2-chambered heart, claspers in males, internal fertilisation, many viviparous	*Scoliodon*, *Pristis*, *Carcharodon*, *Trygon* (poison sting), *Torpedo* (electric)
Osteichthyes	Bony, terminal mouth, operculum, air bladder, cycloid/ctenoid scales, external fertilisation, oviparous	*Labeo*, *Catla*, *Clarias*, *Hippocampus*, *Exocoetus*, *Betta*, *Pterophyllum*

07 Tetrapods: amphibians to mammals

Class	Key features	Examples
Amphibia	Moist skin, no scales, tympanum, cloaca, 3-chambered heart, cold-blooded, external fertilisation	*Bufo*, *Rana*, *Hyla*, *Salamandra*, *Ichthyophis* (limbless)
Reptilia	Dry cornified skin, epidermal scales/scutes, 3-chambered heart (4 in crocodiles), cold-blooded, shed skin, internal fertilisation	*Chelone*, *Testudo*, *Chameleon*, *Calotes*, *Crocodilus*, *Alligator*, *Hemidactylus*, *Naja*, *Bangarus*, *Vipera*
Aves	Feathers, beak, forelimbs = wings, pneumatic bones, crop & gizzard, 4-chambered heart, warm-blooded, air sacs	*Corvus*, *Columba*, *Psittacula*, *Struthio*, *Pavo*, *Aptenodytes*, *Neophron*
Mammalia	Mammary glands, hair, external ears (pinna), different teeth types, 4-chambered heart, warm-blooded, mostly viviparous	*Ornithorhynchus* (oviparous), *Macropus*, *Pteropus*, *Camelus*, *Macaca*, *Rattus*, *Canis*, *Felis*, *Elephas*, *Equus*, *Delphinus*, *Balaenoptera*, *Panthera*

08 Extra + tricks



Types of body symmetry

- Order of non-chordate phyla (mnemonic): "**P**lease **C**ome **T**o **P**arty **A**t **A**ll **M**y **E**xciting **H**ouses" = Porifera, Cnidaria, Ctenophora, Platyhelminthes, Aschelminthes, Annelida, Arthropoda, Mollusca, Echinodermata, Hemichordata.
- Digestive system: **incomplete** (one opening: Cnidaria, Ctenophora, Platyhelminthes) vs **complete** (mouth + anus: Aschelminthes onwards).
- Digestion: extracellular + intracellular in Cnidaria; intracellular in Porifera.
- Metamerism (true segmentation): Annelida, Arthropoda, Chordata. *Taenia* shows pseudo-segmentation (strobilation).
- Exam favourites: *Pteropus* = flying fox; *Hippocampus* = sea horse; *Exocoetus* = flying fish; *Ichthyophis* = limbless amphibian; *Limulus* = king crab (living fossil).

09 Important Q&A

Q1. Differentiate open and closed circulatory systems.

Open: blood pumped into open spaces (sinuses), bathes cells directly (arthropods, molluscs). Closed: blood always in vessels (annelids, chordates).

Q2. Why is the body cavity of Aschelminthes called pseudocoelom?

Mesoderm is present as scattered pouches between ectoderm and endoderm, not lining the cavity completely.

Q3. Name the excretory structures of: Platyhelminthes, Annelida, Arthropoda (insects), Hemichordata.

Flame cells, nephridia, Malpighian tubules, proboscis gland.

10 Common mistakes

- Saying Cnidaria are triploblastic (they are diploblastic with mesoglea).
- Calling *Balanoglossus* a chordate (Hemichordata is a separate non-chordate phylum).
- Forgetting that adult echinoderms are radial but larvae are bilateral.
- Writing crocodile heart as 3-chambered (it is 4).

11 Practice (NEET style)

1. Largest phylum?
2. Water vascular system is found in?
3. Comb plates are found in?
4. Egg-laying mammal?
5. Fish without air bladder?

ANSWERS

1) Arthropoda · 2) Echinodermata · 3) Ctenophora · 4) *Ornithorhynchus* · 5) Cartilaginous (*Scoliodon*)

12 Quick revision: 5 minutes before the exam

NON-CHORDATES

- Porifera: canal system
- Cnidaria: cnidoblasts
- Ctenophora: comb plates
- Platy: flame cells

COELOMATES

- Annelida: metameres, nephridia
- Arthropoda: jointed legs
- Mollusca: radula
- Echino: water vascular

CHORDATES

- Notochord, dorsal nerve cord, gill slits, post-anal tail
- Uro: larval tail only

HEARTS

- Fish 2, amphibia 3, reptile 3 (croc 4)
- Birds, mammals 4

Have a doubt? Ask the AI Doubt Solver at padhaiadda.netlify.app, or take the mock test on this chapter.