

**Department of biology**

**Zoology**

**First stage**

**(10)**

**Taxonomy and Systematics of the Organisms**

**By**

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**Animal diversity**

Animals are highly diverse. Members of the animal kingdom are among the most clear living things in the world. Animal evolution began in the ocean over 600 million years ago with tiny creatures that probably do not resemble any living organism today. Since then, animals have evolved into a highly diverse kingdom.

Although over one million extant (currently living) species of animals have been identified, scientists are continually discovering more species as they explore ecosystems around the world. The number of extant species is estimated to be between 3 and 30 million. The animal classification system characterizes animals based on their **anatomy, morphology, evolutionary history, features of embryological development, and genetic makeup.** This classification scheme is always developing as new information about species arises. **Understanding and classifying the great variety of living species helps in understanding how to conserve the diversity of life on earth.**

**The main characters of animal**

**1. Multicellular Heterotrophs التغاير متعذد الخلايا** :

All animals are multicellular heterotrophs. The unicellular heterotrophic organisms called Protozoa, which were at one time regarded as simple animals, are now considered to be members of the kingdom Protista, the large and diverse group.

**2. Diverse in Form:**

Almost all animals (99%) are invertebrates, lacking a backbone. Of the estimated 10 million living animal species, only 42,500 have a backbone and are referred to as vertebrates. The animal kingdom includes about 35 phyla, most of which occur in the sea. Far fewer phyla occur in fresh water and fewer still occur on land. Members of the three phyla, namely the Arthropoda (spiders and insects), Mollusca (snails الحلزون ), and Chordata (vertebrates), dominate animal life on land.

**3. No Cell Walls:**

Animal cells are distinct among multicellular organisms because they lack rigid cell walls and are usually quite flexible.

**4. Active Movement:**

The ability of animals to move more rapidly and in more complex ways than members of other kingdoms is perhaps their most remarkable characteristic and one that is directly related to the flexibility of their cells and the evolution of nerve and muscle tissues.

**5. Sexual Reproduction:**

Most animals reproduce sexually. Animal eggs, which are non-motile, are much larger than the small, usually flagellated sperm. In animals, cells formed in meiosis function directly as gametes. The haploid cells do not divide by mitosis first, as they do in plants and fungi, but rather fuse directly with each other to form the zygote.

**6. Embryonic Development:** Most animals have a similar pattern of embryonic development. The zygote first undergoes a series of mitotic divisions, called cleavage, and becomes a solid ball of cells, the morula, then a hollow ball of cells, the blastula. In most animals, the blastula folds inward at one point to form a hollow sac with an opening at one end called the blastopore. An embryo at this stage is called a gastrula .

**Principles of classification**

The broad classification of Animalia or animal kingdom is based on the following common fundamental features.

**1. Levels of Organization**

All members of Animalia are multicellular; all of them do not exhibit the same pattern of organization of cells. For example, in sponges, the cells are arranged as loose cell aggregates, i.e., they exhibit cellular level of organization. Some divisions of activities occur among the cells called tissue level organization.

**2. Symmetry**

Animals can be categorized on the basis of their symmetry. When any plane passing through the central axis of the body divides the organism into two identical half, it is called radial symmetry. When the body can be divided into identical left and right half in only one plane, exhibit bilateral symmetry.

**3. Coelom Development and (Diploblastic and Triploblastic Organization)**

Animals in which the cells are arranged in two embryonic layers, an external ectoderm and an internal endoderm, are called diploblastic animals, e.g., Coelenterates. Animals in which the developing embryo has a third germinal layer, mesoderm, in between the ectoderm and endoderm, are called triploblastic animals (Chordates).

**4. Segmentation of the Body**

In some animals, the body is externally and internally divided into segments with a serial repetition of at least some organs. For example, in earthworm, the body shows this pattern called metameric segmentation.

**5. Presence or Absence of Notochord**

The notochord is a flexible rod made out of a material similar to cartilage. If a species has a notochord at any stage of its life cycle, it is, by definition, a chordate. In vertebrates the notochord becomes part of the vertebral column.

**How is Organisms Classified?** There are eight classification groups of living things:

Domain

Kingdom

Phylum

Class

Order

Family

Genus

Species



**Classification and Systematic**

**What is Taxonomy?**

Taxonomy is the describing, naming, and classifying of organisms in biology. It uses **morphological, behavioral, genetic**, as well as **biochemical** observations to identify organisms. Around 1.78 million species of plants, animals, and microorganisms have been named by the taxonomists over the past 250 years. However, 5 to 30 million of species have not yet been identified. Different plants, animals, and microorganisms are grouped into different species. A species is an interbreeding group of organisms, which produces a fertile offspring. It is considered as the fundamental level of the biological classification of organisms.

Taxonomists assign unique names for each for each type of species. The naming of the species is based on the binomial nomenclature where the first part of the name consists of the name of the genus and the second part of the name consists of the name of the species.

**What is Systematics?**

Systematics refers to the study and classification of organisms for the determination of the evolutionary relationship of organisms. Therefore, the systematics consists of both taxonomy and evolution. Systematics uses morphological, behavioral, genetics, and evolutionary relationships between organisms.