CHAPITER I : INTRODUCTION TO THE ANIMAL PHYSIOLOGY

Physiology is a study of how animal form or structure and function sustain life and shape responses to environmental conditions.

The multicellular bodies of animals consist of tissues that make up more complex organs and organ systems. The organ systems of an animal maintain homeostasis within the multicellular body. These systems are adapted to obtain the necessary nutrients and other resources needed by the cells of the body, to remove the wastes those cells produce, to coordinate the activities of the cells, tissues, and organs throughout the body, and to coordinate the many responses of the individual organism to its environment.

I. Levels of Organization of Living Things:

Living things are highly organized and structured, following a hierarchy on a scale from small to large. **The atom** is the smallest and most fundamental unit of matter. It consists of a nucleus surrounded by electrons. Atoms form molecules. **A molecule** is a chemical structure consisting of at least two atoms held together by a chemical bond. Many molecules that are biologically important are macromolecules, large molecules that are typically formed by combining smaller units called monomers. An example of a macromolecule is deoxyribonucleic acid (DNA) (Figure 1), which contains the instructions for the functioning of the organism that contains it.

Figure 1 DNA molecule.

Some cells contain aggregates of macromolecules surrounded by membranes; these are called organelles. **Organelles** are small structures that exist within cells and perform specialized functions. All living things are made of cells; **the cell** itself is the smallest fundamental unit of structure and function in living organisms. This requirement is why viruses are not considered living: they are not made of cells. To make new viruses, they have to invade and hijack a living cell; only then can they obtain the materials they need to reproduce. Some organisms consist of a single cell and others are multicellular. Cells are classified as **prokaryotic** or **eukaryotic**.

Prokaryotes are single-celled organisms that lack organelles surrounded by a membrane and do not have nuclei surrounded by nuclear membranes; in contrast, the cells of **eukaryotes** do have membrane-bound organelles and nuclei. In most multicellular organisms, cells combine to make **tissues**, which are groups of similar cells carrying out the same function. **Organs** are collections

of tissues grouped together based on a common function. Organs are present not only in animals but also in plants**. An organ system** is a higher level of organization that consists of functionally related organs. For example vertebrate animals have many organ systems, such as the circulatory system that transports blood throughout the body and to and from the lungs; it includes organs such as the heart and blood vessels. **Organisms** are individual living entities. For example, each tree in a forest is an organism. Single-celled prokaryotes and single-celled eukaryotes are also considered organisms and are typically referred to as microorganisms.

All **the individuals** of a species living within a specific area are collectively called **a population**. For example, a forest may include many white pine trees. All of these pine trees represent the population of white pine trees in this forest. Different populations may live in the same specific area. For example, the forest with the pine trees includes populations of flowering plants and also insects and microbial populations. A community is the set of populations inhabiting a particular area. For instance, all of the trees, flowers, insects, and other populations in a forest form the forest's community. The forest itself is an ecosystem. **An ecosystem** consists of all the living things in a particular area together with the abiotic, or non-living, parts of that environment such as nitrogen in the soil or rainwater. At the highest level of organization (Figure 2), **the biosphere** is the collection of all ecosystems, and it represents the zones of life on Earth.

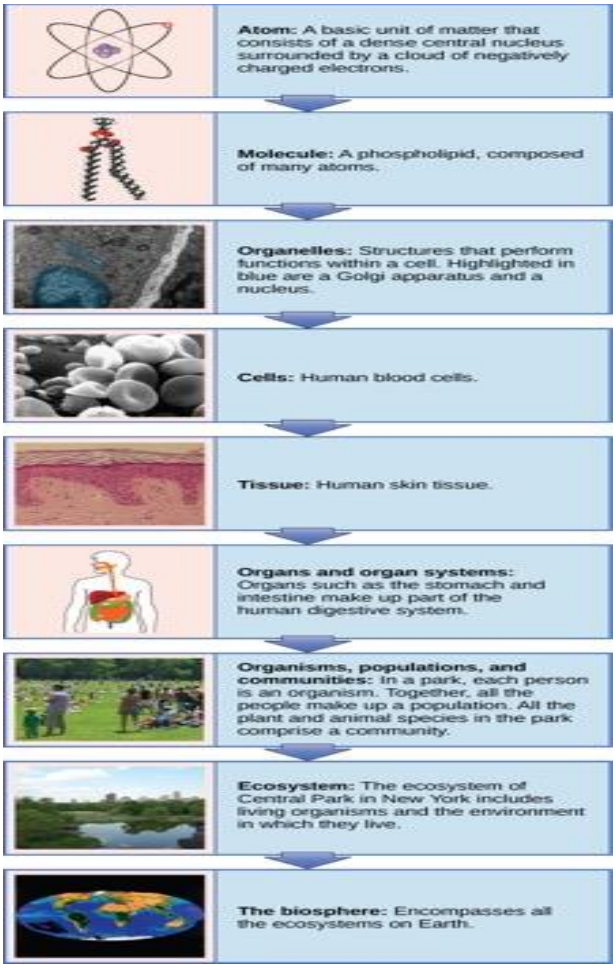

Figure 2: From an atom to the entire Earth

II. The vital functions of an organism:

Physiology is the study of mechanisms; it studies the function of structures.

Anatomy studies the structures of the body. It is a principle of relationship between structure and function.

Conservation of the individual:

- Relational function: enables the individual to interact with its environment,

provided by the nervous, endocrine and locomotor systems

- Respiratory function: provided by the lungs

- Digestive function: provided by the digestive system.

- Circulation: provided by the cardiovascular

- Excretion function: provided by the kidneys

} **nutrition system**

- Protective function: provided by the immune and skin systems

Conservation of the species:

- Reproductive function: provided by the reproductive system