

Chapter: Structural Organisation in Animals

1. Levels of Structural Organization:

1.1 Cells:

- Cells are the basic structural and functional units of life.
- They have specific structures and perform specialized functions.
- Examples include nerve cells, muscle cells, and epithelial cells.

About Cells

Cells are the basic structural and functional units of all living organisms.

They are microscopic in nature and can only be seen under a microscope.

Cells are surrounded by a cell membrane, which regulates the passage of substances in and out of the cell.

The main types of cells are prokaryotic cells (such as bacteria) and eukaryotic cells (found in plants, animals, fungi, and protists).

Prokaryotic cells lack a nucleus and other membrane-bound organelles, while eukaryotic cells have a true nucleus and various organelles.

The nucleus is the control center of the cell, containing DNA, which carries genetic information.

Organelles are specialized structures within cells that perform specific functions. Examples include mitochondria, responsible for energy production, and chloroplasts, involved in photosynthesis in plant cells.

Cells have a cytoplasm, a gel-like substance that fills the cell and houses the organelles.

Cells can reproduce through cell division, either by mitosis (for growth and tissue repair) or meiosis (for the production of gametes in sexual reproduction).

Different types of cells have unique structures and functions to fulfill specific roles in the body, such as nerve cells transmitting signals or muscle cells facilitating movement.

1.4 Organ Systems:

- Organ systems are groups of organs that work together to perform specific functions.
- Examples include the digestive system, respiratory system, circulatory system, nervous system, skeletal system, muscular system, and reproductive system.
- Each organ system has specialized structures and functions that contribute to the overall survival and functioning of the organism.

About Organ Systems:

Organ systems are groups of organs that work together to perform specific functions in the body.

The human body has several organ systems, including the circulatory system, respiratory system, digestive system, nervous system, skeletal system, muscular system, endocrine system, urinary system, reproductive system, and integumentary system.

Each organ system has a specific role and contributes to the overall functioning and survival of the body.

Organ systems are interconnected and often rely on each other to carry out complex physiological processes necessary for life.

The circulatory system, for example, includes the heart, blood vessels, and blood, and is responsible for transporting oxygen, nutrients, hormones, and waste products throughout the body.

The respiratory system, composed of the lungs and airways, facilitates the exchange of oxygen and carbon dioxide, enabling the body to obtain oxygen and eliminate waste gases.

The digestive system, including organs such as the stomach, liver, and intestines, is responsible for breaking down food, absorbing nutrients, and eliminating waste.

The nervous system, consisting of the brain, spinal cord, and nerves, coordinates and controls bodily functions and enables communication between different parts of the body.

Each organ system has its own unique structures and functions, but they often work together in a coordinated manner to maintain homeostasis and ensure the body's overall health and well-being.

Imbalances or disorders within organ systems can lead to various diseases and medical conditions, highlighting the importance of their proper functioning.

The respiratory system works in coordination with the cardiovascular system, as oxygenated blood is transported to body tissues and deoxygenated blood is returned to the lungs for oxygenation.

The nose and nasal cavity filter, warm, and moisten the air before it reaches the lungs.

The pharynx serves as a common pathway for both air and food, branching into the trachea (windpipe) and esophagus (food pipe).

The larynx (voice box) contains the vocal cords and is responsible for sound production.

The trachea divides into two bronchi, which further branch into smaller bronchioles that lead to the alveoli.

The alveoli are tiny air sacs in the lungs where gas exchange occurs between the respiratory system and the circulatory system.

Oxygen diffuses across the walls of the alveoli into the bloodstream, while carbon dioxide moves in the opposite direction, from the bloodstream into the alveoli.

The lungs are elastic organs that expand and contract during breathing.

The diaphragm, a dome-shaped muscle located below the lungs, plays a crucial role in the breathing process by contracting and relaxing to facilitate inhalation and exhalation.

Various respiratory diseases and conditions can affect the respiratory system, such as asthma, chronic obstructive pulmonary disease (COPD), pneumonia, and lung cancer.

The respiratory system also helps regulate pH levels in the body by controlling the concentration of carbon dioxide, which affects blood acidity.

3.3 Circulatory System:

The circulatory system, also known as the cardiovascular system, is a network of organs, vessels, and blood that transports substances throughout the body.

Its primary function is to deliver oxygen, nutrients, hormones, and other vital substances to the body's cells and remove waste products, such as carbon dioxide and metabolic byproducts.

The main organs of the circulatory system are the heart, blood vessels (arteries, veins, and capillaries), and blood.

The heart is a muscular organ that acts as a pump, propelling blood throughout the body.