

# Insect Metamorphosis

Metamorphosis derived from two Greek words “Meta” mean change and “morphe” means shape or form. So, Metamorphosis means "Change of Shape”

“A transformation in shape and in way of life”

In insects, it is a biological process of transformation (hatching to maturity) from an immature form (like egg, larva, nymph) to an adult form in different stages involving a conspicuous and abrupt changes in insects body structure through cell growth and differentiation.

# Insect Metamorphosis

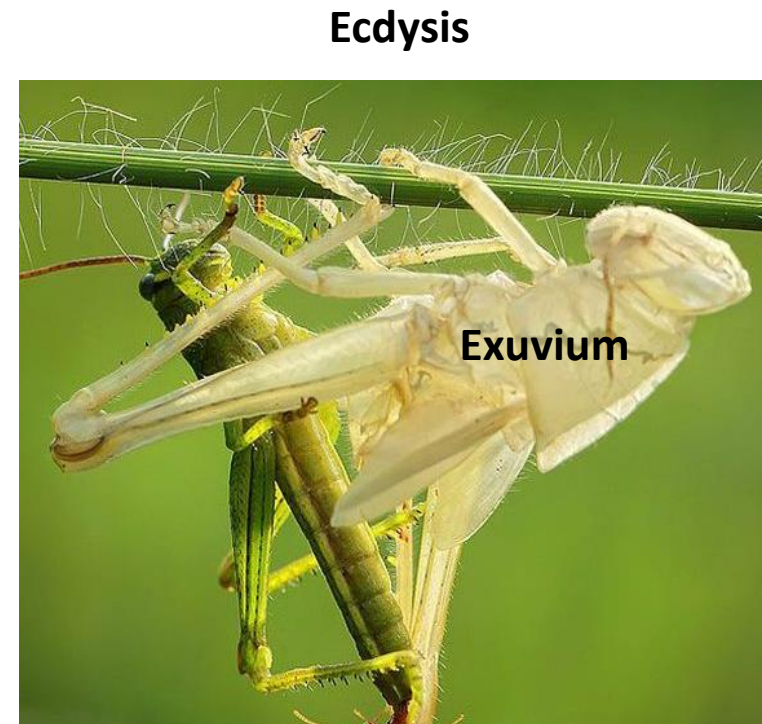
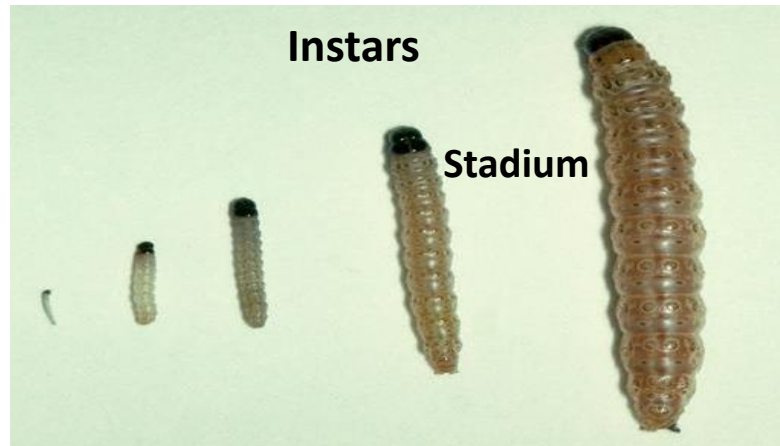
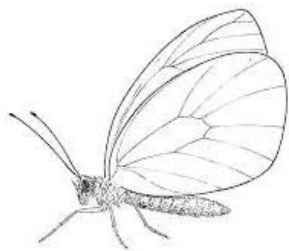
**Ecdysis:** All insects during their postembryonic development go on shedding or moulting their skin. This process is called ecdysis.

**Exuvium:** The moulted skin is termed exuvium (pl exuvia) or exuviae (pl. exuviae).

**Instar:** The particular form or shape of an insect between two moultings is known as instar.

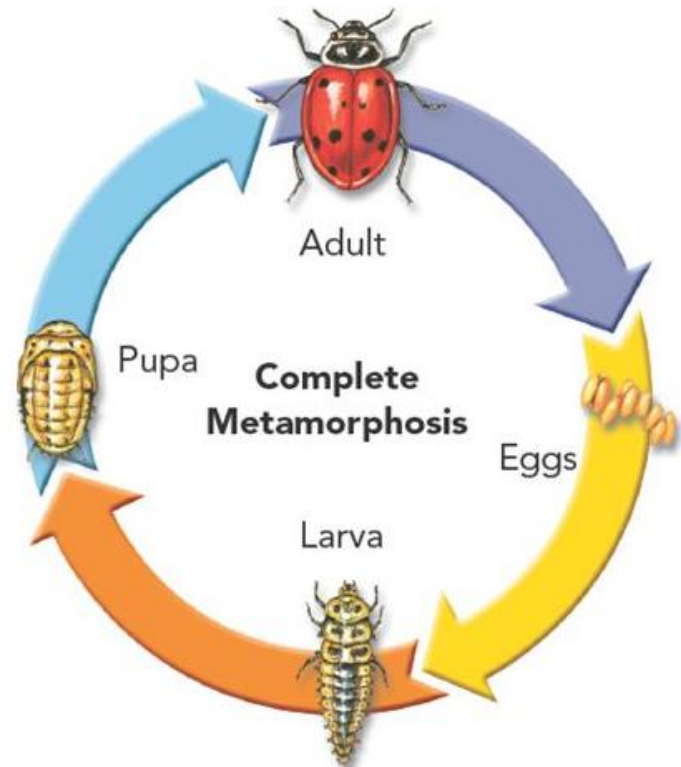
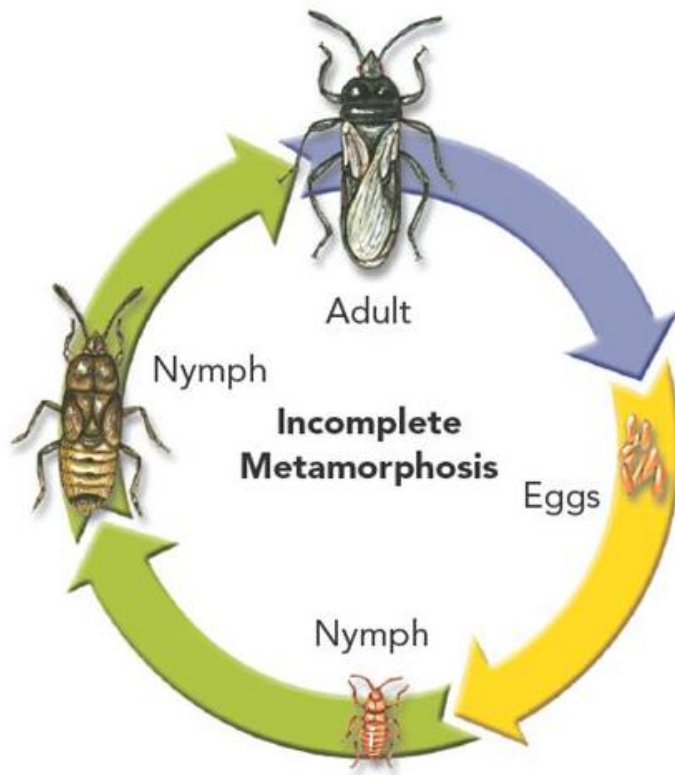
**Stadium:** The period between two moultings is called stadium (pl. stadia).

**Imago:** The adult of an insect is called imago.



# Insect Metamorphosis

## Complete vs. Incomplete Metamorphosis



# Insect Metamorphosis



What do you understand?

# **Insect Metamorphosis**

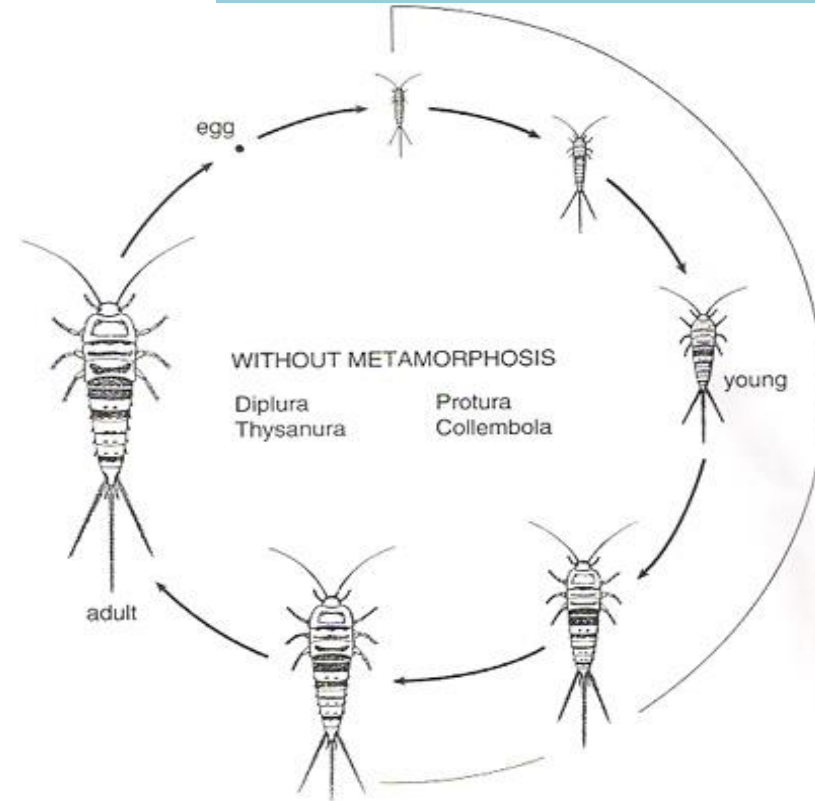
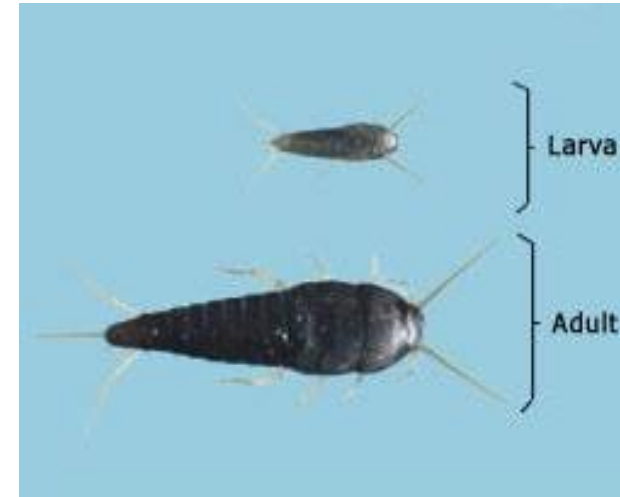
## **Types of Insect Metamorphosis**

1. Ametabola (No or without Metamorphosis)
2. Hemimetabola (Incomplete, Direct, Simple or Gradual Metamorphosis)
3. Holometabola (Complete, Indirect or Complex Metamorphosis)

# Insect Metamorphosis

## Ametabolic development

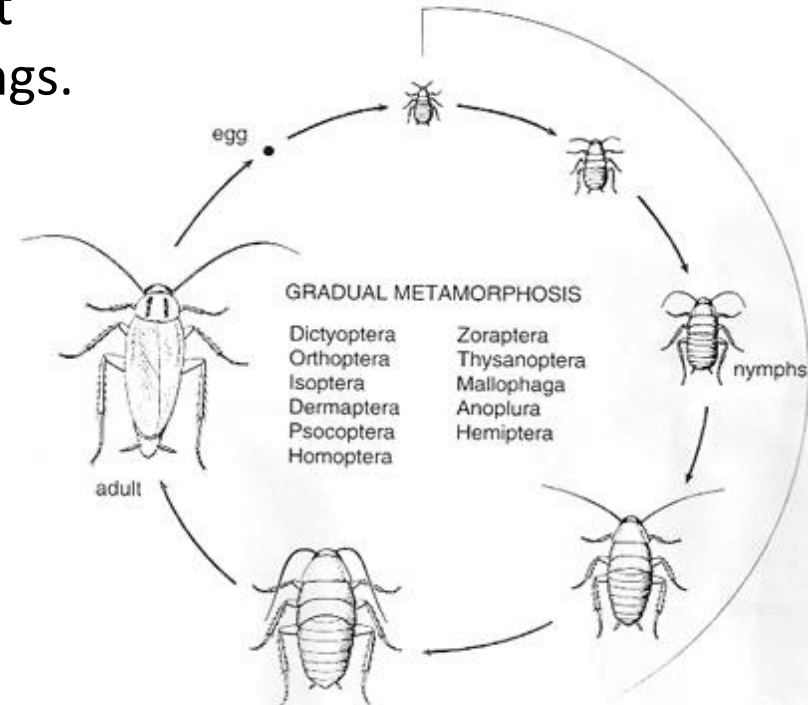
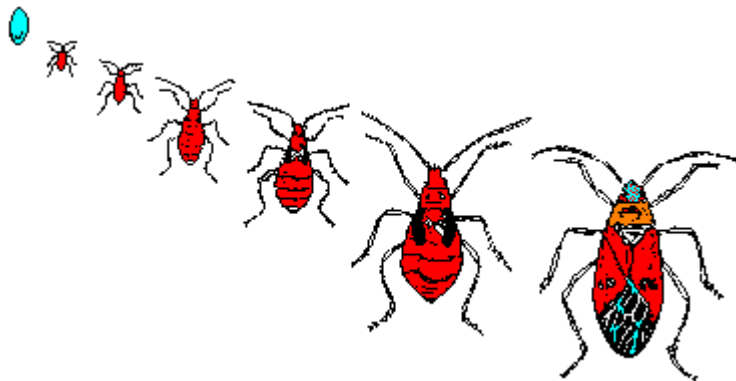
- Silverfish, telsontails, springtails etc.
- No or slight changes during development
- Addition of abdominal scales and styli (Silverfish).
- Addition of abdominal and antennal segments (Telsontails & Springtails).
- Primitively wingless (Apterygota).
- Young ones (Nymph) similar to adults but smaller.
- Anamorphosis (Tensontails) addition or increase in number of segments.
- Egg---Nymphs---Adult



# Insect Metamorphosis

## Hemimetabolic development

- Grasshoppers, crickets, cockroaches, termites and bugs
- Mayflies, stoneflies and dragonflies etc.
- Simple or gradual changes to become adults but no Pupa
- Winged or secondarily wingless
- Exopterygotes
- Young ones (Nymph) similar to adults but smaller with incompletely developed wings.
- **Egg---Nymphs---Adult**



# Insect Metamorphosis

## Hemimetabolic development (Dragonfly)

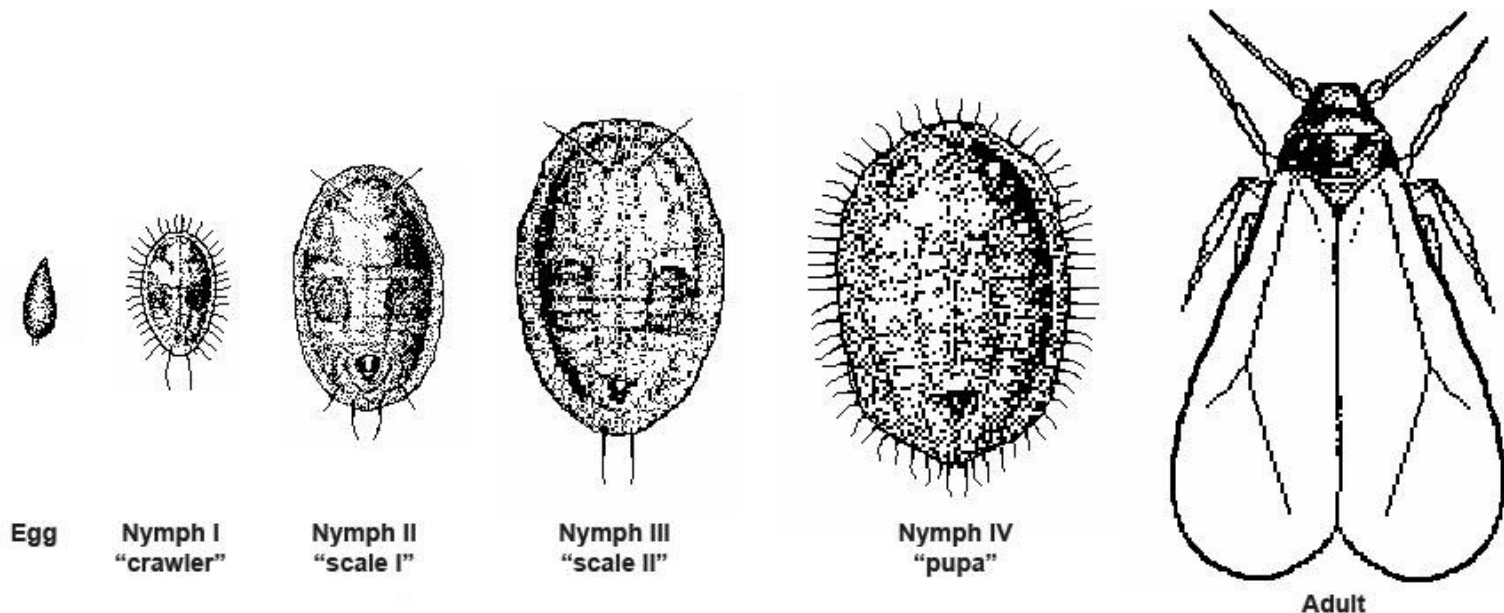
- Aquatic nymphs are called as “Naiads”. eg. Mayflies, stoneflies and dragonflies.
- Naiads posses gills (Temporary) but their aerial adults are without gills.
- **Egg---Naiad---Adult**



# Insect Metamorphosis

## Hemimetabolic development (Whitefly)

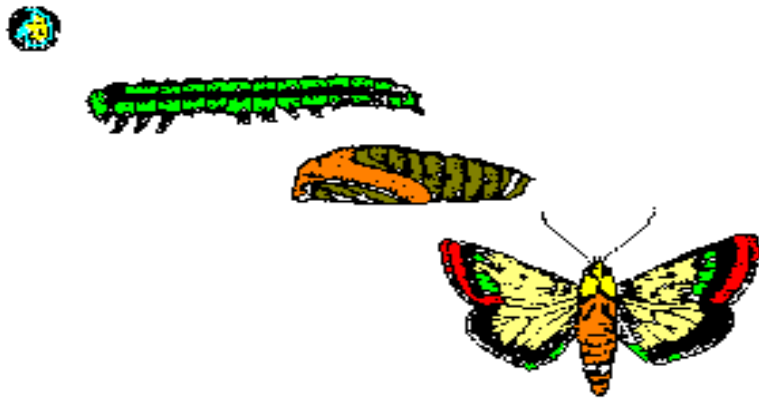
- Whiteflies, male scales and thrips etc.
- They neither fit into hemimetabola nor into holometabola.
- The early instars of their young are without wings and called larvae.
- The later instars are with rudimentary wings and resemble with nymphs.
- The final instar is pupa-like and known as pseudopupa.
- **Egg---Pseudopupa---Adult**



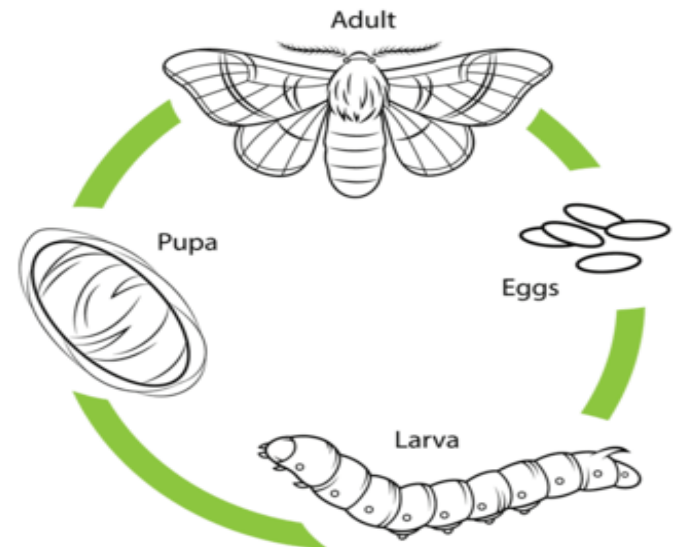
# Insect Metamorphosis

## Holometabolic development

- Moths, butterflies, beetles, flies, bees, wasps etc.
- Complex or marked changes to become adult.
- The young one is called larva which is entirely different from the adult
- They have an additional pupal stage.
- Winged or secondarily wingless.
- Endopterygotes
- **Egg---Larva---Pupa---Adult**



## Life Cycle of a Silkworm



# Insect Metamorphosis

## Holometabolic development (Hypermetamorphosis)

- It is a type of holometamorphosis.
- All larval instars are not similar.
- The shape of larva either goes on changing at all instars (Blister beetle).
- Only first instar is different from the remaining instars which are similar (Hymenopteran parasites).
- Endopterygotes
- **Egg---Larva---Pupa---Adult**

Blister beetle larvae

