

Subject	Insect Taxonomy
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Living Things

What is kingdom classification?

Kingdom classification is the highest classification into which the organisms are grouped in the taxonomy. It is ranked above the phylum.

In the past, all living things comprised of two categories, namely, the plants and animals. Organisms that remained stationary were categorized under plants. On the contrary, animals encompassed all living things that had the ability to move. In due course of time, scientists discovered more living organisms that could neither be included in plants nor animals. This was how the Linnaean system of taxonomic classification.

All this confusion led to a new mode of classification which had to take into account cell structure, the presence of cell wall, mode of reproduction and mode of nutrition. As a result, they came up with the concept of the five-kingdom classification.

The five-kingdom classification of living organisms included the following kingdoms:

1-Kingdom Monera (Bacteria)

Features of Moneran:

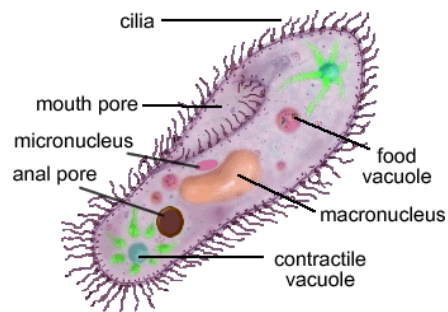
- 1-Monera are about 1 micrometer in size.
- 2- Unicellular and some organisms that form groups or filaments. Prokaryotic cell.
- 3-The genetic material DNA is contained in the cytoplasm called nucleoid.
- 4-Some Monera have hair like pilli for adhesion or tail-like flagella for locomotion.
- 5-The heterotrophic bacteria can be parasitic or saprophytic. The autotrophic bacteria can be chemosynthetic or photosynthetic.
- 6-Reproduction is asexually through binary fission or sexually by conjugation.
- 7-Bacteria that grow in the root nodules help break down atmospheric nitrogen into fixed nitrogen.
- 8-produce antibiotics likes streptomycin that is useful for treatment of infections.

Monera Examples *E.coli* , *Bacillus*,

2-Kingdom Protista

Features of Protista:

- 1- They are unicellular and eukaryotic organisms.
- 2- Some of them have cilia or flagella for mobility.



3- Sexual reproduction is a process of cell fusion and zygote formation.

Example: *Amoeba, Euglena*

3-Kingdom Fungi

Features of Kingdom Fungi:

1- Most fungi are so small as to be invisible to the naked eye and tend to thrive in soil and other dead matter.

2- Single cellular, but most fungi species are multicellular filaments, eukaryotic, non-motile organisms that form hyphae and mycelium.

3- Members belonging to this kingdom lack chlorophyll.

4- Fungi including molds, yeasts, mildews, smuts and mushrooms.

5- Their size may range from small microscopic yeasts to large mushrooms.

Pencilium , *Rhizopus* , *Agaricus* (Mushroom) , *Puccinia* (Rust)



4-Kingdom Plantae

Features of Kingdom Plantae:

- 1- Multicellular, eukaryotes which have chloroplast. non-motile living things.
- 2- Autotrophic in nature, these organisms contain the photosynthetic pigment, called chlorophyll.
- 3- The Cell wall mainly comprises cellulose.
- 4- Plants have two distinct phases in their lifecycle. These phases alternate with each other. The diploid saprophytic and the haploid gametophyte phase.

5-Kingdom Animalia

Features of Kingdom Animalia:

- 1- All multicellular eukaryotes which are heterotrophs.
- 2- The animals are directly or indirectly dependent on plants for food. Their mode of nutrition is the holozoic. Holozoic nutrition encompasses the ingestion of food and then the use of an internal cavity for the digestion of food.
- 3- Many animals are adept at locomotion.
- 4- They reproduce by sexual mode of reproduction.

Major Groups of Animals:

1- Vertebrates with backbones Example: Humans, *Homo sapiens*

2-Invertebrates without backbones, which include;

Phylum

Classes are grouped into phyla (the plural of phylum), and phyla into Kingdoms.

There are only about 30 phyla in the animal kingdom, and only about a dozen of these (including Mollusca and Brachiopoda) leave any fossil remains.

1-Phylum: Porifera- example -Spongia

2-Phylum: Coelenterata (Cnidaria) example--Hydra

3-Phylum: Platyhelminthes example- Flatworms

4-Phylum: Annelida example – Segmented worms

5-Phylum: [Nematoda](#): example- Round worms

6-Phylum: **Onychophora**: Velvet worms

7-Phylum: [Nematomorpha](#)- Horsehair worms

8-Phylum: Mollusca example - Octopus

9-Phylum: Echinodermata example -Starfish

10-Phylum: Chordata example Balanoglossus

11-Phylum: Arthropoda example Butterfly

Major Characteristics of Phylum Arthropoda:

1. Exoskeleton containing chitin secreted by epidermis, three germ layer
2. Body bilaterally symmetrical, with specialized regions (= tagmata, plural)
3. Jointed appendages (one pair per somite or less), variously specialized for feeding, locomotion, sensing
4. Circulatory system are open, heart dorsal position
5. Digestive system complete (Mouth parts are different adaption, Sucking, chewing , ...etc. ; anus terminal.
6. Respiration by tracheae, gills, book lungs, and body surface
7. Excretion by coxal or green glands or Malpighian tubules.
8. Nerves system with paired dorsal ganglia connective to a pair of ventral nerve cord.
9. Sexes usually separate, fertilization mostly internal.

Phylum Arthropod classified in to five class

Class:

A taxonomic category contains a single order or monophyletic group of order, which is separated from other classes by very decided characters.

The class is a major division within the animal Kingdom, and form the basis on which most fossil study is based.

For example, the phylum Arthropoda contains mor than 5 classes: Insecta, Crustacea, Archnida , Chilopoda and Diplopoda .

1-Class: Crustacea

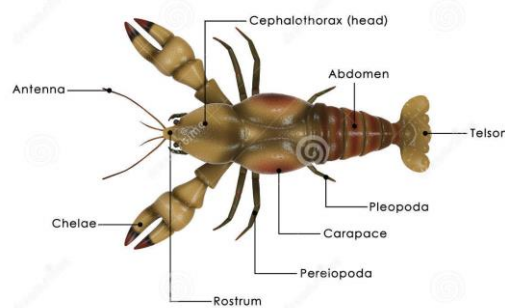
Class Crustacea. This is a very diverse class. There are about 30,000 species of Crustacean. Most are aquatic, the majority of which are marine. Most people will likely encounter only two orders,

1- Order: Decapods: Lobsters, crayfish, crabs, shrimp. Characters

1-Two tagmata (cephalothorax and abdomen)

2-Two pairs of antennae (can be difficult to see both pairs)

3-Five pairs of legs on the cephalothorax, the first pair usually with a large claw



Astacus sp.

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2-Order: Isopoda. Sow bugs, pillbugs, roly-polys.

1-Three tagmata (head, thorax and abdomen)

2-Two pairs of antennae: first pair is greatly reduced, seldom noticed

3-Seven pairs of legs, one pair on each thoracic segment

5-Abdomen small, more or less fused.



2-Class: Arachnida

This is a diverse class which belongs to a subphylum of the Arthropoda known as the Chelicerata. Common orders of Arachnida include:

1-Order Araneae: Spiders. characters

1-Two tagmata (cephalothorax and abdomen) -No antennae.

3-Four pairs of legs.

5-Mouthparts: One pair chelicerae and one pair of pedipalps

6-Usually with eight simple ocelli.



2-Order: Scorpions: Scorpions characters

- 1-Two tagmata (cephalothorax and abdomen)
 - 2-No antennae
 - 3-No pedicel between cephalothorax and abdomen
 - 4-Four pairs of legs on cephalothorax
 - 5-One pair of chelicerae and one pair of long, pincher-like pedipalps.
 - 6-Abdomen with seven broad segments anteriorly, followed by five narrower segments which end with a large stinger. Ex. *Buthus* sp.
- (Scorpion)



3- Order Acari , Mites and Ticks.

- 1-Two tagmata (cephlothorax and abdomen)
- 2-No antennae.
- 3-Abdomen broadly joined to cephalothorax (no pedicel).
- 4-Four pairs of legs in adults; only three pairs at hatching.



Ex. Ixodes sp.

3-Class: Chilopoda: Centipedes. Characters

- 1-Two tagmata (head and trunk)
- 2-One pair of antennae with 14 or more segments
- 3-One pair of legs per trunk segment.
- 4-Mouthparts: one pair of mandibles and two pairs of maxillae
- 5-Appendages on the first trunk segment are claw like poison jaws or fangs with which centipedes paralyze their prey.
- 6-Eyes may be present or absent. **Ex .Sclopendara SP.**



4-Class: Diplopoda: Millipedes: characters

- 1-Two tagmata (head and trunk)
- 2-One pair of antennae, usually having seven segments
- 3-Two pairs of legs on most trunk segments (30 or more pairs total)
- 4-Mouthparts: one pair of mandibles, and one pair of maxillae
- 5-Eyes are usually present



5-Class: Insecta

Insects are the most abundant life form now known to science. Around 1,000,000 species have been described and named. That is more than all the other known animals put together.

Taxonomist A.D. Imms proposed a classification of insect.

Characters of class Insecta:

1. Body is divided into three regions (head, thorax and abdomen)
2. In head a pair of antenna and a pair of compound eyes are usually present.
3. Thorax with, 3 pairs of legs and two pairs of wings. (some with one pair, other wingless)
4. Excretion is mainly through Malpighian tubules.
5. Tracheal system of respiration well developed.
6. Development with several molts and indirect, the metamorphosis present with different form; or direct, the metamorphosis is absent (egg. young. adult)
7. sex separate, fertilization internal.