



# 4-H Study Materials for Entomology Contests

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## III. Metamorphosis

All insects undergo metamorphosis, a change in body form, as they develop from egg to adult. Insects with simple metamorphosis undergo changes only in size, but insects with more complex metamorphosis change in many ways. The most complex changes occur in such groups as flies, wasps, butterflies and beetles. These insects have a larval or caterpillar stage that looks nothing like the adult insect. The best-known example is a worm-like caterpillar that changes to the pupal or cocoon stage and, after many changes occur within the cocoon, a butterfly emerges. Four main types of metamorphosis are:

### 1. Ametabolous or No Metamorphosis

Stages include egg, young, and adult. The main difference between the young and adult is size. Adults are never winged.

Examples: silverfish, springtails

### 2. Paurometabolous or Gradual Metamorphosis

Stages include egg, nymph, and adult. The nymphs do not have well-developed wings but otherwise resemble the adults. Adults and nymphs share the same food habit.

Examples: grasshoppers, cockroaches

### 3. Hemimetabolous or Incomplete Metamorphosis

Stages include egg, aquatic nymph, and adult. Aquatic nymphs in these groups sometimes are called naiads. These aquatic nymphs look different than the adults. Adults are winged.

Examples: dragonflies, mayflies, stoneflies

### 4. Holometabolous or Complete Metamorphosis

Stages include egg, larva, pupa, and adult. The larvae look very different than the adults. The larvae may have different feeding behavior than the adults. The pupae are non-feeding and typically rather inactive.

Example: beetles, butterflies, flies, wasps

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