١. Osteichthyes (Bony Fishes)

- Origin: Early to middle Silurian period.
- Key Features:
- Endochondral bone replaces cartilage during development.
- Lung or swim bladder evolved from the gut.
- Unique cranial and dental characteristics.

٢. Class Sarcopterygii (Lobe-finned Fishes)

- Importance: Ancestors of tetrapods, pre-adapted for land with strong fins and lungs.
- Diversity:
- Only 7 species today (6 lungfish, 1 coelacanth).
- Early species had lungs, gills, and heterocercal tails.
- Coelacanth:
- Thought extinct but rediscovered in 1938.
- Diphycercal tail with a unique middle lobe.

٣. Class Actinopterygii (Ray-finned Fishes)

- Largest group: 96% of living fishes, 42 orders, 24,000 species.
- Key Groups:
- Chondrosteons: Primitive, e.g., sturgeons and paddlefishes.
- Neopterygians: Modern fishes (teleosts), e.g., gars, bowfins.
- Teleosts: Most diverse, adaptable to extreme environments.

٤. Structural and Functional Adaptations

- Locomotion:
- Myomeres (zigzag muscles) propel the fish.
- Fast fish use stiff tails; slow fish use flexible bodies.
- Buoyancy:
- Sharks: Use squaline in the liver.
- Bony Fishes: Use swim bladder for depth control.
- Respiration:
- Gills use countercurrent exchange to maximize oxygen intake.

- .Some use ram ventilation or gulp air

- :Osmoregulation

- .Freshwater: Hyperosmotic regulators (expel water, absorb salt)

- .Marine: Hypoosmotic regulators (drink seawater, excrete salt)

٥. Feeding Behavior

- .Carnivores dominate; other types include herbivores, suspension feeders, and scavengers

- .Specialized digestion: Short intestines for carnivores, coiled for herbivores

٦. Reproductive Strategies

- :Modes

- .Ovuliparity: Eggs are externally fertilized (e.g., salmon)

- .Oviparity: Internal fertilization; eggs laid outside (e.g., sharks)

- .Ovoviviparity: Internal development, nutrients from yolk (e.g., guppies)

- .Viviparity: Internal development, nutrients from parent (e.g., lemon sharks)

- .Hermaphroditism: Sequential sex changes (e.g., wrasses)

- Sexual Parasitism: Rare (e.g., deep-sea anglerfish).

٧. Reproductive Behavior

- Trade-offs: Large eggs with care vs. small eggs without care.
- Mate selection: Females choose based on size, color, and nesting abilities.