ا.م.د. رشيد محمد رشيد

قسم التقنيات الاحيائية/ كلية العلوم / جامعة الانبار

المرحلة الاولى/ بايلوجية الخلية

المحاضرة الاولى: ماهي الحياة

What is Life?

Introduction

In this chapter we will learn how living organisms change as they become better adapted to their environment. Over billions of years, these changes have produced a large number of different kinds of organisms. It has been estimated that there may be 15 to 30 million species of organisms living on earth.

Living organisms are comprised of the same chemical elements that make up nonliving things. They obey the same laws of physics and chemistry as nonliving objects. We can better understand what distinguishes living from nonliving by examining characteristics that all living organisms have in common. Some of these characteristics are discussed below.

Characteristics Common to All Living Organisms

Living things are composed of cells

Small organisms such as bacteria and many protists are composed of a single cell. Larger organisms are composed of many cells; they are ***multicellular***.

Living things are organized

The list below shows increasing levels of biological organization.

atoms
molecules
macromolecules
organelles
cells ← The smallest unit of life is the cell.
tissues
organs

organ systems
individual organism
population
community
ecosystem

.

Cells are considered to be the smallest structure that is alive. They are often too small to see without the aid of a microscope. All living organisms are composed of cells. The smallest organisms are composed of a single cell; larger organisms are composed of more than one cell.

Similar kinds of cells may be arranged together to form a ***tissue***. Tissues have specific properties and functions. For example muscle tissue is composed of muscle cells. It functions to move body components.

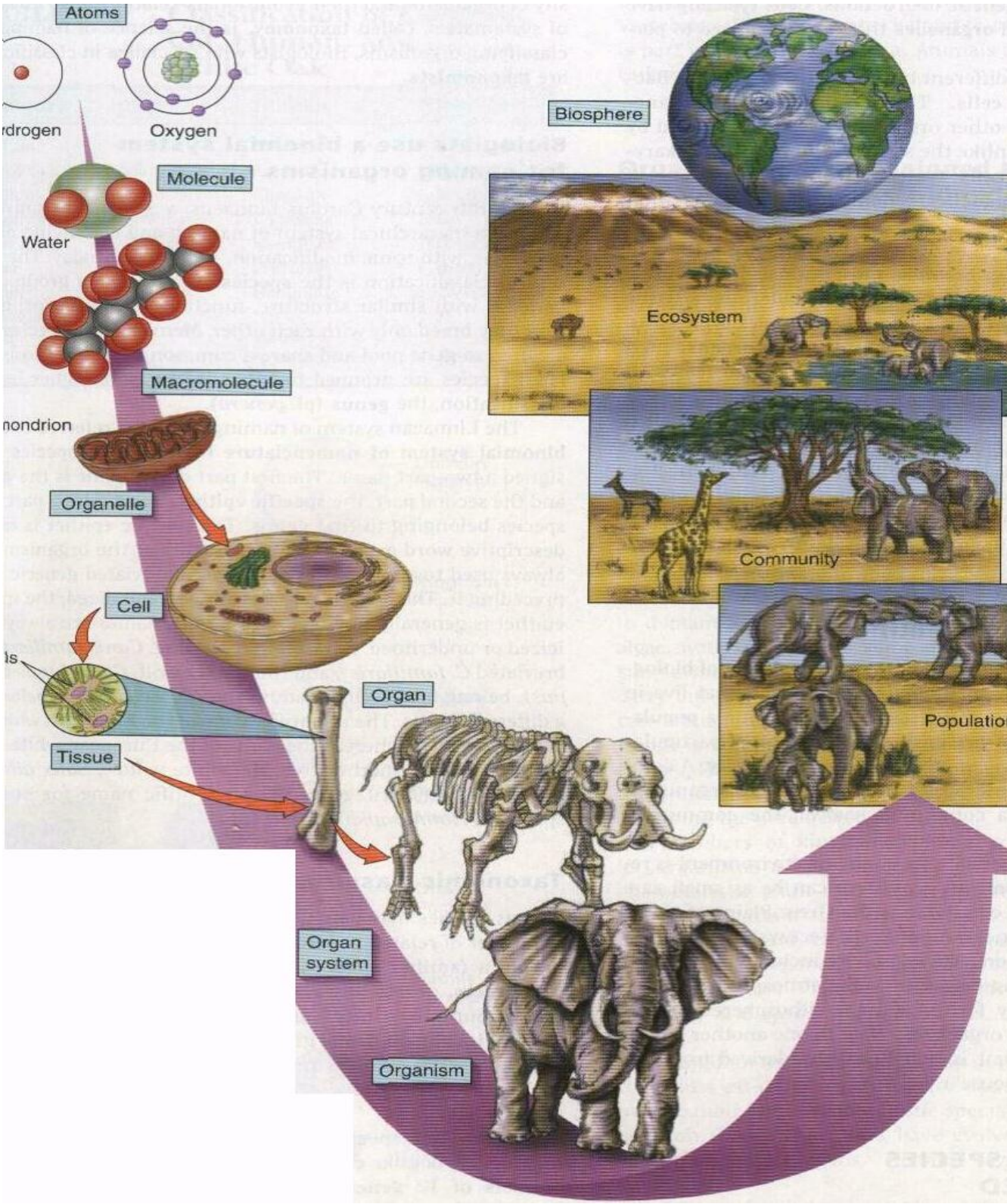
Two or more tissues that form a structure with a specific function is an ***organ***. For example, the heart is an organ formed from muscle tissue, nervous tissue, connective tissue, and epithelial tissue. It functions to pump blood.

An ***organ system*** consists of two or more organs which perform a specific task. Some organ systems are: the integumentary, nervous, sensory, endocrine, skeletal, muscular, circulatory, immune, lymphatic, digestive, respiratory, excretory, and reproductive systems.

A ***population*** is an interbreeding group of organisms (the same species) that occupies a particular area.

Two or more populations form a ***community***.

The word community refers to the organisms. The word ***ecosystem*** refers to the organisms of a community and also the nonliving environment.


Atoms
drogen
Oxygen
Molecule
Water
Macromolecule
nondrion
Organelle
Cell
ls
Tissue
Organ
Organ system
Organism
Biosphere
Ecosystem
Community
Populatio

Living things require nutrients and energy

Organisms need nutrients and energy for their activities, organization, growth, and maintenance.

Chemical reactions are needed to store and release energy and to synthesize compounds needed by the organism. The word ***metabolism*** refers to the chemical reactions that occur within a cell.

Energy cannot be created or destroyed, but it can be transferred from one form to another. In living organisms, it can be transferred from one chemical to another.

Plants, some algae, and some bacteria obtain their energy from light. The light energy is used to bond molecules of carbon dioxide together to form sugar (glucose). The energy is stored in glucose. This process is called photosynthesis. When a cell needs energy, chemical reactions within the cell are able to release this stored energy for it's needs. The energy stored in glucose can be used to form other chemicals. The new chemicals now contain some of the energy. Whenever energy is transferred from one chemical to another, a little is lost as heat. Animals that eat plants obtain their energy from the chemicals in the plants. As with plants, chemical reactions within the animal cells release the energy stored in their food and make it available for the cell.

Living things respond to their environment

Organisms must sense, interact with, and respond to their environment because they need nutrients and energy from the environment.

Organisms need to protect themselves to prevent other organisms from taking their energy (by eating them).

The internal environment of an organism fluctuates less than the external environment. For example the temperature of some organisms remains fairly constant even though the outside temperature fluctuates. The maintenance of constant internal conditions is called ***homeostasis***.

Living things contain DNA

The genetic instructions of all living organisms is contained in molecules of deoxyribonucleic acid.

Living things reproduce

Asexual Reproduction

The advantage of asexual reproduction is that it can produce large numbers of offspring very rapidly and it does not require a mate.

Asexual reproduction, however, produces offspring which are identical to the parent. Populations in which all of the individuals are identical are more likely to go extinct if the environment fluctuates. Moreover, these populations are less likely to change over time in response to environmental change.

Sexual Reproduction

Sexual reproduction requires two parents and thus promotes genetic variation. Populations which show variability are more likely to survive environmental fluctuations because there is an increased likelihood that at least some individuals are going to be able to survive due to their being better adapted.

Populations of living things evolve

Evolution refers to changes in the genetic composition of a population. Genetic changes may result in changes in the physical or behavioral characteristics of the individuals.

A ***mutation*** is a change in the genetic instructions (DNA) of an individual.

The change is usually harmful but occasionally it is beneficial.

Any beneficial mutations that occur are likely to spread within a population because individuals that possess the mutations will have higher reproductive output and they will reproduce the mutation. Beneficial mutations are therefore likely to result in evolutionary change.

References المصادر

Russo Vanputte, Regan : Seeley's Anatomy & Physiology 10th Edition (Hardcover) Hardcover – January 1, 2014