Ashur university collage

Dept. of Biology

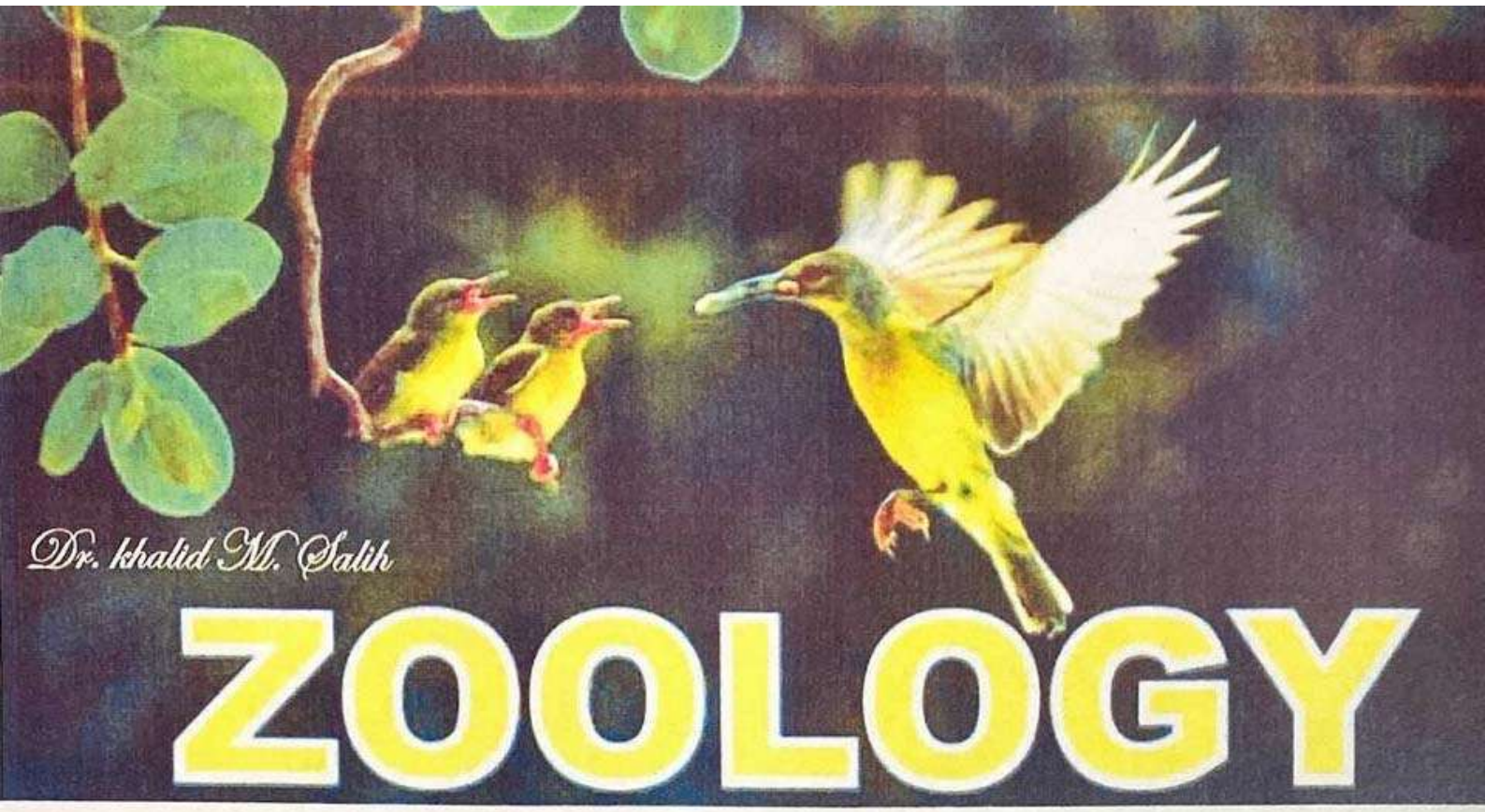
First-year

Lecture 1

Zoology

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ZOOLOGY

Biology

- The term biology is derived from the Greek word:

  βίος (bios) = life + **λογία** (logia) = study of

- Therefore, Biology is a natural science concerned with the study of life and living organisms, including their structure, function, growth, evolution, distribution, and taxonomy.

Zoology

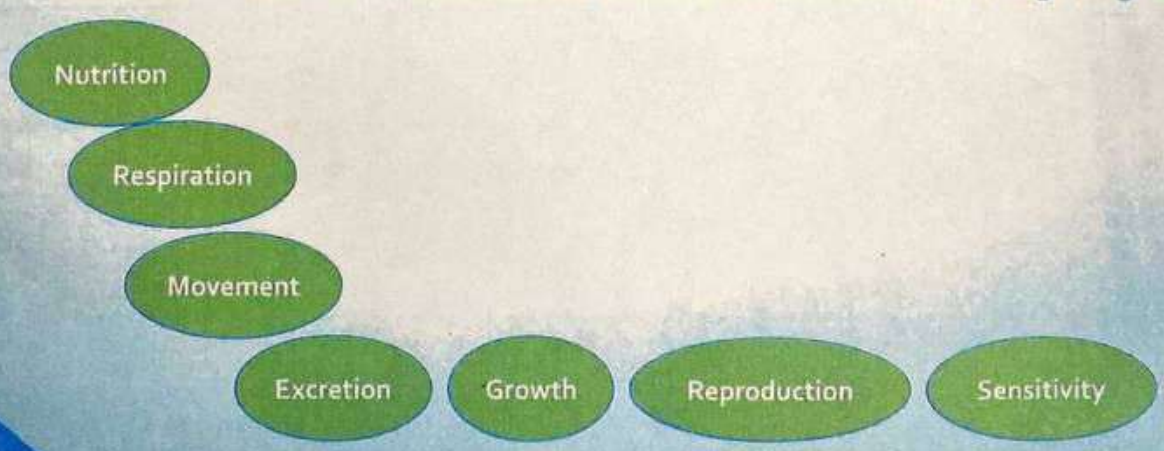
- The term is derived from Ancient Greek:

  ζῷον (zoon) = animal + **λόγος** (logos) = knowledge or study of

- Therefore, Zoology also known as **animal biology**, which is the branch of biology that relates to the animal kingdom, including the structure, embryology, evolution, classification, habits, and distribution of all animals, both living and extinct.

Characteristics of living things

There are seven activities which make organisms different from non-living things:



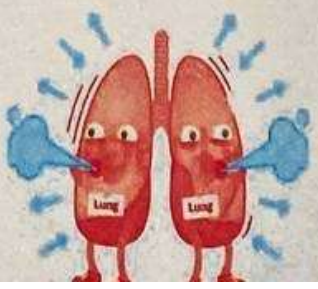
1. Nutrition



- Nutrition is the process by which organisms obtain energy and raw materials from nutrients such as:
  - Proteins
  - Carbohydrates
  - fats
- Living things take in materials from their surroundings that they use for:
  - growth or
  - provide energy

2. Respiration

- Respiration is the release of energy from food substances in all living cells.
- Living things break down food within their cells to release energy for carrying out their activities.



3. Movement

- All living things **move**.
- It is very obvious that a cat moves but what about the thorn tree it sits in?
- Plants also move in various different ways.
- The movement may be so slow that it is very difficult to see.



4. Excretion

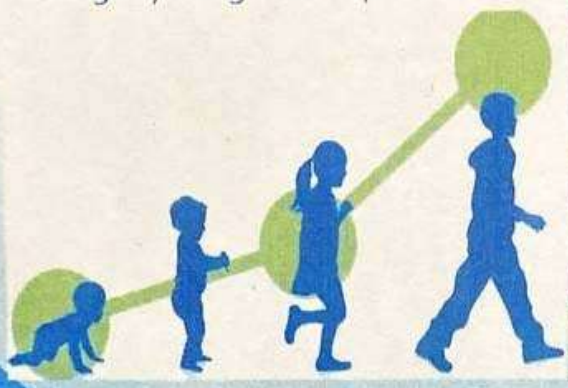


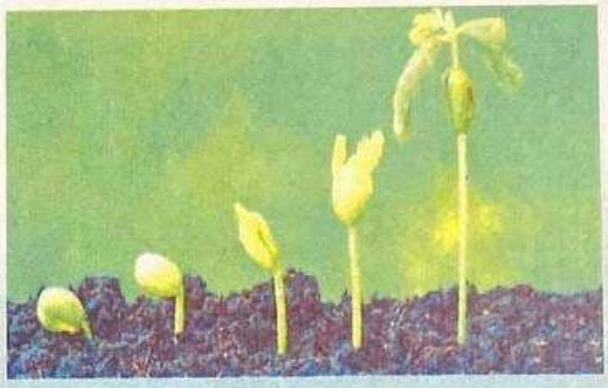


- Excretion is defined as the removal of:
  - toxic materials
  - waste products of metabolism
  - substances in excess from the body of an organism.
- All living things **excrete** to get rid of waste products which might poison the cells.

5. Growth

- Growth is permanent increase in cell number and size seen in all living things by using food to produce new cells.





6. Reproduction

- All living organisms have the ability to produce **offspring**.





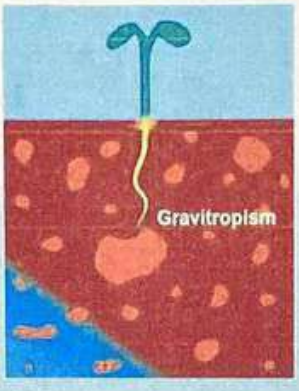


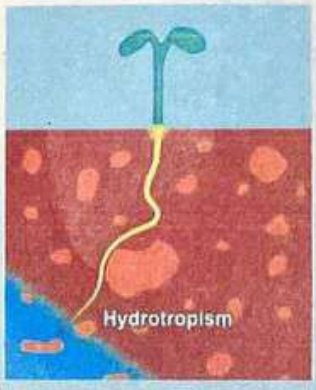


7. Sensitivity

- All living things are able to **sense** and **respond** to stimuli around them such as light, temperature, water, gravity and chemical substances.
- Whilst many other things carry out one or more of the above processes, only **living organisms** possess **all** of these characteristics.







Levels of Organization

- The living world consists of all biotic and abiotic factors that affect life within it.
- Living things are part of a whole that organize themselves in several levels proceeding from the very small (simple) to the very large (complex), these levels of organization include:

1. *Organization at cellular level*
2. *Organization at organism level*
3. *Organization at population level*

1. Organization at cellular level

1. Molecules

- Molecules consist of several atoms of different elements that joined together into complex cluster known as ***macromolecules*** (biological molecules) including carbohydrates, lipids, proteins, and nucleic acids (DNA & RNA).

2. Organelles

- They are tiny compartments within cell assembled from complex of biological molecules which are responsible for specific function in the cell (e.g. nucleus, ribosome, mitochondria, etc.).

3. Cells

- They are the smallest unit of life that has all the characteristics of living things (organisms).

2. Organization at organism level

- Organism is a specific ***species*** of plant, animal, bacteria, fungus or other living thing that lives in a specific area. There are two types of organisms:
- ***Unicellular organisms*** which are composed of single cell such as Bacteria, Amoeba, Paramecium, etc.
- ***Multi-cellular organisms*** have several types of cells located in different parts of the living organism that carry out specific functions such as animals & plants. Therefore, cells are organized into three levels of complexity:

1. Tissues
2. Organs
3. Systems

2. Organization at organism level

1. Tissues

- They are groups of similar cells that act as a functional unit such as nervous tissue which composed of specialized cells called nerve cells (neurons) and able to carry signals & impulses from one place to another within organism.

2. Organs

- Organ is a set of tissues connected that carry out a specific function for a living thing (an example of an organ may include the heart, the lung, the brain, etc.).

3. Systems

- The system is a set of organs inside an organism that carry out a specific function (digestion, circulation, respiration, etc.).

3. Organization at population level

Organisms are organized into several higher hierarchical levels within the living world:

1. Population

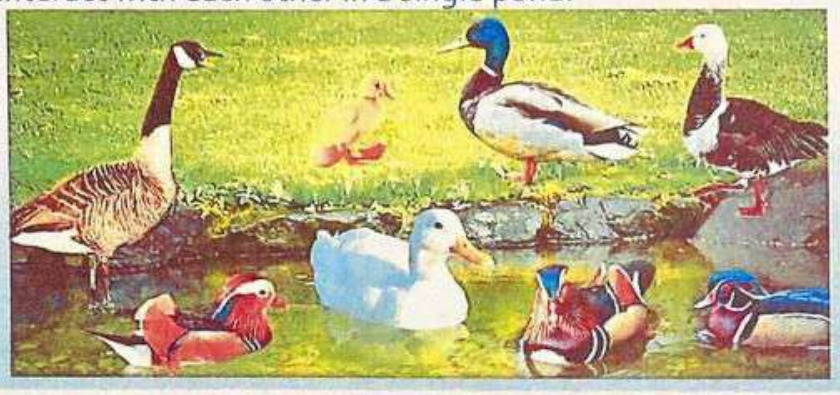
- Population is a group of organisms of the same ***species*** that live in the same place at the same time.
- The members of certain species are similar in appearance and able to interbreed.
- For example, several deer may belong to a population and can interact with other deer in the same area.



3. Organization at population level

2. Community

- Community consists of all populations of different species living together in one place (Gees may share their pond with ducks, fish, and many kinds of insects) all interact with each other in a single pond.



3. Organization at population level

3. Biome = Ecosystem

- It is the community and its non-living surrounding that may be separated by living or non-living matter (mountain or other boundaries) such as Deserts, oceans, and forests. A deer, rabbit, and all the plant populations that live in a grasslands area and the lake, air, and rocks are part of an ecosystem.



3. Organization at population level

4. **Biosphere** (part of the Earth that contains all ecosystems).

