NCERT Exemplar Solutions of Class 11 Biology – Chapter: 4 – Animal Kingdom

VERY SHORT ANSWER TYPE QUESTIONS

1. Identify the phylum in which adults exhibit radial symmetry and larva exhibit bilateral symmetry.

Explanation: This phenomenon demonstrates evolutionary relationships. Echinoderms are deuterostomes related to chordates, and their bilateral larval stage suggests their evolutionary origin from bilateral ancestors. Examples include starfish, sea urchins, and sea cucumbers.

---

2. What is the importance of pneumatic bones and air sacs in Aves?

Explanation: Pneumatic bones are hollow bones filled with air, reducing body weight without compromising strength. Air sacs extend the respiratory system, providing continuous airflow through the lungs during both inspiration and expiration, making gas exchange more efficient during flight.

---

3. What is metagenesis? Mention an example which exhibits this phenomenon.

Explanation: Metagenesis involves alternation between a sexual polyp stage and an asexual medusa stage. Example: Obelia (cnidarian) where the polyp reproduces asexually by budding to produce medusae, which then reproduce sexually to form new polyps.

---

4. What is the role of feathers?

Explanation: Feathers serve multiple functions:

- **Flight**: Contour feathers provide lift and thrust
- **Insulation**: Down feathers trap air for temperature regulation
- **Waterproofing**: Special oils make feathers water-resistant
- **Display**: Colored feathers for mating displays and species recognition

---

5. Which group of chordates possess sucking and circular mouth without jaws?

Explanation: Cyclostomes (like lampreys and hagfish) are primitive chordates. Their circular, jawless mouth is adapted for parasitic or scavenging lifestyles. "Agnathan" means "without jaws," distinguishing them from jawed vertebrates (gnathostomes).

---

6. Give one example each for an animal possessing placoid scales and that with cycloid scales.

Explanation:

- **Placoid scales**: Tooth-like structures in cartilaginous fish, providing protection and reducing drag
- **Cycloid scales**: Smooth, disc-like scales in bony fish with concentric rings showing age

---

7. Mention two modifications in reptiles required for terrestrial mode of life.

Explanation: These adaptations help reptiles survive on land:

- Internal fertilization protects gametes from desiccation
- Scaly skin prevents water loss and provides protection
- Shelled eggs prevent desiccation of developing embryos

---

8. Mention one example each for animals with a chitinous exoskeleton and those covered by a calcareous shell.

Explanation:

- **Chitin**: A tough, flexible polysaccharide providing structural support in arthropods
- **Calcium carbonate shell**: Provides protection in molluscs and can be internal or external

---

9. What is the role of the radula in molluscs?

Explanation: The radula is a ribbon-like feeding organ with rows of tiny teeth. It functions like a conveyor belt, continuously replacing worn teeth. Different mollusc groups have radulae adapted for their specific diets (herbivorous, carnivorous, or filter-feeding).

---

10. Name the animal which exhibits the phenomenon of bioluminescence. Mention the phylum to which it belongs.

Explanation: Bioluminescence involves the reaction between luciferin (substrate) and luciferase (enzyme) in the presence of oxygen. In ctenophores, this creates beautiful rainbow-like displays along their comb rows, used for communication, defense, and predation.

---

11. Write one example each of the following in the space provided.

a. Cold blooded animal: **Frog (Amphibians)**

b. Warm blooded animal: **Humans (Mammals)**

c. Animal possessing dry and cornified skin: **Lizard (Reptiles)**

d. Dioecious animal: **Ascaris (Aschelminthes)**

Explanation:

- **Cold-blooded (Poikilothermic)**: Body temperature varies with environment
- **Warm-blooded (Homeothermic)**: Maintain constant body temperature
- **Dioecious**: Separate sexes (male and female are different individuals)

---

12. Differentiate between a diploblastic and a triploblastic animal.

Solution:

- **Diploblastic animals**: Cells arranged in two embryonic layers (ectoderm and endoderm). Example: Coelenterates
- **Triploblastic animals**: Developing embryo has a third germinal layer (mesoderm). Example: Chordates

Explanation: The mesoderm in triploblastic animals gives rise to muscles, circulatory system, excretory organs, and reproductive organs, allowing for greater complexity and specialization.

---

13. Give an example of the following

a. **Roundworm**: Ascaris b. **Fish possessing poison sting**: Trygon c. **A limbless reptile/amphibian**: Reptile – Snake, Amphibian – Ichthyophis d. **An oviparous mammal**: Duck-billed platypus

---

14. Provide appropriate technical term in the space provided.

a. **Blood-filled cavity in arthropods**: Haemocoel b. **Free-floating form of cnidaria**: Medusa c. **Stinging organ of jelly fishes**: Nematocyst d. **Lateral appendages in aquatic annelids**: Parapodia

---

15. Match the following:

Animals ↔ Locomotory Organ

- a. Octopus ↔ Tentacles
- b. Crocodile ↔ Limbs
- c. Catla ↔ Fins
- d. Ctenoplana ↔ Comb plates

SHORT ANSWER TYPE QUESTIONS

1. Differentiate between:

a. Open circulatory system and closed circulatory system

- **Open**: Blood is pumped out of the heart and cells and tissues are directly bathed in it
- **Closed**: Blood circulates throughout the body through a series of vessels

b. Oviparous and viviparous characteristic

- **Oviparous**: Laying of fertilized and unfertilized eggs
- **Viviparous**: Giving birth to young ones

c. Direct development and Indirect development

- **Direct**: Larval stage is absent in development
- **Indirect**: Larval stage is present that doesn't resemble the adult

---

2. Sort out the animals on the basis of their symmetry (radial or bilateral): coelenterates, ctenophores, annelids, arthropods, and echinoderms.

Explanation:

- **Radial symmetry**: Body can be divided into equal halves by any plane passing through the longitudinal axis
- **Bilateral symmetry**: Body can be divided into two halves only when the plane passes through the median longitudinal axis

3. There has been an increase in the number of chambers in the heart during the evolution of vertebrates. Give the names of the class of vertebrates having two, three or four-chambered heart.

Solution:

- **Two-chambered hearts**: Chondrichthyes and Osteichthyes
- **Three-chambered heart**: Amphibia and Reptilia
- **Four-chambered heart**: Aves and Mammalia

Explanation: This evolutionary progression shows increasing efficiency in separating oxygenated and deoxygenated blood, leading to better oxygen delivery to tissues.

4. Fill up the blank spaces appropriately

Phylum/Class	**Excretory organ**	**Circulatory organ**	**Respiratory organ**
Arthropoda	**A**	**B**	Lungs/Gills/Tracheal system
C	Nephridia	Closed	Skin/parapodia
D	Metanephridia	Open	**E**
Amphibia	**F**	Closed	Lung

Solution:

- A = Malpighian tubules
- B = Open
- C = Annelida
- D = Mollusca
- E = Feather-like gills
- F = Kidneys

5. Match the following

- a. Amphibia ↔ Dual habitat
- b. Mammals ↔ Mammary glands
- c. Chondrichthyes ↔ Cartilaginous endoskeleton
- d. Osteichthyes ↔ Air bladder
- e. Cyclostomata ↔ Sucking and circular mouth without jaws
- f. Aves ↔ Pneumatic bones

6. Endoparasites are found inside the host body. Mention the special structures possessed by these and which enable them to survive in those conditions.

Solution: For survival, they have adapted:

- High reproductive capacity
- Presence of adhesive organs or suckers to cling to the host

- Loss of digestive system
- Loss of unnecessary sense organs

Explanation: These adaptations help endoparasites survive in the harsh internal environment of hosts where nutrients are absorbed directly from host tissues.

---

7. Match the following and write correct choice in space provided

- a. Pila ↔ Presence of shell
- b. Cockroach ↔ Jointed appendages
- c. Asterias ↔ Water vascular system
- d. Torpedo ↔ Electric organ
- e. Parrot ↔ Perching
- f. Dogfish ↔ Placoid scales

---

8. Differentiate between:

a. Open and closed circulatory system Same as above.

b. Oviparity and viviparity Same as above.

c. Direct and indirect development Same as above.

d. Acoelomate and pseudocoelomate

- **Acoelomate**: Animals possessing no coelom
- **Pseudocoelomate**: Body cavity lined by mesoderm, with mesoderm present between ectoderm and endoderm

e. Notochord and nerve cord

- **Notochord**: Mesodermally derived rod-like structure formed on dorsal side during embryonic development
- **Nerve cord**: Solid strand of nervous tissue

f. Polyp and medusa

- **Polyp**: Sessile and cylindrical form (like Hydra)
- **Medusa**: Umbrella-shaped and free-swimming (like jellyfish)

---

9. Give the characteristic features of the following citing one example of each

a. Chondrichthyes and Osteichthyes

Chondrichthyes:

- Habitat: Mainly marine
- Body: Streamlined
- Endoskeleton: Cartilaginous
- Examples: Scoliodon, Trygon

Osteichthyes:

- Habitat: Both marine and freshwater
- Body: Streamlined
- Endoskeleton: Bony

- Examples: Marine - Hippocampus (Sea horse), Freshwater - Labeo (Rohu)

b. Urochordata and Cephalochordata

- **Urochordates**: Notochord present only in larval tail
- **Cephalochordates**: Notochord extends from head to tail region and persists throughout life
- Examples: Urochordates - Ascidia, Salpa; Cephalochordates - Branchiostoma

---

10. Mention two similarities between

a. Aves and mammals

- Both are warm-blooded
- Both have 4-chambered heart

b. A frog and crocodile

- Both are cold-blooded
- Both are oviparous

c. A turtle and pila

- Both are cold-blooded
- Both are oviparous animals

---

11. Name

a. **A limbless animal**: Ichthyophis b. **A cold-blooded animal**: Trygon c. **A warm-blooded animal**: Macaca (monkey)

d. **An animal possessing dry and cornified skin**: Naja (Cobra) e. **An animal having a canal system and spicules**: Euspongia f. **An animal with cnidoblasts**: Hydra

---

12. Give an example for each of the following

a. **A viviparous animal**: Panthera leo b. **A fish possessing a poison sting**: Trygon c. **A fish possessing an electric organ**: Torpedo d. **An organ which regulates buoyancy**: Air bladder

e. **Animal which exhibits alternation of generation**: Obelia

f. **An oviparous animal with mammary gland**: Echidna

---

13. Excretory organs of different animals are given below. Choose correctly and write in the space provided.

- a. Balanoglossus ↔ Proboscis gland
- b. Leech ↔ Nephridia
- c. Locust ↔ Malpighian tubule
- d. Liver fluke ↔ Flame cells
- e. Sea urchin ↔ Absent
- f. Pila ↔ Metanephridia