Complete and Incomplete Metamorphosis

Let’s look at the difference!
What is metamorphosis?

• Metamorphosis refers to the way that certain organisms develop, grow, and change form.

• Metamorphosis actually means "change".
Two Types of Metamorphosis

• INCOMPLETE METAMORPHOSIS - has THREE stages

• COMPLETE METAMORPHOSIS - has FOUR stages.
INCOMPLETE METAMORPHOSIS

Let’s take a closer look at each stage!
3 STAGES OF INCOMPLETE METAMORPHOSIS

• Egg

• Nymph

• Adult
• **EGG**

• A female insect lays eggs. These eggs are often covered by an **egg case** which protects the eggs and holds them together.
NYMPH

• The eggs hatch into nymphs.
• Nymphs look like small adults, but usually don't have wings.
• Insect nymphs eat the same food that the adult insect eats.
• Nymphs shed or molt their exoskeletons and replace them with larger ones several times as they grow.
• Most nymphs molt 4-8 times.
What is molting?

• Shed the feathers, skin, old exoskeleton or the like, that will be replaced by a new growth.

• Shed its old exoskeleton and secrete a larger one, a complex process called molting.
What is exoskeleton?

• Outer casings (covering) made up of a hard substance called **chitin**
• ADULT

• The insects stop molting when they reach their adult size. By this time, they have also grown wings.
Example:
Grasshopper, cockroach, termites, aphids, scales, dragonfly
- stage Praying Mantis life cycle
COMPLETE METAMORPHOSIS

Let’s take a closer look at each stage!
4 STAGES OF COMPLETE METAMORPHOSIS

- Egg
- Larva
- Pupa
- Adult
Butterflies go through four life stages, and they look very different at each stage...
Stage One

The mummy butterfly lays her eggs safely on a leaf.

She tries to find a nice large, healthy plant so that the newly born caterpillars will have lots of fresh leaves to munch their way through!
The female lays eggs.
Stage Two - larva

Once the baby caterpillar hatches from its egg it begins the primary growth stage of this marvellous insect.

The caterpillar eats lots and lots of leaves so that it grows big and healthy.
LARVA

- They do not look like adult insects. They usually have a **worm-like shape** *(Caterpillars)*.
- Larvae **molt their skin** several times and they grow slightly larger.
Stage Three - Pupa

Soon the caterpillar is ready to become a butterfly. He weaves a **chrysalis (cocoon)** out of silk which will keep him safe whilst he transforms into a butterfly.
PUPA

- Larva make cocoons around themselves.
- Larva don't eat while they're inside their cocoons.
- Their bodies develop into an adult shape with wings, legs, internal organs, etc.
- This change takes anywhere from 4 days to many months.
Stage Four

When he is ready he will split open the chrysalis (cocoon) and emerge as a fully formed butterfly.
• Inside the cocoon (chrysalis) the **larvae change into adults**. After a period of time, the adult breaks out of the cocoon.
Example

• Butterflies, beetles, bees and mosquito
# Metamorphosis Comparison

<table>
<thead>
<tr>
<th>Complete</th>
<th>Incomplete</th>
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<tbody>
<tr>
<td>* Occurs in four stages</td>
<td>Occurs in three stages</td>
</tr>
<tr>
<td>egg</td>
<td>egg</td>
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<tr>
<td>larva</td>
<td>Larva</td>
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<tr>
<td>pupa</td>
<td>Nymph</td>
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<tr>
<td>adult</td>
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<tr>
<td>* Insect's appearance changes</td>
<td>* Young insect looks like the adult</td>
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<tr>
<td>completely</td>
<td></td>
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<tr>
<td>* Young insect looks nothing</td>
<td>* Insect grows bigger and bigger</td>
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<td>like the adult</td>
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<tr>
<td>* Occurs in butterflies and</td>
<td>* As the insect grows, it sheds its exoskeleton</td>
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<td>moths</td>
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Butterfly Life Cycle.flv
Let’s see what we know!

Let’s take Professor Know-It-All’s Quiz and see what we have learned!
QUESTION #1

• What are the two types of metamorphosis?

1. Complete
2. Incomplete
QUESTION #2

• How many stages are there in incomplete metamorphosis?

Answer: 3
QUESTION #3

• Name the stages of **incomplete** metamorphosis?

1. Egg
2. Nymph
3. Adult
QUESTION #4

• How many stages are there in **complete** metamorphosis?

Answer: 4
QUESTION #5

Name the stages in complete metamorphosis.

1. Egg
2. Larva
3. Pupa
4. Adult
QUESTION #6

Identify the cycle as **complete** or **incomplete** metamorphosis.
QUESTION #7

Identify the cycle as complete or incomplete metamorphosis.
QUESTION #8

Identify each stage of the complete metamorphosis of the butterfly.
YOU’VE JUST COMPLETED PROFESSOR KNOW-IT-ALL’S QUIZ

How did you do?
Where do butterflies lay their eggs?

leaves
flowers
grass
trees
That's right!

Butterflies lay their eggs on leaves.
How long before the butterfly egg hatches?

- 5 days
- 10 days
- 15 days
- 20 days
That's right!
The egg hatches after about 10 days.
What do caterpillars eat?

- fruit
- vegetables
- leaves
- chocolate
That's right!

Caterpillars eat leaves to grow.
What creatures like to eat caterpillars?

- spiders
- bees
- cats
- birds
- wasps
- beetles
That's right!

Spiders like to eat caterpillars.
That's right!

Birds like to eat caterpillars.
That's right!

Wasps like to eat caterpillars.
How long does the caterpillar stay inside the pupa for?

1 week
2 weeks
3 weeks
4 weeks
That's right!

A caterpillar stays in the pupa for about 3 weeks.
How long do butterflies live?

1-2 months

2-3 months

3-4 months

4-5 months
That's right!

Butterflies can live between 4-5 months.
Well Done!
You answered all the questions correctly.
Insect Growth and Development

* Insects eat a lot, so they grow very fast. As they grow, insects may molt and grow new **exoskeletons**, or they may change completely.

* A huge change in appearance is called **metamorphosis**.

* There are two kinds of metamorphosis: **complete** and **incomplete**.
In complete metamorphosis, insects like butterflies and moths have **four** stages of development.

* The first stage makes an **egg**.

* During the second stage, the egg hatches and a **larva** comes out.

* A caterpillar is the larva of an insect that will become a butterfly or a moth.
Complete Metamorphosis

* During the third stage, a ___________ is made.

* A pupa is sometimes wrapped in a _______________ or in a _______________.

* A cocoon is the pupa of a _______________.
  A cocoon is made of _____________.

* A chrysalis is the pupa of a _____________.

* In the last stage, the insect is finally an adult.
From Caterpillar to Butterfly

Larva

Pupa

Chrysalis

Emerging butterfly

Monarch butterfly
Incomplete Metamorphosis

* Incomplete metamorphosis happens in grasshoppers, termites, and dragonflies.

* In incomplete metamorphosis, young animals that look like the **adult** hatch from eggs.

* As the young animals grow, they keep **molting**, shedding their exoskeletons, and getting larger.
Insect Behavior

* Most insects live alone. But, some insects are ________ and cannot survive alone.

* These insects live in ____colonies____ or hives.

* A colony is ___a group of insects living together.____

The insects do different jobs and are very organized.
Insect Behavior

* An amazing example of a colony is a **beehive**.

* A beehive is a very organized colony of bees.
Mosquito life cycle.flv
Importance of Insects:

- Pollination agents of most fruits and vegetables
- Serve as food for birds, fish, animals and man
- Destroy dangerous insects provide useful food and materials for man e.g. honey, wax, silk and other products assist in the decomposition and recycling of organic matter; dead plant and animal matter
Negative Effects of Insects:

- Transmit diseases of humans, domestic animals, and plants
- Compete with humans and other animals for food feed on crops and ornamental plants
- Responsible for significant public health and economic impact on individuals, communities, populations, and nations
Life Cycle of a Frog

A: Egg
B: Tadpole
C: Juvenile frog
D: Young frog
E: Subadult frog
F: Adult frog
Metamorphosis

• Metamorphosis is the changes that a frog goes through during its life cycle.

• There are four main stages in the life cycle of a frog.
Metamorphosis means change.
Frogs have a life cycle with two parts, living in water as tadpoles and on land as adults.
What is the first stage of the frog life cycle?
The first stage in the life cycle of the frog is the *egg*.

A frog lays many eggs at one time.

The eggs are covered with a jellylike coating.
Frog Eggs
Eggs in a Pond
What is the next stage of the frog life cycle?
Tadpole

• The second stage of the frog life cycle is the tadpole.

• Hatched tadpoles have gills for breathing in the water.

• They have a tail, but no legs.
As a tadpole grows, lungs begin to form.

Back and front legs begin to grow. These parts allow the adult frog to live on land.
Froglet

- The next stage of the frog life cycle is the froglet.
- These legs help the frog on land.
What is the last stage of the frog life cycle?
Adult Frog

- Once the lungs form and begin to work, the **gills** and **tail** disappear.
The adult frog is now ready to live on land.
...and the life cycle begins again.
eggs → tadpole → adult
Life Cycle of a Frog2.flv
Identify the lifecycle of the frog as complete or incomplete metamorphosis.
Q: Why are frogs always happy?
A: Because they always eat what bugs them!

Q: What kind of frog do you find on a farm?
A: A bullfrog!
More Frogs!