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اللافقريات	**اسم المادة باللغة العربية**
Invertebrates	**اسم المادة باللغة الانكليزية**
ابراهيم عبد النبي شبيب	**اسم التدريسي**
مقدمة عامة عن اللافقريات	**عنوان المحاضرة باللغة العربية**
General introduction to invertebrates	**عنوان المحاضرة باللغة الإنكليزية**
1	**رقم المحاضرة**

Lec. 1 Invertebrates

Introduction:

The invertebrates include those animals which are without backbone as opposed to vertebrates in which a series of vertebrates constitute backbone. The invertebrate constitutes about 97% of the known animals which number over a million. There is not even positive character which is common to all invertebrates, and the differences between the groups are very large, each group of invertebrates has certain structural peculiarities, a special terminology, and distinct classification.

Vertebrates	Invertebrates
1. They have an internal skeleton.	1. They have no internal skeleton.
2. A backbone is present.	2. Backbone is not present.
3. Nerve cord is dorsal and hollow.	3. Nerve cord is ventral and solid.
4. Heart is on the ventral side of the body.	4. Heart when present is on the dorsal side of the body.
5. Hemoglobin is present is Red blood cells.	5. Hemoglobin if present is dissolved in plasma.

Animal Classification:

There are more than one million species of animals. A way of sorting through all those species is to organize them by similar properties, or characteristics. There are three different system of classification:

1-Artificial Classification: The ordering of organisms into groups based on non-evolutionary features. It is a system of classification based on one or two easily recognizable characters.

2-Natural Classification: The natural classification may be defined as "Classification based on characters which indicate natural relationships". The natural system of classification is based on similarity.

3. Phylogenetic Classification: The phylogenetic system is based on the evolutionary and genetic relationship of the organisms. It enables us to find out the ancestors or derivatives of any taxon.

Taxon and Category:

The taxa are the groups of animals generally groups of species. Any such group of such population is called taxon.

Taxonomic Categories:

Kingdom

A taxonomic category of the highest rank, grouping together all forms of life having certain fundamental characteristics in common.eg Animalia,plantae,etc

Phylum

Phylum is second highest unit of classification after Kingdom. It includes one or more related classes of

animals. In plants, instead of phylum, the term 'division' is used.

Class

Class is a taxonomic group consisting of one or more related orders.

Order

Order is a taxonomic group containing one or more families.

Family

Family is a taxonomic group containing one or more related genus.

Genus

Genus is a taxonomic group including closely related species.

Species

A group of closely related organisms that are very similar to each other and are usually capable of interbreeding and producing fertile offspring. The species is the fundamental category of taxonomic classification, ranking below a genus or subgenus.

The Importance of Invertebrates:

Some Invertebrates Benefits:

1- Pollinators,
Example honey bees

2- **Recyclers** :recycling and processing of waste in the environment. Example (Dung Beetles).

3- **Play a large role in Food webs** it is shown that while different species of invertebrates can play the role of herbivores and carnivores in a food web, there are also many species of decomposer invertebrates that help to break down animal wastes and bodies of dead plants and animals.

4- **Biological Control Agents:** Uses invertebrate predators and parasitoids, so called natural enemies, for the sustainable reduction of pest populations, including other invertebrates and invasive plant species.

5- Soil Ecosystem Engineer and Regulators

6- **Provider of Goods:** Sponges for bathing, Corals, Oysters and others for jewelry, Cloth production (silk).

7- Use as Food

8- **Medicinal benefits.** Hirudin is a naturally occurring peptide in the salivary glands of blood-sucking leeches that has a blood anticoagulant property.

9- **Invertebrates as model organisms for research**.

Example : *Drosophila melanogaster* (fruit fly).This fruit fly has approximately 15,500 genes on its four chromosomes, whereas humans have about 22,000 genes among their 23 chromosomes. Low and manageable number of chromosomes make *Drosophila* species easier to study. Another example is *Caenorhabditis elegan*s which is used in biological research. Because it has , short lifespan, and small genome.

10- **Invertebrates as Bioindicators:** Some invertebrate communities are often used as indicators of ecosystem health because many species are sensitive to pollution.

Some Harms of Invertebrates

1- Many invertebrates affected the agriculture production in field and stores.

2- Some invertebrates transmit and cause variable diseases to man and animals.

3- Some group of marine invertebrates cause **biofouling** (the accumulation of invertebrates such as cnidarians, protozon and sponges on ships cause reduction of their efficiency.

Some examples:

Disease	Vector	Causative agent
Leishmaniasis	Sand fly	*Leishmania tropica, Leishmania donovani Leishmania major*
Chagas disease (American trypanosomiasis)	Various assassin bugs of subfamily Triatominae	*Trypanosoma cruzi*
Malaria	Mosquito	*Plasmodium*