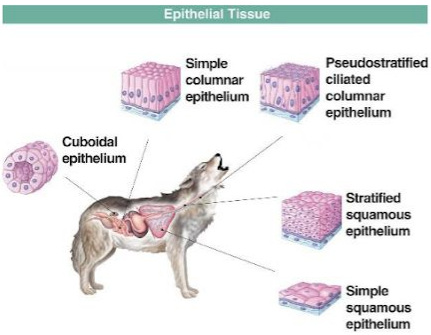
Epithelial Tissue

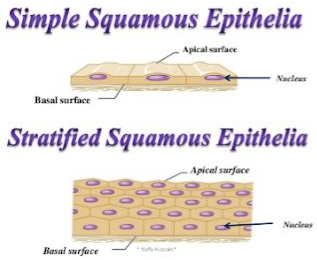


The tissue which covers the body surface, organs, ducts, blood vessels etc. is called an epithelial tissue. The main functions of epithelial tissues are as follows:

1. They help in the exchange of materials from the surrounding environment.
2. They help in the secretion of hormones and other required juices.
3. They help in the absorption of digested food and water in the alimentary canal.

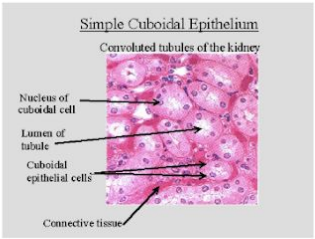
On the basis of form and structure, epithelial tissue is classified into following types:

1. Pavement/Squamous epithelium
2. Cubical epithelium
3. Columnar epithelium
4. Glandular epithelium
5. Ciliated epithelium
6. Stratified epithelium



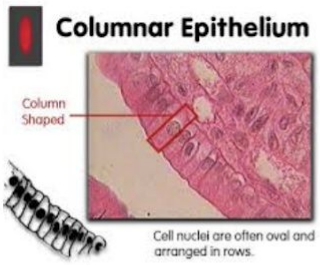
Pavement/Squamous Epithelium

Squamous epithelium consists of a single layer of cells. The cells of this epithelium are thin, broad and flat which are arranged like the mosaic tiles on the floor. So, it is also called pavement tissue. It is found in the skin epidermis, lining of the mouth, body cavities, oesophagus and blood vessels. It helps in the protection, exchange of gases and ultra-filtration.



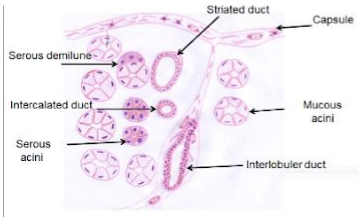
Cubical Epithelium

Cubical Epithelium is also a single-layered epithelium tissue. It has equal height and width. It has spherical nucleus placed more or less in the centre. The cells are closely fitted together and lie on a basement membrane. It is found in the duct of sweat gland, liver, seminiferous tubule, uterus etc. It is actively involved in the conduction of secretary materials. It also helps in absorption and excretion.



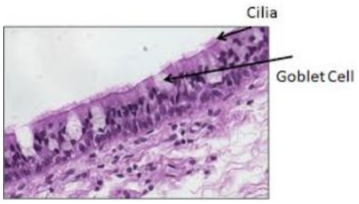
Columnar Epithelium

Columnar Epithelium is made of the single layer of cells. The cells of this epithelium are elongated and also lie on the basement membrane. The nucleus is usually located at the base of the cell. The height of the cell exceeds its width. It is found in lining of the stomach, intestine, reproductive organs, urogenital organs, gall bladder, salivary gland etc. It main functions are absorption and secretion.



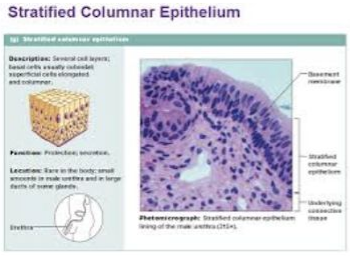
Glandular Epithelium

Glandular Epithelium is a single layered tissue. It is also modified the form of columnar epithelium. The cells of this epithelium are specialized for the secretion of chemical substances needed for different activities of metabolism. Liver, pancreas, mammary glands, sweat glands and mucous glands are the examples of such tissues. These cells secrete the hormone, enzymes, saliva, mucus, etc.



Ciliated Epithelium

Ciliated Epithelium is a single layered tissue. It is modified form of columnar or cubical epithelium. It has fine, hair-like processes called cilia at the free margin. It is found in lining of the uterine tubes, nasal passage and respiratory tract. In the uterine tubes, the cilia propel ova towards the uterus, and in the respiratory tract, it propels mucus towards the throat.



Stratified Epithelium

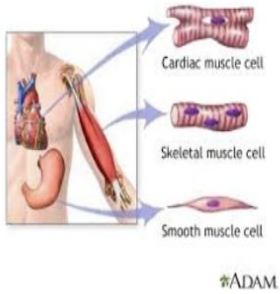
Stratified Epithelium is formed of many layers of cells. In the deepest layers, the cells are mainly columnar and, as they grow towards the surface they become flattened. The lowest layer is called germinal layer which produces new cells. They are also of different types and are mainly found in the nails, hair and conjunctiva of eyes and larynx. It prevents loss of water and protects from mechanical injury.

Animal Tissue

A group of animal cells with similar size, shape, and specific functions are called animal tissues. On the basis of their size, shape and function, they are divided into four major types. They are:

1. Epithelial tissue
2. Muscular tissue
3. Connective tissue
4. Nervous tissue

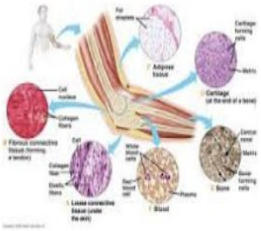
Muscular tissue



Muscular tissue contains many small, longitudinal and parallel contractile fibers called myofibrils. They may be uni-nucleated or multinucleated. On the basis of their positions and functions, they are of following types:

Skeletal muscle: The movement of the muscle is under the control of skeletal muscle. So, they are also called voluntary muscle.
Smooth muscle: Their movement is not under the control of ones will thus it is also called involuntary muscle. They have the unique power of rhythmic contraction.
Cardiac muscle: It has characteristics of both skeletal and smooth muscle. It contracts automatically and rhythmically.

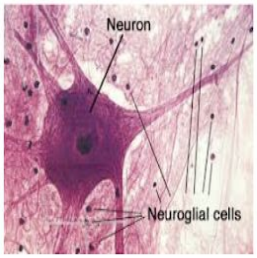
Connective tissue



Connective tissue connects and provides support to the various organs of the body together. By the nature of the matrix, they are of three types. They are:

Connective tissue proper: It surrounds organs and tissues such as muscles, nerves, bones, kidney etc. It helps to strengthen the structure and helps to repair the tissue.
Skeletal connective tissue: It provides support for the body and forms the rigid framework for the attachment of the muscles.
Fluid connective tissue: It circulates in the body and is responsible for the transportation of materials from one place to another.

Nervous tissue



They perform the function of response and conduction of impulses. It consists of nerve cells and nerve fibers. The unit of the nervous system is called neuron.

A neuron consists of two parts: **cell body** and **nerve fibers**. The cell body is the round structure and has two types of nerves fibers generated from it. They are Dendron and Axon. The branch of dendron is called dendrites. Dendron carries impulses to the cell body whereas axon carries impulses from the cell body to dendrites.

Plant Tissue

Tissue may be defined as a group or layer of similarly specialized cells which together performs certain special functions. On the basis of the types of cells found in tissues, they are classified as animals and plants tissues.

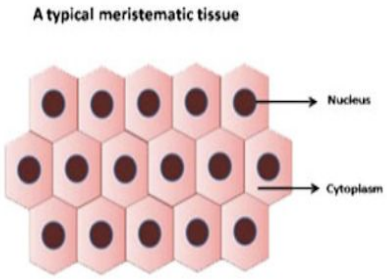
Plant tissue

A group of plant cells performing essentially the same function and common to the similar structure is a plant tissue. On the basis of the stages of development, plant tissues are divided into two types:

1. Meristematic tissue
2. Permanent tissue

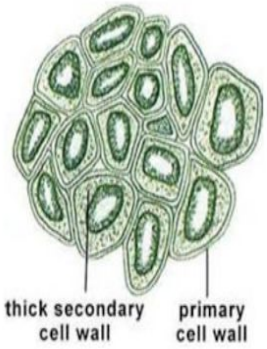
1. Meristematic tissue

The group of young cells which have the capacity of active cell division is called meristem. On the basis of origin, they are classified as primary and secondary meristems.



Primary meristems: Those meristems, which are derived directly from the meristems of the embryo and responsible for primary growth and lie mainly on the apices of stems and roots, are called primary meristems. They are apical meristems (root apical and shoot apical meristems), intercalary meristems (only in monocots). They help increase the length of the plant.
Secondary meristems: They are the meristems which are formed as new meristems in permanent cells by redifferentiation and are responsible for increasing the diameter of the plant organ. They are of two types vascular cambium and cork cambium collectively known as lateral cambium (lateral meristem). They help plant to increase its girth.

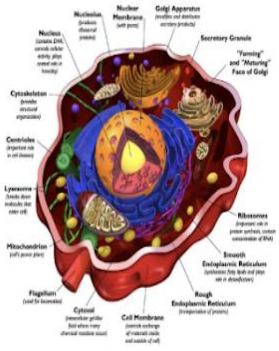
2. Permanent tissue



They are made up of cells that have lost the power of division and are differentiation to carry out various functions. The permanent tissues are of following types:

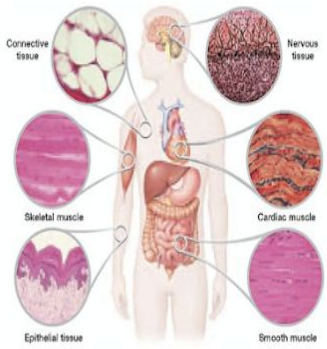
Simple permanent tissue: These tissues are concerned with manufactured and storage of food and to provide mechanical support to plants.
Complex permanent tissue: They are made up of different types of cells. The most important complex tissues are xylem and phloem.
Special tissue: They are concerned with the secretion of materials like gums, oils, latex and other substances. They are further subdivided into two groups: lactiferous tissue and glandular tissue.

Interrelationship Between Cell, Tissue and Organ in Human Body



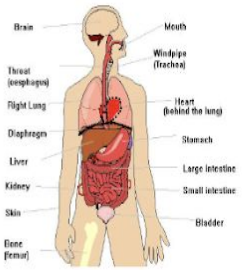
Cell

The cell is the simplest and smallest unit, capable of carrying all the life activities. Each cell is capable of performing the basic functions of life such as respiration, reproduction, excretion, growth etc. All these life processes are performed by their single cell. So, the cell is the structural and functional unit of life. A cell can be defined as the protoplasm surrounded by the cell membrane, which works as structural and functional unit of life.



Tissue

The tissue is defined as a group or layer of similarly specialized cells which together performs certain special functions. Cells combine together inside the body to form a tissue, each of which has a specialized function e.g. blood, muscles bone etc. Blood is a kind of tissue which also consists of many cells and provides transportation inside our bodies and helps in movement.



Organs

Organs are made up of group or layer of tissues. Organs have various functions according of its structure. Some of the organs do multiple functions. For example: Heart pumps the blood and regulates the blood in all body. Kidney purifies water and also regulates water in surrounding.

Various organs forms system. There are 9 systems in the human body. Every system has their unique functions. Table of system with its organ and functions in animals is below:

S.N	System	Organs	Main functions
1	Skeletal system	1. Bones 2. Joints	To protect internal organs and give rigidity to a body.
2	Muscular system	1. Muscles 2. Tendons and ligaments	To control the movements of the body.
3	Digestive system	1. Mouth 2. Esophagus 3. Stomach 4. Small intestine 5. Large intestine 6. Rectum 7. Anus 8. Liver 9. Gallbladder 10. Pancreas 11. Appendix	To extract nutrients from food and excrete waste products from the body.
4	Respiratory system	1. Nose 2. Larynx and pharynx 3. Trachea and Bronchi 4. Lungs	To add oxygen to the blood and remove carbon dioxide from the blood.
5	Circulatory system	1. Heart 2. Blood vessels	To pump blood and circulates it throughout the body.
6	Excretory system	1. Kidneys 2. Ureters 3. Bladder 4. Urethra	To filterwaste products from the blood.
7	Nervous system	1. Brain 2. Spinal cord 3. Nerves	To directs intentional and many automatic actions of the body and enable thinking, self-awareness, and emotions.
8	Reproductive system	1. Ovaries 2. Testes	To enable reproduction.
9	Glandular system	1. Pituitary gland 2. Thyroid gland 3. Parathyroid gland 4. Adrenal gland 5. Pancreas 6. gonads	To produce chemical messenger and circulate them through the blood, which direct the activities to the different organ.

Relation between cell, tissue, organ and system in animals

Various types of tissues are grouped together to form an organ which carries out one or more specific activities. In a multicellular organism, several interrelated organs arranged into an organ system. For example: The respiratory system includes organs such as the nose, pharynx, larynx, trachea, lungs etc. They are composed of different types of cells. Likewise, the digestive system includes organs such as mouth, salivary glands, stomach, intestine, liver, gallbladder, pancreas etc. The main function of the digestive system is to take in food and carry out its digestion, absorption, and egestion.