Salahaddin University - Erbil
Collage of Agricultural Engineering sciences
Forestry Department

# 1st Lab.
# Entomology

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**Forest Insects- 2nd stage**
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## What is Entomology ?

It is the science which study insects(morphology, anatomy, taxonomy, ecology)

**Forest Insects**
This includes the insects Associated with forest trees As economic crop

**Economic Entomology:-**

Insects affect us in different ways. Some are beneficial while some are harmful.

**Beneficial effects**

Production of products

Pollination

Bio-control agents

**Harmful effects**

1.the science which study insects that negative influence on plants (bite the leaves ,cut the root ,borrow in the stem, attack the fruits, suck cell juices ,etc.)

2.Transmits disease in plants and animals

3. harmful to stored products

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# Objectives

Our aims of reading forest insects are to better understand the sources of infestation and how to minimize the lost by finding suitable solutions.

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## What is an Insect?

Is a small arthropod animal that has six legs and generally one or two pairs of wings.

**Characters of an insects:-**

**1**. Insects have a chitinous exoskeleton

**2**. Three part body (head, thorax and abdomen)

**3**. Three pairs of jointed legs,

**4**. Compound eyes and one pair of antennae.

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## Body of insects divided in to three parts

### head, thorax and abdomen

**1.The head:**

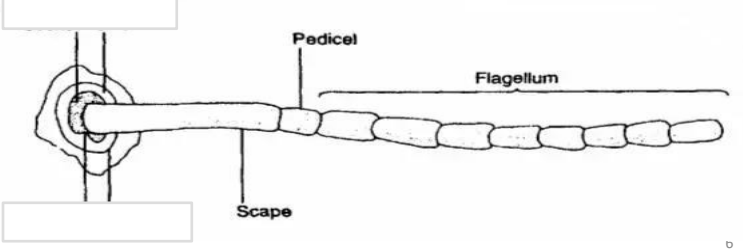
carries a single pair of antennae at the front and a pair of compound eyes on the side. are also called feelers

Antennae (They are paired, highly mobile and segmented). Morphology of antenna which have three segments

1.Scape

2- Pedicel

3- Flagellum

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**2. The thorax**

is made up of three segments,
**prothorax** (pro=first), **mesothorax** (meso=middle), and **metathorax** (meta=last).

wings if present, are attached to the thorax and usually consist of two pairs – the forewings and the hind wings.

each with a pair of jointed legs. The **fore-legs** are located on the prothorax, the **mid-legs** on the mesothorax, and the **hind legs** on the metathorax.

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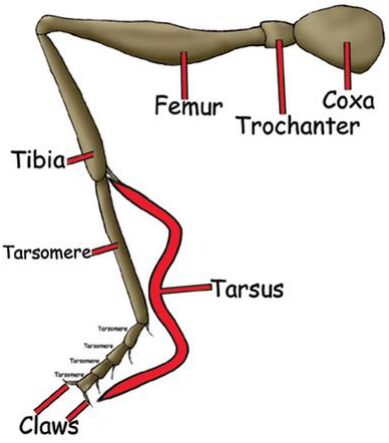
Each leg has six major components:

**Coxa,**
**trochanter,**
**femur,**
**tibia,**
**tarsus,**
**and pretarsus.**

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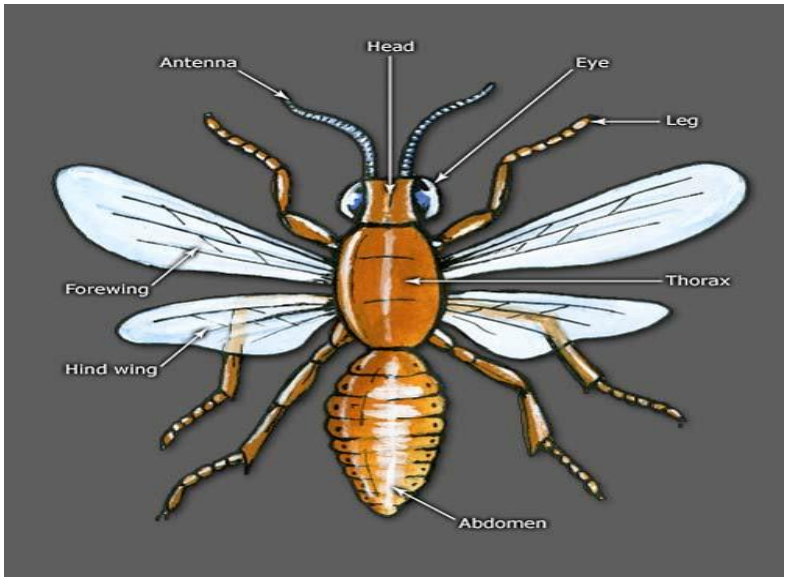
**3. The abdomen**:-at the rear of the insect, has 9–11 segments, each with a pair of breathing holes (spiracles) on the side

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# Life cycle of insects

**Metamorphosis** :- series of changes that takes place during the development of an insect from egg to adult are collectively known as metamorphosis.

**Types of metamorphosis:-**

1- Ametamorphosis (without metamorphosis)
(Immature are called juveniles)

which the wingless orders

Egg ⟹ Young stages ⟹ Adult

**2- Incomplete metamorphosis:**

**A. (Immature are called naiads)**

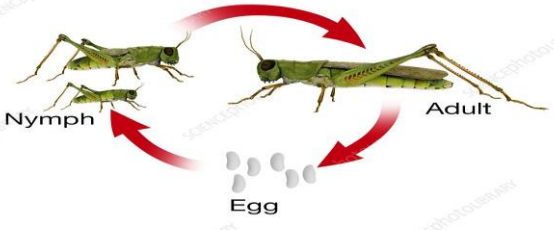
The second type is "incomplete" metamorphosis.
which is found among the aquatic insect orders such as ephemeroptera , odonata.

**Egg ⟶ Naiad ⟶ Adult**


**B.(Immature are called nymphs)**

This type is "gradual" metamorphosis seen in such orders as the grasshoppers (Orthoptera) cockroach
This life cycle starts as an egg, but each growth, or nymphal stage looks similar, except it lacks wings and the reproductive capacity that the adult possesses.

Egg ⟶ Nymph ⟶ Adult



# 3- Complete metamorphosis:

(Immature are called larvae and pupae)

Theis type is "complete" metamorphosis found in butterflies(Lepidoptera),beetles(Coleoptera),flies (Diptera), and bees, wasps, and ants (Hymenoptera).

This life cycle has the four stages of:

Egg ⟹ Larvae ⟶ Pupa ⟶ Adult

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