KSQUARE CAREER INSTITUTE

ANIMAL KINGDOM

Class 11 Biology • Lecture 01: Basis of Classification • NEET Notes

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Lecture at a Glance

1. What is an animal? 11 phyla of Kingdom Animalia
2. Basis of classification — levels of organisation, body symmetry, germ layers, coelom, metamerism, notochord
3. Body plan, digestive & circulatory systems, protostomes vs deuterostomes
4. Classification flowchart (Parazoa / Eumetazoa) & NCERT overview table
5. Added: salient features of each phylum (overview), practice MCQs

WHAT IS AN ANIMAL?

- Animals are **multicellular, heterotrophic** organisms **without a cell wall and chlorophyll**.
- **Aristotle** is called the **Father of Zoology**.

Kingdom Animalia — 11 Phyla

#	Phylum	#	Phylum
1	Porifera	7	Arthropoda
2	Cnidaria (Coelenterata)	8	Mollusca
3	Ctenophora	9	Echinodermata
4	Platyhelminthes	10	Hemichordata
5	Aschelminthes (Nemathelminthes)	11	Chordata
6	Annelida		

BASIS OF CLASSIFICATION

Six features: **levels of organisation, body symmetry, germinal (embryonic) layers, coelom (body cavity), metamerism (segmentation) and notochord**.

1. Levels of Organisation

Level	Feature	Example
Cellular	Cells arranged as **loose cell aggregates**	Porifera (sponges)
Tissue	Cells arranged into **tissues**	Cnidarians, ctenophores

Level	Feature	Example
Organ	Tissues grouped into **organs**	Platyhelminthes, higher animals
Organ system	Organs associated into **organ systems**, each with a physiological function	Higher animals (Aschelminthes to Chordata)

Digestive & circulatory systems

System	Type	Feature & examples
Digestive	**Incomplete**	Single opening acting as both mouth and anus — Cnidaria, Platyhelminthes (*Hydra*, *Planaria*)
	Complete	Two openings — mouth and anus (roundworm onwards)
Circulatory	**Open**	Blood pumped out of the heart; cells/tissues directly bathed in it (sinuses) — arthropods, molluscs, echinoderms, hemichordates, lower chordates
	Closed	Blood circulates through vessels — annelids, vertebrates

Body plan (class notes)

Body plan	Feature	Examples
Cell-aggregate	Loose aggregate of cells	Sponges
Blind-sac	Incomplete digestive system (single opening)	Coelenterates to Platyhelminthes
Tube-within-tube	Complete digestive system	Nemathelminthes to Chordates

▸ 2. Body Symmetry

- Arrangement of similar body parts on two sides of the main body axis.

Symmetry	Meaning	Examples
Asymmetrical	Body cannot be divided into two similar halves	Most poriferans (sponges), snails
Radial	Divided into two equal halves by **any plane** through the central (oral–aboral) axis	Some poriferans, cnidarians, ctenophores, **adult echinoderms**
Bilateral	Divided into identical right and left halves in **only one plane**	Platyhelminthes to Chordata (except adult echinoderms)

- A bilaterally symmetrical animal has **dorsal** (upper) and **ventral** (lower) sides, **left and right lateral** sides, an **anterior (cephalic)** and a **posterior (anal/tail)** end.

3. Germinal (Embryonic) Layers

Type	Layers	Examples
Diploblastic	2 — outer **ectoderm**, inner **endoderm**; undifferentiated jelly-like **mesoglea** in between	Cnidaria, Ctenophora
Triploblastic	3 — ectoderm, **mesoderm**, endoderm	Platyhelminthes to Chordata

4. Coelom (Body Cavity)

- A **body cavity lined by mesoderm**, between the **body wall and the gut wall**; it separates the muscles of the gut and the body wall.
- **Functions:** accommodates **visceral organs**; coelomic fluid **reduces friction** between organs; acts as a **shock absorber**.

Type	Feature	Examples
Acoelomate (no coelom)	Space between body wall and gut filled with **matrix (parenchyma)**	Porifera to Platyhelminthes
Pseudocoelomate (false coelom)	Cavity **not lined by mesoderm**; mesoderm present as **scattered pouches** between ectoderm and endoderm	Aschelminthes
Coelomate (true coelom)	Cavity arises from mesoderm, lined by **peritoneum** and filled with **coelomic fluid**	Annelida to Chordata

Coelomate type (embryonic origin)	Formation	Examples
Schizocoel	By **splitting** of the mesodermal mass	Annelida, Arthropoda, Mollusca
Enterocoel	By **fusion of gut (enteric) pouches** during embryonic development	Echinodermata, Hemichordata, Chordata

5. Metamerism (Segmentation)

- Body is **externally and internally divided into repeated segments (metameres)** — e.g. **annelids (earthworm), arthropods**.
- Class note: **pseudometamerism** (segments not true metameres) in **tapeworms**.

6. Notochord

- A **mesodermally derived rod-like** supporting structure on the **dorsal side** during embryonic development.
- Animals with a notochord = **chordates**; without = **non-chordates** (Porifera to Hemichordata).
- Chordate features: notochord, **dorsal hollow nerve cord**, **pharyngeal gill slits**, **post-anal tail**.

Embryonic Development (Class Notes)

Type	Feature	Examples
Protostomes	Blastopore forms the **mouth** first	Platyhelminthes to Mollusca
Deuterostomes	Blastopore forms the **anus** first	Echinoderms, hemichordates, chordates

CLASSIFICATION FLOWCHART

Animals (Metazoa) → **Parazoa** (cellular level) → **Porifera** | **Eumetazoa** (tissue/organ/organ-system level) → by symmetry:

- **Radiata** — diploblastic, tissue level, acoelomate: **Coelenterata, Ctenophora**.
- **Bilateria** — triploblastic, organ/organ-system level → by coelom: **Acoelomata** (Platyhelminthes), **Pseudocoelomata** (Nematoda/Aschelminthes), **Coelomata** — schizocoel (Annelida, Mollusca, Arthropoda) and enterocoel (Echinodermata, Hemichordata, Chordata).

Basis of Classification — Overview (NCERT)

Phylum	Level of organisation	Germ layers	Symmetry	Coelom
Porifera	Cellular	—	Asymmetrical / radial	Acoelomate
Cnidaria, Ctenophora	Tissue	Diploblastic	Radial	Acoelomate
Platyhelminthes	Organ & organ system	Triploblastic	Bilateral	Acoelomate
Aschelminthes	Organ system	Triploblastic	Bilateral	Pseudocoelomate
Annelida, Arthropoda, Mollusca, Echinodermata, Hemichordata, Chordata	Organ system	Triploblastic	Bilateral	Coelomate

NEET Point / PYQ Alert

Echinoderms: **larvae bilateral, adults radial** — a favourite trap.

Learn this table thoroughly — direct NEET statement questions come from it.

SALIENT FEATURES OF EACH PHYLUM — OVERVIEW (ADDITIONAL TOPIC)

Phylum	Key features	Examples
Porifera	Sponges; water canal system (ostia → spongocoel → osculum); **choanocytes**; spicules/spongin; hermaphrodite; indirect development	*Sycon, Spongilla, Euspongia*
Cnidaria	**Cnidoblasts** (stinging cells); polyp & medusa; metagenesis (*Obelia*); corals have $CaCO_3$ skeleton	*Hydra, Physalia, Adamsia, Aurelia*

Phylum	Key features	Examples
Ctenophora	Sea walnuts / comb jellies; **8 comb plates**; **bioluminescence**	*Pleurobrachia, Ctenoplana*
Platyhelminthes	Flatworms; dorso-ventrally flattened; **flame cells**; hooks & suckers in parasites	*Taenia, Fasciola, Planaria*
Aschelminthes	Roundworms; circular in section; **sexes separate** (dioecious), females longer	*Ascaris, Wuchereria, Ancylostoma*
Annelida	Metameric segmentation; **nephridia**; closed circulation; parapodia (Nereis)	*Pheretima, Nereis, Hirudinaria*
Arthropoda	**Largest phylum** (~2/3 of animals); jointed appendages, chitinous exoskeleton; Malpighian tubules	*Apis, Bombyx, Anopheles, Limulus*
Mollusca	Second largest; soft body with **mantle**, shell, **radula**; ctenidia (gills)	*Pila, Pinctada, Octopus, Sepia*
Echinodermata	Spiny skin; **water vascular system**; adults radial, larvae bilateral; no excretory system	*Asterias, Echinus, Antedon*
Hemichordata	Proboscis, collar, trunk; **stomochord**; proboscis gland	*Balanoglossus, Saccoglossus*
Chordata	Notochord, dorsal hollow nerve cord, pharyngeal gill slits, post-anal tail; closed circulation	Urochordata, Cephalochordata, Vertebrata

PRACTICE MCQS

Q1. Cellular level of organisation is found in

(a) Cnidaria
(b) Porifera
(c) Platyhelminthes
(d) Ctenophora

Answer: (b)

Q2. Radial symmetry is found in adults of

(a) Annelida
(b) Echinodermata
(c) Arthropoda
(d) Chordata

Answer: (b)

Q3. Mesoglea is present in

(a) Triploblastic animals
(b) Diploblastic animals
(c) Coelomates
(d) Pseudocoelomates

Answer: (b)

Q4. Pseudocoelom is found in

(a) Annelida

(b) Aschelminthes
(c) Platyhelminthes
(d) Mollusca

Answer: (b)

Q5. Enterocoelous coelom is found in

(a) Arthropoda
(b) Mollusca
(c) Echinodermata
(d) Annelida

Answer: (c)

Q6. Incomplete digestive system with a single opening is found in

(a) Ascaris
(b) Hydra and Planaria
(c) Earthworm
(d) Cockroach

Answer: (b)

Q7. Open circulatory system is found in

(a) Annelids
(b) Arthropods
(c) Vertebrates
(d) Earthworm

Answer: (b)

Q8. True metamerism is shown by

(a) Tapeworm
(b) Earthworm
(c) Hydra
(d) Sponges

Answer: (b)

Q9. Animals in which the anus forms first from the blastopore are

(a) Protostomes
(b) Deuterostomes
(c) Acoelomates
(d) Diploblastic

Answer: (b) — Echinoderms, hemichordates, chordates.

Q10. Notochord is

(a) ectodermal
(b) endodermal
(c) mesodermal
(d) absent in chordates

Answer: (c)

QUICK REVISION

- Animals: multicellular, heterotrophic, no cell wall, no chlorophyll; 11 phyla; Aristotle — father of zoology.

- Levels: cellular (Porifera), tissue (Cnidaria, Ctenophora), organ (Platyhelminthes), organ system (rest).
- Symmetry: asymmetrical (sponges), radial (cnidarians, ctenophores, adult echinoderms), bilateral (Platyhelminthes → Chordata).
- Diploblastic (with mesoglea): Cnidaria, Ctenophora; triploblastic: Platyhelminthes → Chordata.
- Acoelomate: Porifera → Platyhelminthes; pseudocoelomate: Aschelminthes; coelomate: Annelida → Chordata (schizocoel: Annelida, Arthropoda, Mollusca; enterocoel: Echinodermata, Hemichordata, Chordata).
- Metamerism: Annelida, Arthropoda; notochord: chordates only (mesodermal).

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