ZOO603 – FISH BIOLOGY

MID TERM MOST IMPORTANT QUESTIONS

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GROUP LINK: https://chat.whatsapp.com/BjC6W0jZx8o9yaC2ISh1Gu

1. What is lateral line system?

The lateral line system is a specialized sensory system that allows fish to detect movements and vibrations in the water around them. It consists of a line of fluid-filled canals and sensory cells (called neuromasts) that run along each side of the fish's body from head to tail. These sensory cells respond to changes in water pressure and movement, helping the fish:

- Detect predators or prey nearby
- Navigate in dark or murky waters
- Maintain schooling behavior with other fish
- Avoid obstacles and sense currents

2. Give some examples of herbivore fishes.

Here are some common examples of herbivorous fishes — fish that primarily feed on plants, algae, or phytoplankton:

1. ***Parrotfish*** – Scrape algae from coral reefs using beak-like teeth.
2. ***Surgeonfish (e.g., Blue Tang)*** – Graze on algae growing on rocks and coral.
3. ***Molly (Poecilia sphenops)*** – Eat algae and plant matter in freshwater habitats.
4. ***Siamese Algae Eater*** – Known for consuming algae in aquariums.
5. ***Silver Dollar Fish*** – Freshwater fish that feed on soft aquatic plants.
6. ***Grass Carp*** – Feed on a variety of aquatic plants and are used for weed control.
7. ***Tilapia (some species)*** – Primarily herbivorous, feeding on algae and plant material.

3. Write general features of Osteichthyes.

General Features of Osteichthyes:

1. ***Bony Skeleton:*** Their internal skeleton is made primarily of bone (unlike cartilaginous fishes).
2. ***Swim Bladder:*** Most have a swim bladder, an internal gas-filled organ that helps maintain buoyancy.
3. ***Gills Covered by Operculum:*** Gills are protected by a bony flap called the operculum, aiding in respiration.
4. ***Scales:*** Their body is usually covered with overlapping cycloid or ctenoid scales.
5. ***Paired Fins:*** They have paired pectoral and pelvic fins for stability and movement.
6. ***Two-Chambered Heart:*** Like all fishes, they have a two-chambered heart (one atrium and one ventricle).
7. ***External Fertilization:*** Most bony fishes reproduce via external fertilization, though some are exceptions.
8. ***Lateral Line System:*** Present for detecting water vibrations and movement.
9. ***Well-Developed Eyes and Sense Organs:*** Helps them navigate, hunt, and avoid predators.

- ***Examples:*** Rohu, Catla, Salmon, Tuna, Tilapia.

4. Write types and functions of pectoral fins.

Pectoral fins are the paired fins located on each side of a fish's body, just behind the head. They play important roles in movement and balance.

Types of Pectoral Fins (based on function or shape):

1. ***Wing-like Pectoral Fins:***
   - Seen in flying fish and rays.
   - Used for gliding above water or swimming gracefully.
2. ***Oar-like Pectoral Fins:***
   - Found in slow-swimming fishes like wrasses.
   - Help in precise movements and hovering.
3. ***Lobed Pectoral Fins:***
   - Present in lobe-finned fishes like coelacanths.
   - Thought to be evolutionary precursors of tetrapod limbs.
4. ***Pointed or Narrow Pectoral Fins:***
   - Found in fast swimmers like tuna.
   - Reduce drag and aid in high-speed swimming.

Functions of Pectoral Fins:

1. ***Steering and Maneuvering:*** Help fish turn left or right and make sharp movements.
2. ***Balancing and Stabilizing:*** Maintain equilibrium during swimming and resting.
3. ***Braking:*** Used to slow down or stop forward motion.
4. ***Lift Generation:*** In some species, like sharks and rays, they help lift the body while swimming.
5. ***Locomotion:*** In certain fishes, like wrasses or gobies, they help in slow and precise swimming.

5. Which kind of food herbivore fishes eat?

Herbivorous fishes primarily eat plant-based food found in their aquatic environments. Their diet typically includes:

1. Algae:

- The most common food for herbivorous fishes.
- Includes green algae, blue-green algae (cyanobacteria), and diatoms.
- Eaten by species like surgeonfish**,** parrotfish, and mollies.

2. Aquatic Plants:

- Soft, submerged or floating plants like duckweed, hydrilla, and elodea.
- Consumed by grass carp and silver dollar fish.

3. Periphyton:

- A mix of algae, microbes, and detritus that grow on surfaces in water.
- Scraped or grazed by many herbivorous species.

4. Phytoplankton:

- Microscopic plant-like organisms floating in water.
- Filter-fed by fishes like tilapia and some milkfish.

5. Vegetables (in captivity):

- In aquariums or fish farms, herbivorous fishes are often fed lettuce**,** spinach, peas, or zucchini.

6. What do you know about Romer's classification?

Romer's classification is a system of classifying vertebrates, especially fishes and other chordates, proposed by the American paleontologist Alfred Sherwood Romer. Romer grouped vertebrates based on their evolutionary relationships and structural features, focusing on their skeletal and anatomical traits. Romer's classification was significant because it emphasized the evolutionary development of vertebrates, showing how fishes were the earliest vertebrates and how they gave rise to amphibians and other land-dwelling animals. His work is still referenced today in evolutionary and comparative fish biology. According to Romer, fishes are placed under the subphylum Vertebrata and divided mainly into three major classes:

1. ***Agnatha*** – Jawless fishes (e.g., lampreys and hagfish)
2. ***Chondrichthyes*** – Cartilaginous fishes (e.g., sharks, rays)
3. ***Osteichthyes*** – Bony fishes (e.g., rohu, tilapia)

7. What is the function of lateral line system in fishes?

The lateral line system in fishes functions as a specialized sensory organ that detects vibrations, water currents, and pressure changes in the surrounding water. This system helps fish sense movement around them, allowing them to detect predators, locate prey, avoid obstacles, and swim in coordinated schools. It works through small sensory units called neuromasts, which are embedded along a line running down each side of the fish's body. The lateral line is especially useful in dark or murky waters, where vision is limited.

8. Differentiate between Sarcoptergyii and Actinoptergyii.

Sarcopterygii (Lobe-finned fishes) have fleshy, lobed paired fins connected to the body by a single bone. Their fins are muscular and resemble limbs, which is why they are considered the ancestors of terrestrial vertebrates. They typically have a more robust skeletal structure inside their fins. Examples include coelacanths and lungfishes.

Actinopterygii (Ray-finned fishes) have fins supported by long, thin bony rays or spines, with little muscle inside the fins themselves. These fins are more flexible and fan-like. This group includes the majority of modern fishes, such as salmon, trout, and goldfish.

9. Differentiate between middle feeders and Marginal feeders.

Middle feeders are fishes that feed in the middle layers of the water body, neither near the surface nor at the bottom. They often prey on small fish, plankton, or insects found suspended in mid-water. Examples include many types of trout and perch.

Marginal feeders, on the other hand, feed near the edges or margins of water bodies, such as along shorelines, riverbanks, or among vegetation. They often feed on insects, plants, or small animals found close to the water's edge. Examples include some species of minnows and catfish.

10. How dorsal fins help fish in locomotion?

Dorsal fins play an important role in locomotion by providing stability and balance while swimming. Located on the back (dorsal side) of the fish, these fins help prevent rolling or unwanted side-to-side movement as the fish moves forward. This stability allows the fish to swim straight and make controlled turns. Additionally, in some species, the dorsal fin can assist in sudden stops or quick changes in direction, helping the fish maneuver efficiently in water.

11. What are different types of scales in fishes?

Fishes have different types of scales that protect their bodies and reduce water resistance. The main types of fish scales are:

1. ***Placoid scales:*** Found in cartilaginous fishes like sharks and rays. These are small, tooth-like structures with a tough outer layer of enamel and a central pulp cavity.
2. ***Cycloid scales:*** Found in many bony fishes such as carp and salmon. These scales are smooth, thin, and circular with growth rings.
3. ***Ctenoid scales:*** Present in fishes like perch and bass. These are similar to cycloid scales but have tiny comb-like projections (ctenii) on their edges.
4. ***Ganoid scales:*** Found in primitive fishes like gars and bichirs. These scales are thick, diamond-shaped, and covered with a hard, shiny layer of ganoine.

12. Differentiate between herbivore, carnivore and omnivore.

The difference between herbivores, carnivores, and omnivores lies in their diet:

- **Herbivores** are fish that primarily eat plants, algae, and other plant-based materials. Examples include parrotfish and grass carp.
- **Carnivores** feed mainly on other animals, such as smaller fish, insects, or zooplankton. Examples include pikes and sharks.
- **Omnivores** consume both plant and animal matter, giving them a varied diet. Examples include catfish and tilapia.

13. Write classification of barbles.

Here's the classification of Barbels in fish biology:

- ***Kingdom:*** Animalia
- ***Phylum:*** Chordata
- ***Class:*** Osteichthyes (bony fishes)
- ***Order:*** Cypriniformes
- ***Family:*** Cyprinidae
- ***Genus:*** Barbus
- ***Common Name:*** Barbels

14. Write names of Voracious fishes.

Voracious fishes are those that have a very aggressive feeding behavior and consume large amounts of food quickly. Some common examples of voracious fishes include: Catfish, Piranha, Largemouth bass, Barracuda, Northern pike, Tigerfish, Giant gourami.

15. Write names of chambers of fish heart.

The heart of a fish typically has two main chambers:

1. ***Atrium*** – The upper chamber that receives deoxygenated blood from the body.
2. ***Ventricle*** – The lower, muscular chamber that pumps blood to the gills for oxygenation.

Additionally, there are two smaller structures:

3. ***Sinus venosus*** – A thin-walled sac that collects blood before it enters the atrium.
4. ***Conus arteriosus*** (or bulbus arteriosus in some fishes) – A muscular tube that helps smooth the flow of blood leaving the ventricle towards the gills.

16. What is parasitic feeding? Define with examples.

Parasitic feeding is a mode of nutrition where one organism (the parasite) lives on or inside another organism (the host) and feeds on its tissues, fluids, or nutrients, often harming the host in the process. The parasite benefits by gaining food and shelter, while the host may suffer from reduced health or damage. Examples of parasitic feeding in fishes include:

- ***Lampreys***, which attach to other fish and suck their blood.
- ***Fish lice (Argulus)***, external parasites that feed on the skin and blood of fish.
- ***Isopods***, crustaceans that live in the mouths or on the bodies of fish, feeding on their tissues.

17. Explain Muller's classification.

Muller's classification is a system used to categorize fishes based on their feeding habits and the position of their mouth. This classification helps understand how different fish species adapt to their environments by specializing in various feeding strategies. Muller divided fishes into several groups such as:

1. ***Surface feeders*** – Fish that feed at the water surface, often having an upward-facing mouth (e.g., flying fish).
2. ***Mid-water feeders*** – Fish that feed in the middle layers of water, usually with a terminal mouth (e.g., trout).
3. ***Bottom feeders*** – Fish that feed near or on the substrate, often with a downward-facing mouth (e.g., catfish).
4. ***Parasitic feeders*** – Fish that feed by attaching to and feeding off other fishes (e.g., lampreys).

18. What is Protrusible mouth?

Protrusible mouth is a type of mouth that can extend outward from the fish's face. This adaptation allows the fish to quickly thrust its mouth forward to capture prey or suck in food from a distance. The protrusible mouth increases the fish's reach and feeding efficiency, especially when hunting fast or elusive prey. Many bony fishes, like bass and cichlids, have this feature, which helps them grab food with precision.

19. Write importance of taxonomy and systematics in fishes.

Taxonomy provides a structured way to name, describe, and categorize fishes based on their physical characteristics, which helps scientists communicate clearly about different species and avoid confusion. It also aids in identifying new species and organizing fish into groups based on similarities.

Systematics, on the other hand, studies the evolutionary relationships among fish species. It helps trace the lineage and history of fishes, showing how different species are related and how they have evolved over time. This knowledge is essential for conservation efforts, managing fisheries, and understanding the ecological roles of different fishes.

20. Define Jugular and Pelvic fins.

Jugular fins are a special type of pelvic fins located in front of the pectoral fins, near the throat or "jugular" region of the fish. Not all fishes have jugular fins; when present, they assist in stability and precise movements.

Pelvic fins (also called ventral fins) are paired fins located on the belly or underside of the fish, usually behind or below the pectoral fins. They help in steering, balancing, braking, and maintaining posture during swimming.

21. How gills are protected in fishes?

The gills—which are vital for breathing—are protected by a bony flap called the operculum. The operculum covers the gill chambers on each side of the fish's head, shielding the delicate gill filaments from physical damage and harmful particles in the water. Besides protection, the operculum also plays a role in respiration by helping to pump water over the gills, allowing efficient oxygen exchange. This protective structure is characteristic of bony fishes (Osteichthyes). In contrast, cartilaginous fishes like sharks have multiple exposed gill slits without an operculum.

22. Write characteristics of Cephalospidomorphi.

1. They are jawless fishes (Agnatha) with eel-like, elongated bodies.
2. They have a circular, sucker-like mouth with horny teeth used to attach to other fish.
3. Their skeleton is made of cartilage, lacking true bones.
4. They possess seven pairs of gill openings instead of a single gill cover.
5. They lack paired fins but have a dorsal fin and tail fin.
6. Lampreys have a notochord throughout life instead of a well-developed vertebral column.
7. They have a simple heart with two chambers and a rudimentary brain.
8. Many are parasitic, feeding on the blood of other fishes.
9. They have a single nostril located on the top of the head.
10. Reproduction involves spawning in freshwater, after which adults usually die.

23. Define parasitic fishes with examples.

Parasitic fishes are those that live on or inside other fish and feed off their tissues, blood, or body fluids, often harming the host. They rely on their hosts for nutrition and may cause damage or disease. Examples include lampreys, which attach to fish and suck their blood, and fish lice (Argulus), which cling to the skin of fish and feed on their blood. These parasitic relationships affect fish health and can impact fish populations.

24. Write characteristics of class Myxini.

1. They are jawless, eel-like marine fishes.
2. Their bodies are soft, slimy, and covered with thick mucus-producing glands.
3. They lack paired fins and have a simple, elongated body shape.
4. Skeleton is made of cartilage without vertebrae (they have a notochord instead).
5. They have a single nostril opening into a nasal sac.
6. Eyes are rudimentary and often covered by skin.
7. They have multiple gill openings (usually 5 to 15 pairs) that open independently to the outside.
8. Hagfishes are scavengers, feeding on dead or dying fish and marine animals.
9. They possess slime glands that produce large amounts of slime for defense.
10. Reproduction details are not well known, but they lay eggs.

25. What will happen if there is too much plankton in the ocean?

If there is too much plankton in the ocean, it can lead to several problems. Excessive plankton growth, especially of certain algae (called algal blooms), can reduce water quality by blocking sunlight and disrupting the balance of marine ecosystems. When these large plankton populations die and decompose, they consume a lot of oxygen in the water, causing hypoxia or “dead zones” where oxygen levels are too low to support most marine life. This can lead to the death of fish and other aquatic organisms, harming biodiversity and fisheries. Some algal blooms also produce toxins that can poison marine animals and even humans. So, too much plankton can upset the ocean’s health and its ability to support life.

26. What are Pneumatic sacs?

Pneumatic sacs are air-filled sacs found in some fishes that help with buoyancy control. These sacs allow the fish to regulate its position in the water column without constantly swimming. In many bony fishes, the pneumatic sac is connected to the digestive tract and is called a swim bladder. By adjusting the amount of gas in the swim bladder, fish can float at different depths easily. Pneumatic sacs can also sometimes aid in respiration and sound production.

27. What are Gill Rakers?

Gill rakers are bony or cartilaginous projections located on the inner side of a fish's gill arches, near the gill filaments. Their main function is to filter food particles from the water as it passes over the gills, preventing debris and unwanted material from damaging the delicate gill filaments. Gill rakers also help in feeding, especially in filter-feeding fishes, by trapping plankton or small prey. The size and spacing of gill rakers vary depending on the fish's diet—fishes that feed on tiny plankton have long, closely spaced gill rakers, while those that eat larger prey have shorter, widely spaced ones.

28. Write types of Dorsal Fins.

There are generally three types of dorsal fins found in fishes:

1. ***Spinous dorsal fin:*** This type has hard, sharp spines that provide protection against predators. These spines are usually rigid and can be raised or lowered. Example: catfish.
2. ***Soft-rayed dorsal fin:*** Made up of flexible, soft rays instead of spines, this fin helps with stability and smooth swimming. Example: most bony fishes like trout.
3. ***Adipose dorsal fin:*** A small, fleshy fin without spines or rays, located behind the soft dorsal fin. It's found in some fishes like salmon and catfish and is thought to help with stability during swimming.

29. Write characteristics of Agnatha.

1. They lack jaws and paired fins.
2. Their bodies are elongated and eel-like.
3. Skeleton is made of cartilage, without true bones.
4. They have a notochord that persists throughout life.
5. Mouth is circular and sucker-like, often with horny teeth (in some species).
6. They possess multiple gill openings (7 pairs or more).
7. Skin is smooth and scaleless.
8. They have a simple heart with two chambers.
9. Mostly parasitic or scavengers, feeding on blood or dead matter.
10. Examples include lampreys and hagfishes.

30. Write classification of fishes on the basis of feeding.

Based on feeding habits, fishes can be classified into three main types:

1. ***Herbivorous fishes:*** These fishes feed mainly on plants, algae, and other plant materials. Examples include grass carp and parrotfish.
2. ***Carnivorous fishes:*** These fishes feed primarily on other animals like smaller fishes, insects, or zooplankton. Examples include sharks, pikes, and catfish.
3. ***Omnivorous fishes:*** These fishes consume both plant and animal matter, having a varied diet. Examples include tilapia and catfish.

31. Differentiate between telencephalon and diencephalon.

Telencephalon is the largest part of the brain, forming the cerebral hemispheres. It is responsible for higher brain functions like voluntary movement, sensory perception, learning, and memory.

Diencephalon is located beneath the telencephalon and includes structures like the thalamus and hypothalamus. It acts as a relay center for sensory information and regulates autonomic functions, hormones, temperature, and emotions.

32. What is holocephali digestive system?

The digestive system of Holocephali (chimaeras or ratfishes) is relatively simple and adapted to their diet. It includes a mouth with grinding tooth plates used to crush hard-shelled prey. The esophagus leads to a short stomach, which is followed by a long, coiled intestine that aids in digestion and nutrient absorption. Unlike some other fishes, Holocephali lack a stomach valve called a spiral valve, which is common in sharks. Their digestive tract is efficient for processing their diet of mollusks, crustaceans, and small fishes.

33. Name three parts of fish brain.

Three main parts of a fish brain are:

1. Forebrain (Prosencephalon)
2. Midbrain (Mesencephalon)
3. Hindbrain (Rhombencephalon)

34. Name recommended food for omnivore fishes.

Recommended food for omnivore fishes includes:

- Algae and aquatic plants
- Small insects and insect larvae
- Zooplankton
- Detritus (organic matter)
- Commercial fish pellets or flakes containing both plant and animal ingredients

35. Explain feeding system of Carp.

The feeding system of carp is adapted for bottom feeding and omnivorous diet. Carp have a protractile mouth located on the underside of their head, which helps them suck up food from the substrate. Their mouths are equipped with sensitive barbels that detect food particles in murky water. Carp feed on a variety of items such as detritus, plant material, small invertebrates, and larvae. Inside the mouth, they have pharyngeal teeth that help grind and crush the food before swallowing. This feeding system allows carp to efficiently gather and process food from the bottom of rivers, lakes, and ponds.

36. Explain Ramsar classification.

Ramsar classification is a system used to categorize wetlands based on their ecological characteristics and importance. It was developed under the Ramsar Convention, an international treaty for wetland conservation. The classification divides wetlands into several types, such as:

1. ***Marine/coastal wetlands*** – including coral reefs, tidal flats, and estuaries.
2. ***Inland wetlands*** – such as rivers, lakes, marshes, and peatlands.
3. ***Human-made wetlands*** – like reservoirs, rice paddies, and fish ponds.

37. What is Fugu Poisoning?

Fugu poisoning occurs when someone eats the flesh or organs of the fugu fish (pufferfish) that contain tetrodotoxin, a powerful neurotoxin. This toxin blocks nerve signals, causing symptoms like numbness, dizziness, paralysis, and in severe cases, respiratory failure or death. Fugu is considered a delicacy in some countries, especially Japan, but must be prepared carefully by licensed chefs to remove toxic parts and avoid poisoning.

38. Write role of skeleton in fishes.

The skeleton in fishes plays several important roles. It provides structural support to the body, giving shape and protecting vital organs. It also serves as an attachment point for muscles, enabling efficient movement and swimming. The skeleton protects delicate parts like the brain and gills, and in many fishes, it helps in buoyancy control. Additionally, the skeleton houses bone marrow, which is important for producing blood cells. Overall, the skeleton is essential for protection, movement, and maintaining the fish's body structure.

39. Explain phylogenetic situation in fishes.

The phylogenetic situation in fishes refers to their evolutionary relationships and how different fish groups have evolved over time. Fishes are considered the earliest vertebrates, originating in the Cambrian period. They show a wide range of evolutionary adaptations from jawless fishes (Agnatha) like lampreys and hagfishes to jawed fishes (Gnathostomes), which include cartilaginous fishes (Chondrichthyes) like sharks and rays, and bony fishes (Osteichthyes).

Phylogenetically, fishes represent a paraphyletic group because they gave rise to other vertebrates such as amphibians, reptiles, birds, and mammals. Studying their phylogenetic position helps understand the evolutionary development of vertebrate features like jaws, paired fins, and lungs. The classification and evolutionary history of fishes show a progression from simple to more complex anatomical and physiological structures.

40. Define Cannibalistic, Veracious and Piscivores fishes.

- ***Cannibalistic fishes:*** These are fishes that feed on other individuals of their own species. Cannibalism may occur due to food scarcity or territorial behavior.
- ***Voracious fishes:*** Fishes that have a very strong appetite and consume large amounts of food rapidly. They are aggressive feeders and often top predators in their habitats.
- ***Piscivores:*** Fishes that primarily feed on other fishes. They are carnivorous and depend on fish as their main food source.

41. Name different types of fish bodies with examples.

Here are different types of fish body shapes with examples:

1. ***Fusiform (spindle-shaped):*** Streamlined for fast swimming. *Example:* Tuna, Salmon
2. ***Compressiform (laterally compressed):*** Flattened side to side, good for quick turns. *Example:* Angelfish, Butterflyfish
3. ***Depressiform (dorsoventrally flattened):*** Flattened top to bottom, suited for bottom dwelling. *Example:* Rays, Skates
4. ***Anguilliform (eel-like):*** Long, slender, and flexible for wriggling movements. *Example:* Eels, Lampreys
5. ***Globiform (rounded or spherical):*** Rounded body, usually slow swimmers. *Example:* Pufferfish, Ocean sunfish

42. Write functions of Pneumatic sacs in osteichthyes.

1. ***Buoyancy control:*** Helps fish maintain neutral buoyancy, allowing them to stay at a desired water depth without sinking or floating.
2. ***Respiration:*** In some species, it functions as a lung for gas exchange, especially in air-breathing fishes.
3. ***Sound production and reception:*** Assists in producing and detecting sounds, aiding in communication and environmental awareness.
4. ***Pressure regulation:*** Helps fish adjust to changes in water pressure during vertical movement.

43. Write characteristics of pellet.

1. ***Compact and uniform:*** Pellets are small, dense, and uniform in size and shape, making them easy to handle and feed.
2. ***Nutritionally balanced:*** Formulated to provide essential nutrients like proteins, fats, vitamins, and minerals for fish growth and health.
3. ***Water-stable:*** Designed to resist breaking down quickly in water, ensuring the fish can consume them before they dissolve.
4. ***Varied types:*** Available in floating or sinking forms to suit different feeding habits (surface feeders or bottom feeders).
5. ***Convenient:*** Easy to store, transport, and measure for controlled feeding.

44. Write functions of stomach and pyloric caeca.

Functions of the stomach:

- The stomach stores ingested food temporarily.
- It secretes digestive enzymes and acids that break down proteins and other food components.
- It helps in the mechanical digestion by churning food to mix it with digestive juices.

Functions of pyloric caeca:

- Pyloric caeca are finger-like projections located near the junction of the stomach and intestine.
- They increase the surface area for digestion and absorption.
- They secrete enzymes that aid in the digestion process.
- They help in nutrient absorption and improve digestive efficiency.

45. How osmoregulation occurs in fishes?

Osmoregulation in fishes is the process by which they maintain the balance of water and salts in their bodies to survive in different aquatic environments.

- In freshwater fishes, the surrounding water is less salty than their body fluids. They constantly gain water by osmosis and lose salts. To cope, they excrete large amounts of dilute urine and actively absorb salts through their gills.
- In marine fishes, the surrounding seawater is saltier than their body fluids. They lose water by osmosis and gain salts. To maintain balance, they drink seawater, excrete excess salts through special cells in their gills, and produce small amounts of concentrated urine.

46. Explain predatory adaptations in fishes.

Predatory fishes have several adaptations that help them catch and eat prey efficiently. They often have sharp, pointed teeth or specialized crushing teeth for gripping or breaking down prey. Their streamlined bodies enable quick, agile movements to chase or ambush prey. Many possess keen eyesight and sensitive lateral line systems to detect vibrations and movements in water. Some have protrusible mouths that can extend to capture prey quickly. Additionally, strong jaws and powerful muscles aid in seizing and swallowing prey. These adaptations make predatory fishes effective hunters in their aquatic environments.

47. What adaptations have been made in gills to improve respiratory system?

Gills have several adaptations to improve the efficiency of respiration in fishes:

1. ***Large surface area:*** Gills have numerous thin filaments covered with tiny structures called lamellae, greatly increasing the surface area for gas exchange.
2. ***Thin membranes:*** The lamellae have very thin walls, allowing rapid diffusion of oxygen and carbon dioxide between water and blood.
3. ***Counter-current flow:*** Blood flows through gill capillaries in the opposite direction to water passing over the gills, maximizing oxygen uptake.
4. ***Rich blood supply:*** Gills are highly vascularized, ensuring a continuous flow of blood to transport oxygen efficiently.

5. ***Protection:*** Gills are covered by the operculum, protecting delicate structures while allowing water flow.

48. Write features of class Elasmobranchii.

1. They have a cartilaginous skeleton, lacking true bones.
2. Possess multiple gill slits (usually 5 to 7) on each side, without an operculum.
3. Body is covered with tough placoid scales (dermal denticles) that reduce friction.
4. They have paired pectoral and pelvic fins for maneuvering.
5. Possess well-developed jaws with sharp teeth that are continually replaced.
6. Lack a swim bladder; buoyancy is maintained by a large oily liver.
7. Have a spiral valve in the intestine to increase digestive surface area.
8. Reproduction may be oviparous, ovoviviparous, or viviparous depending on species.
9. Possess electroreceptors called ampullae of Lorenzini to detect prey.
10. They have a heterocercal tail (upper lobe longer than lower) aiding in propulsion.

49. Define Larvivorous fishes with examples.

Larvivorous fishes are fishes that feed mainly on the larvae of insects, especially mosquito larvae. They help control mosquito populations and reduce the spread of mosquito-borne diseases. Examples: Gambusia, (Mosquito fish), Poecilia (Guppy), Aplocheilus (Killifish).

50. Differentiate in Sinus Venous and Bulbous arteriosus in fishes.

The sinus venosus and bulbous arteriosus are two important parts of the fish heart that play distinct roles in circulation. The sinus venosus is located at the posterior end of the heart and acts as a collecting chamber for deoxygenated blood coming from the veins. It has thin, elastic walls and channels the blood smoothly into the atrium. Additionally, the sinus venosus helps regulate the heartbeat by acting as a pacemaker. On the other hand, the bulbous arteriosus is found at the anterior end of the heart, just after the ventricle. It has thick, muscular walls and functions to smooth out the pulsating blood flow coming from the ventricle before it moves to the gills. This helps maintain a steady blood pressure and prevents damage to the delicate gill tissues. Together, these two structures ensure efficient blood circulation in fishes.

51. Differentiate between Terminal Mouth and Inferior Mouth.

A **terminal mouth** is located at the front tip of the head, facing straight forward. Fishes with terminal mouths usually feed on prey directly in front of them, often in open water. Examples include trout and bass.

An **inferior mouth** is positioned on the underside of the head, facing downward. Fishes with inferior mouths are typically bottom feeders, scraping or sucking food from the substrate. Examples include catfish and carp.

52. Differentiate between ganoid and ctenoid scales.

Ganoid scales and ctenoid scales differ in structure and appearance:

Ganoid scales are thick, diamond-shaped, and have a shiny, enamel-like outer layer called ganoine. They are hard, heavy, and provide strong protection. These scales are found in fishes like gars and bichirs.

Ctenoid scales are thin, overlapping, and have tiny comb-like projections (ctenii) on their free edges. They are lighter and more flexible, allowing better movement. These scales are typical of most modern bony fishes like perch and bass.

53. Explain Berg's classification.

Berg's classification is a system used to categorize freshwater fishes based on their geographical distribution and evolutionary history. It divides fishes into three main groups:

1. ***Palaeogean group:*** These are ancient fishes with a wide distribution, often found in both freshwater and marine environments. They represent older lineages.
2. ***Arcto-Tertiary group:*** Fishes that evolved during the Tertiary period, mainly distributed in the Northern Hemisphere's temperate regions.
3. ***Recent group:*** These are newer species with limited geographical ranges, often adapted to specific local habitats.

Disclaimer:

For best results, it is advised NOT to rely on this file only. Go through video lectures, handouts and other sources as well.

Regards,
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