

Human body comprises of billions of cells performing a multitude of functions. In multicellular entities, a group of similar cells along with intercellular substances perform a particular function, which is termed as a tissue. These tissues form organs which in turn form the organ system. Understand in detail about this organization through Structural organization is animals notes provided here.

Topics Covered In Structural Organization In Animals

Animal Tissues

Organ and Organ System

Earthworm

Cockroach

Frog

Animal Tissues

Since the structure of cells varies as per their functions, tissues can broadly be classified into the following:

- Epithelial tissue - These tissues have free surface and are compactly arranged with very little intercellular matrix. There are two types of epithelial tissues:
- Simple epithelium - single layer of cells, functioning as a lining of body cavities, ducts and tubes. Based on structural modifications of cells, they are further classified into three types - squamous, cuboidal and columnar
- Compound epithelium - consists of two or more layers and protects the skin

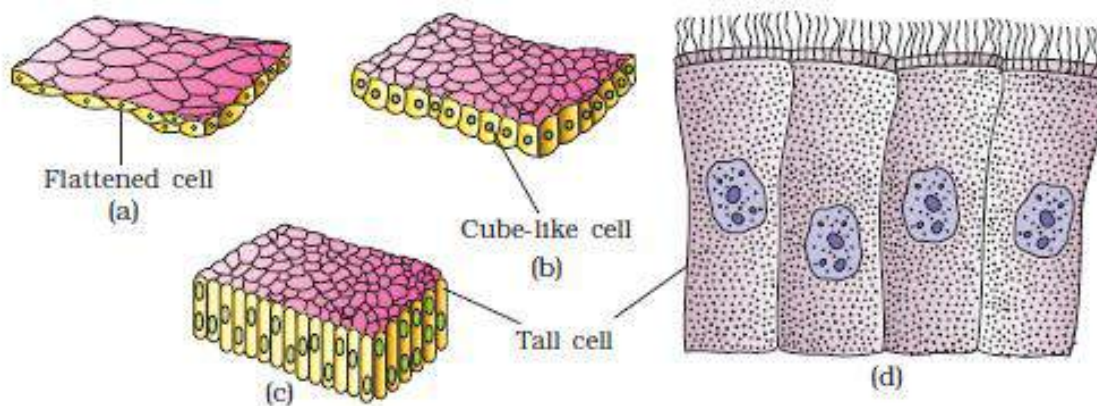


Figure Simple epithelium: (a) Squamous (b) Cuboidal (c) Columnar (d) Columnar cells bearing cilia

- Connective tissue - They link and support other tissues/organs of the body. These include soft connective tissue, cartilage, bone, adipose and blood. These fibres provide strength, elasticity and flexibility to the tissues. These tissues can furthermore be classified into - loose connective tissue (Aerolar and adipose tissues), dense connective tissue and specialized connective tissue

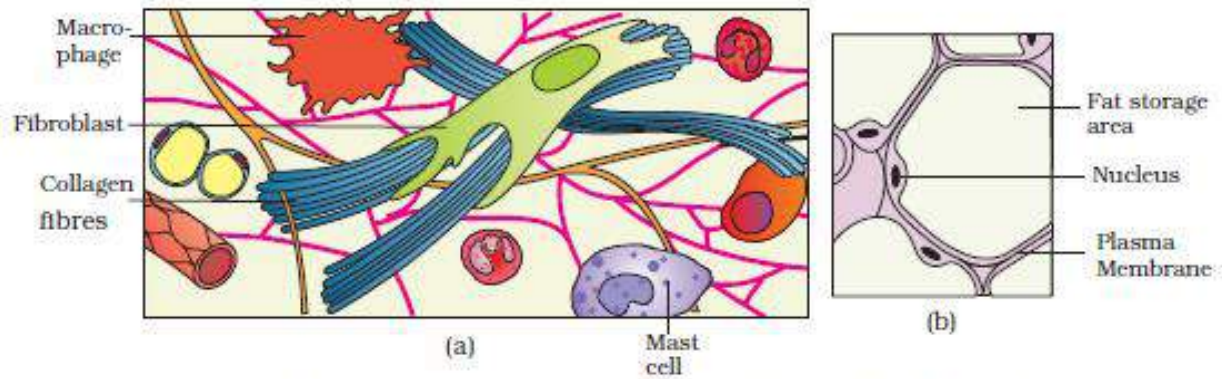


Figure Loose connective tissue : (a) Areolar tissue (b) Adipose tissue

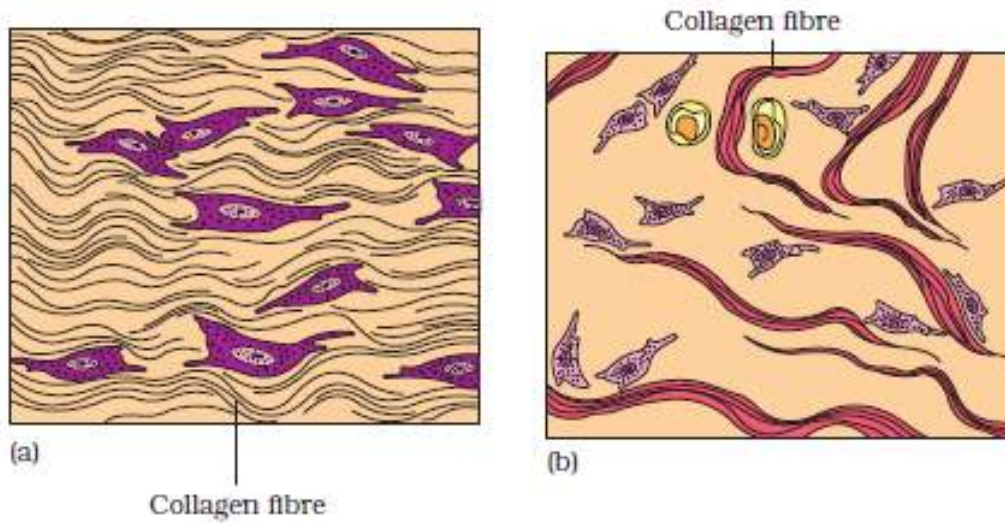


Figure Dense connective tissue:
(a) Dense regular
(b) Dense irregular

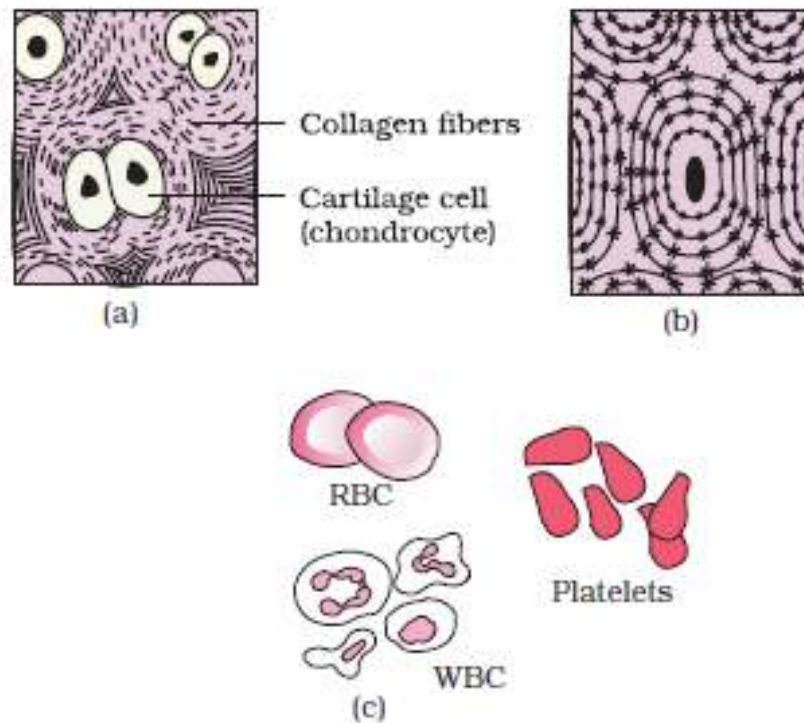


Figure Specialised connective tissues : (a) Cartilage (b) Bone (c) Blood

- Muscular tissue - muscles consist of many long, cylindrical fibres arranged in parallel arrays which are composed of numerous fine fibrils known as myofibrils. They bring about the movements of the body. These are of three types -
- Skeletal - closely attached to the skeletal bones. Striated muscle fibres are bundled together
- Smooth - they taper at both ends and do not show striations. The cell junctions hold them together and are bundled in a connective tissue sheath. They line the internal organs such as blood vessels, intestine, stomach and the intestine. They are involuntary in nature
- Cardiac muscles - it is a contractile tissue found in the heart. The cell junctions fuse the plasma membrane of these cells and make them stick together

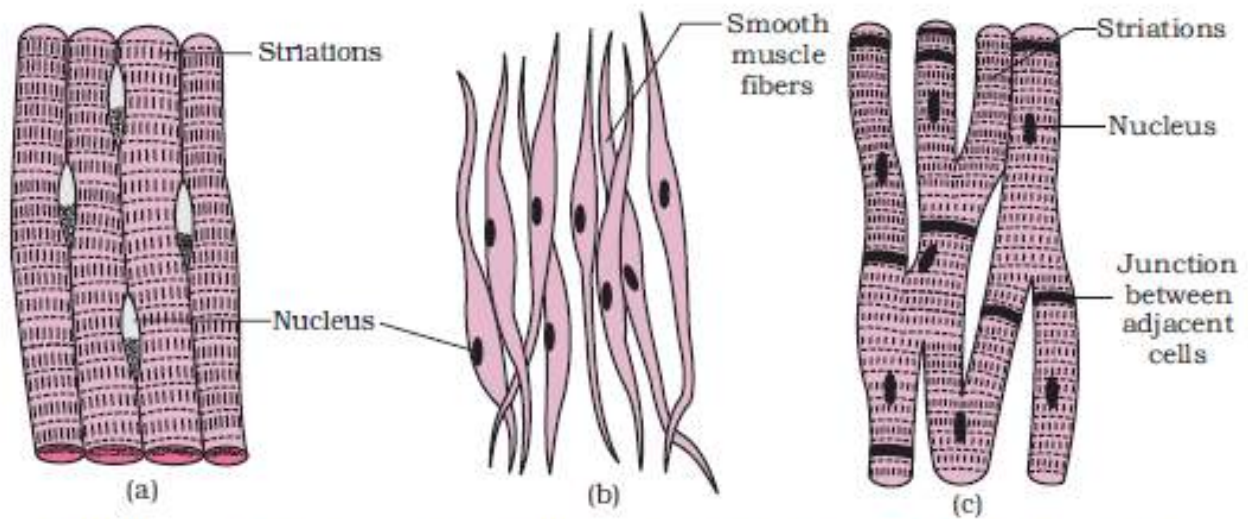


Figure Muscle tissue : (a) Skeletal (striated) muscle tissue (b) Smooth muscle tissue (c) Cardiac muscle tissue

- Neural tissue - Neurons (nerve cells) are a unit of neural system and are excitable cells constituting for the neural system, providing protection and support.

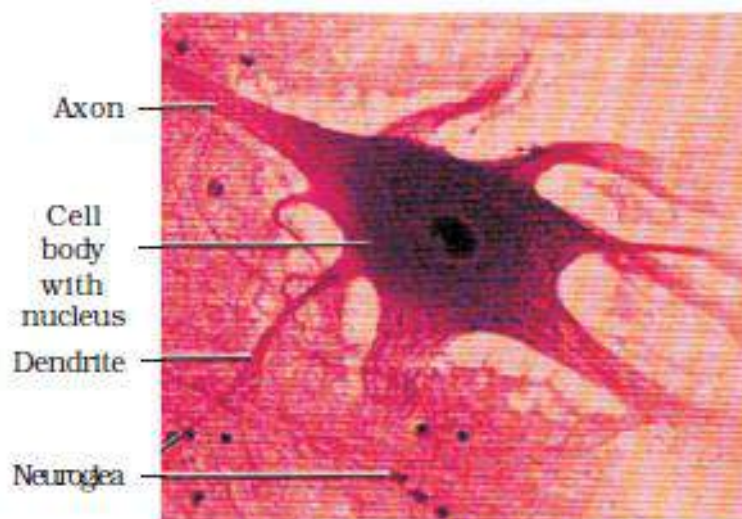


Figure Neural tissue

Earthworm

These are terrestrial invertebrates, reddish-brown in color, found in the upper moist layer of sand. They can be easily located by their faecal deposits known as worm casting. Common Indian earthworms are Pheretima and Lumbricus

- They have a long cylindrical body and the body is divided into more than a hundred short segments known as metamerer

- The dorsal blood vessel is represented by a dark medium mid-dorsal line situated in the dorsal side of the body while the ventral side is characterized by presence of genital openings
- The anterior end has the mouth and the prostomium which is a lobe serving as a mouth covering while the prostomium is sensory in function. Peristomium is the first segment containing the mouth
- Clitellum covers the 14-16 segments in an adult worm and the body is divided into three segments - preclitellar, clitellar and postclitellar segments

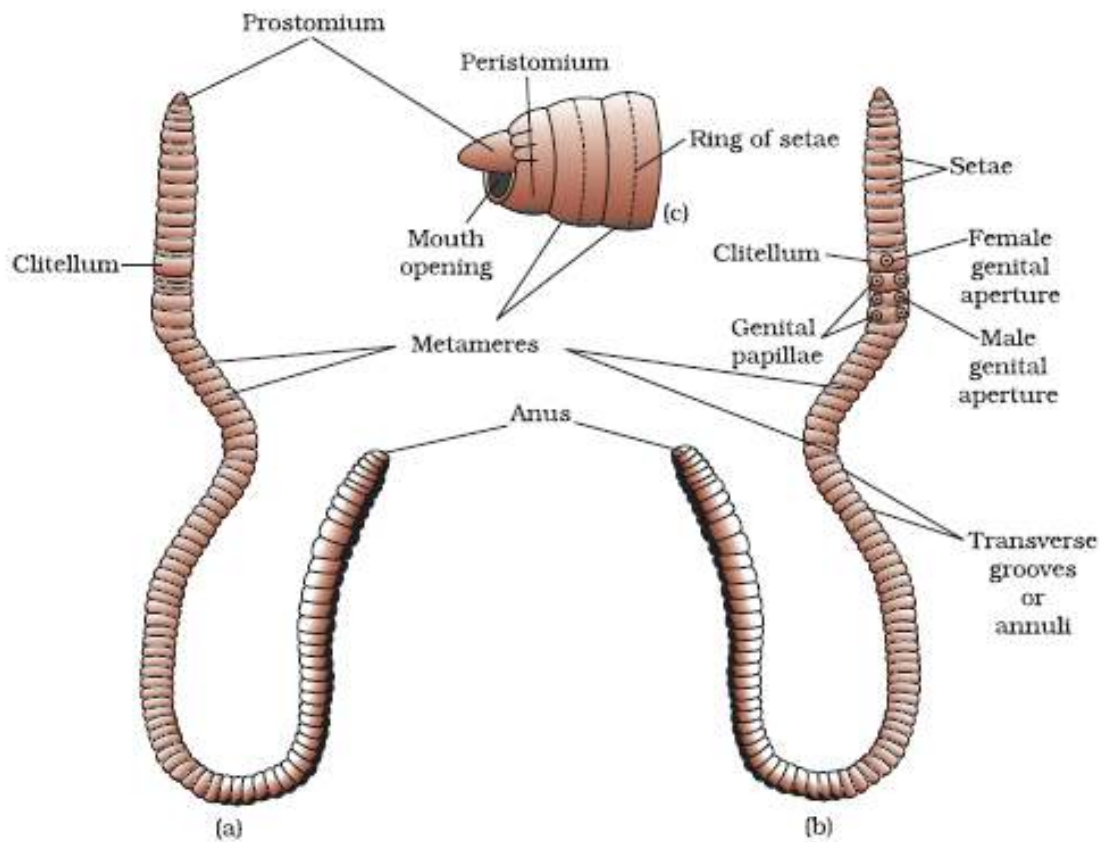


Figure Body of earthworm : (a) dorsal view (b) ventral view (c) lateral view showing mouth opening

Cockroach

They are black or brown bodied animals categorized under Phylum Arthropoda. They have a long antenna, legs and flat extension to the upper body wall concealing the head. The adults of the common species of cockroach are about 35-53mm long with wings extending beyond the tips of abdomen in males.

- Their body is segmented into three distinct regions - head, thorax and abdomen. The complete body is covered by a hard chitinous exoskeleton.
- The exoskeleton in each segment has sclerites(hardened plates) which are joined to each other by a thin and flexible articular membrane (Arthrodiol membrane)
- Triangular shaped head lies anteriorly at right angles to the longitudinal axis formed by the fusion of six segments. The head has a pair of compound eyes
- A pair of thread-like antennae(having sensory receptors) emerge from membranous sockets

present in front of the eyes

- Mouthparts consist of the labrum, a pair of mandibles, a pair of maxillae and a labium. A median flexible lobe serving as a tongue lies enclosed within the cavity by the mouthparts
- Thorax consists of - prothorax, mesothorax and metathorax. Each of the thoracic segment has a pair of walking legs

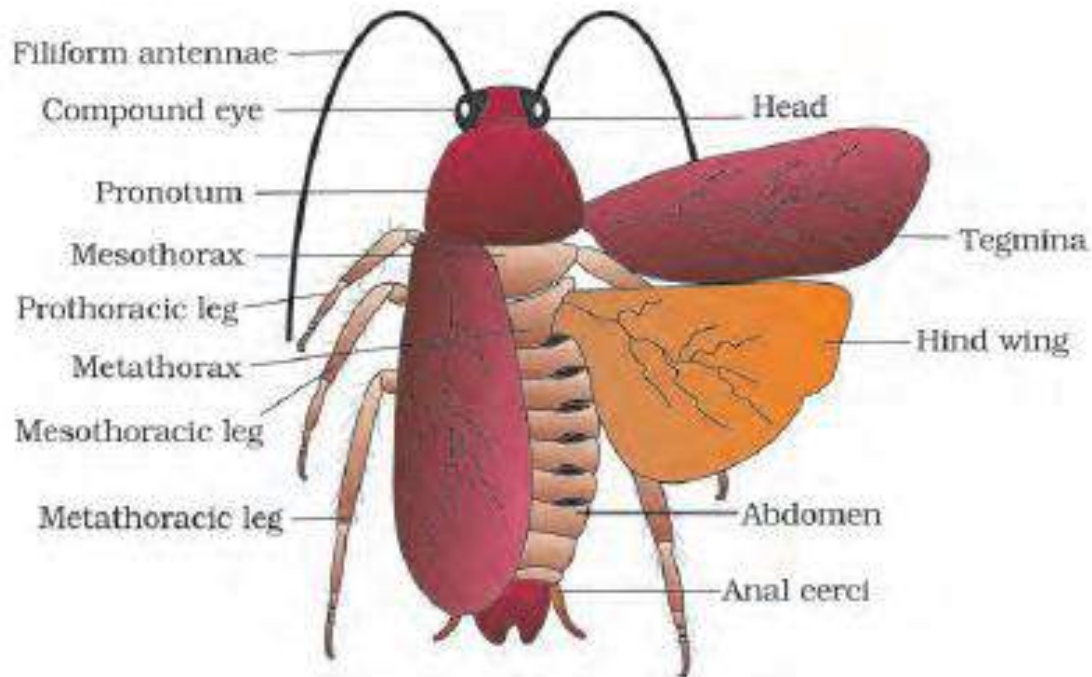


Figure External features of cockroach

Frog

Frogs are amphibians belonging to Phylum Chordata. Most common species in India is *Rana tigrina*. They are cold-blooded and exhibit camouflage. In order to protect themselves from extreme heat and cold, they take shelter through summer sleep and winter sleep.

They have a smooth and slippery skin due to the presence of mucus and absorbs water through the skin. Their body is divisible into head and trunk where a neck and tail are absent. A pair of nostrils are found just above the mouth with bulged eyes covered by nictitating membrane protecting them in water. The tympanum present on either side of the eye receives sound signals. The forelimbs(ending in four digits) and hindlimbs(ending in five digits) enable them to swim, walk, burrow and leap. They exhibit sexual dimorphism

Their body cavity accommodates different organ systems such as the digestive, circulatory, respiratory, nervous, excretory and reproductive system with well-developed structures and functions.

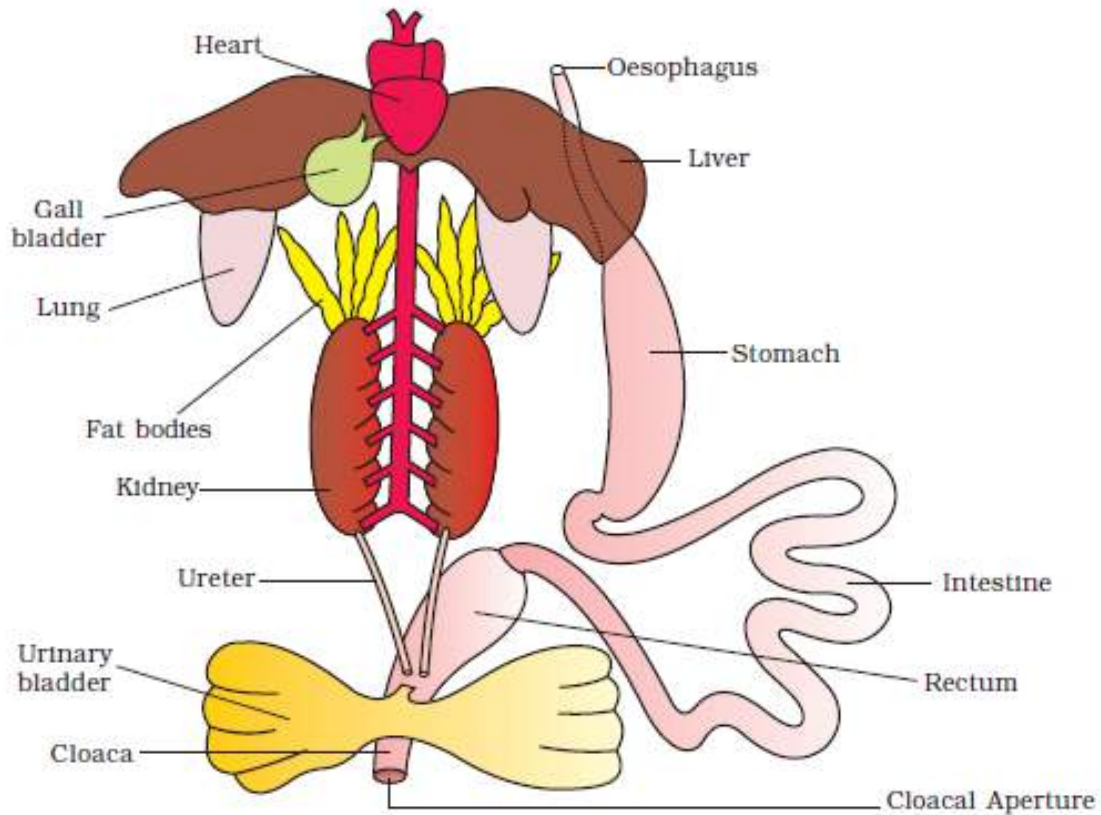


Figure Diagrammatic representation of internal organs of frog showing complete digestive system

