

12 Life cycles of living organisms



By observing the environment carefully you will notice that all living beings are born from an egg / a seed or as a small creature, and they pass through many different stages. A grown-up organism produces offspring of its own by the reproductive process. These stages are repeated in each generation through and it ensures the survival of living organisms in the environment.

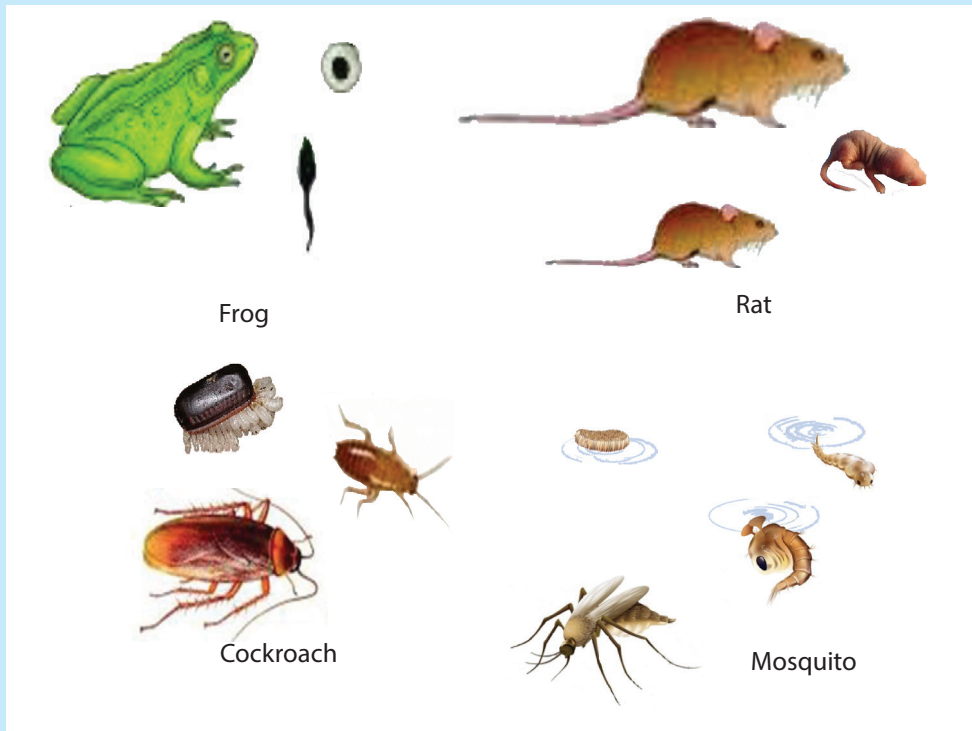
The sequence of events in stages of development as a cyclic process, which a living organism passes from its birth to death is termed as a life cycle.

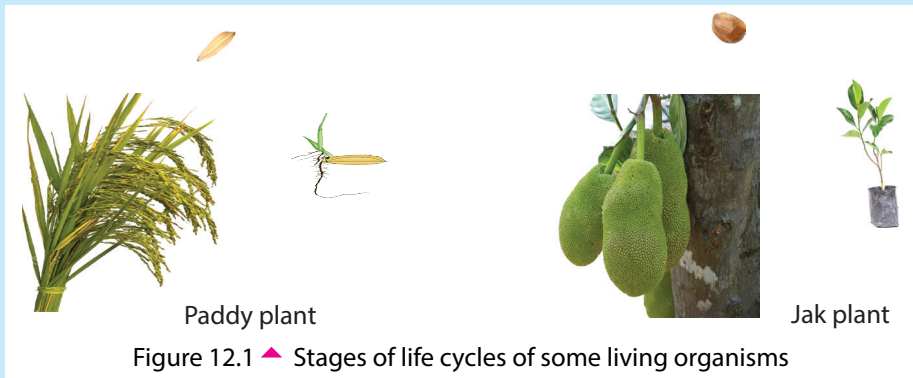
Let us do Activity 12.1 to study about the life cycles of living organisms.



Activity 12.1

You will need :- Some pictures of animals with the stages of life cycles

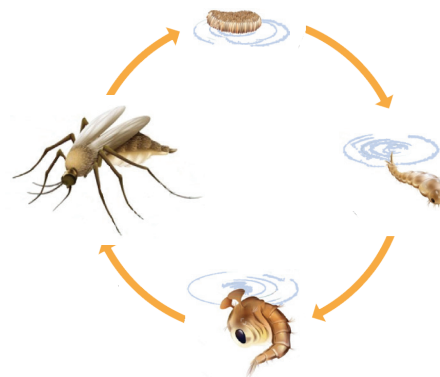
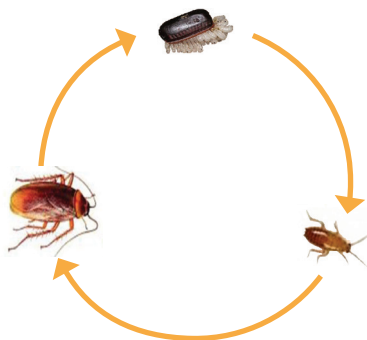
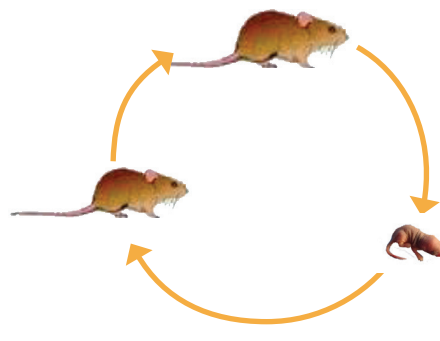
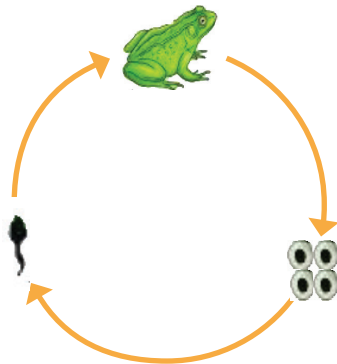




Method :-

- Observe the pictures given in Figure 12.1 and identify the different stages of each organism.
- Make the different stages in order and write the life cycle of each organism.

Compare the life cycles you prepared with the following.



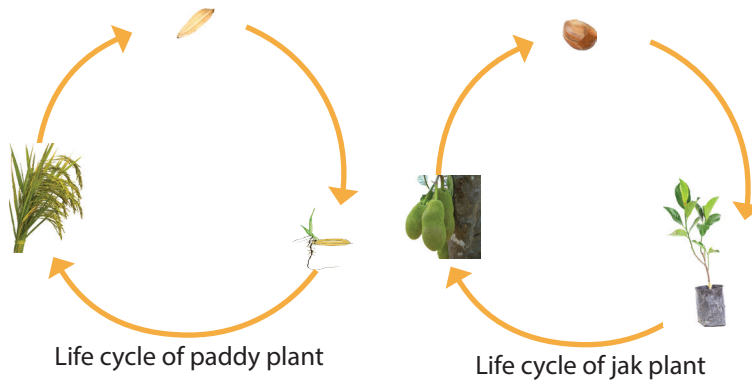


Figure 12.2 ▲ Life cycles of some organisms

When you have completed arranging the stages of life cycles of plants and animals in order you would have understood that life cycles of organisms can be build up.

12.1 Life cycles of animals

To study about the life cycles of animals engage in Activity 12.2



Activity 12.2

You will need:- Life cycles of butterfly, frog, cockroach, mosquito, rat, human

Method :-

- Observe the life cycles well and identify the special characteristics of each stage of animals.
- Tabulate your observations depending on the differences of shapes/ patterns of the different stages.

Table 12.1

With different morphological forms of stages	Without different morphological forms of stages

You would have noticed that there are no different morphological forms in different stages of rat and human, while there are morphological changes in different stages of cockroach, butterfly, mosquito and frog.

Some animals (e.g.:- rat) born morphologically similar to their parents, but smaller in size. Some species have slightly complicated life cycles. That is, they go through different morphological forms before becoming an adult.

Some animals such as butterfly, mosquito, cockroach, frog etc, are hatched from eggs. As the nutrients in the eggs are not sufficient for them to become an adult, they go through different stages. During these stages most of the feeding is done for them to become an adult. Going through different stages in the life cycles ensures their survival.

Also the adaptations of these stages for different environments secure their survival.

There are different stages in human life cycle. Although the infant is differ in body size, he has similar appearance of the adult. The infant go through the life stages childhood, adolescence and becomes an adult. Stages of human life cycle have approximately the similar morphological features that they will have as human adults.

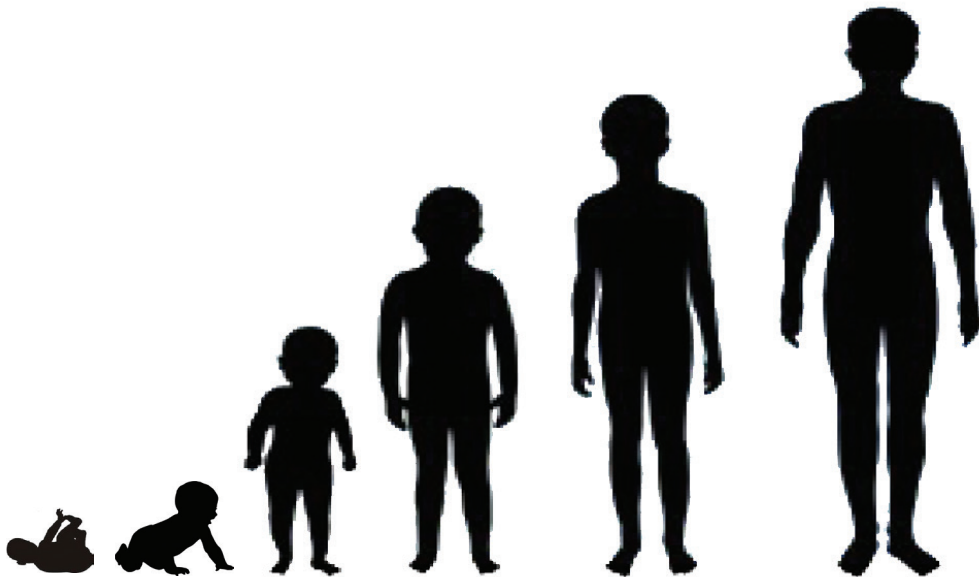


Figure 12.3 ▲ Some stages of human life cycle

Hence, you may have noticed that some organisms who undergo changes with different morphological features while some have similar morphological features in their different stages of life cycle.

Would you have noticed that the eggs of the butterfly hatch and a larva is born ? After some days larva becomes a pupa and later on it becomes a beautiful butterfly with colourful wings. These stages of life cycle have different morphological features.

The process with different morphological changes in different stages of life cycle that some living organisms go through to become adults is referred to as **metamorphosis**.

Animals like rat and man who do not show morphological differences in life cycles do not have metamorphosis in their development.

Are the morphological changes of different stages of every organism that undergo metamorphosis, significant? Let us do Activity 12.3 to study about it.

 **Activity 12.3**

You will need:- Some pictures that show the life cycles of frog, cockroach, butterfly, mosquito, dragon fly, white ant

Method :-

- Observe the pictures well.
- Are the morphological changes of different stages of every creature significant?
- Tabulate your answer.

Table 12.2

The creatures that have significant differences in stages of life cycle	The creatures that do not have significant differences in stages of life cycle

The organisms hatched from eggs of cockroach, dragon fly, white ant are smaller in size but they resemble adult in appearance. The creatures hatched from eggs of butterfly, mosquito, frog are completely different from the adult.

Commonly metamorphosis is exhibited by insects and amphibians. Metamorphosis is a reason for successful existence of insects.

There are two common forms of metamorphosis.

- **Complete metamorphosis**
- **Incomplete metamorphosis**

Metamorphosis with significant morphological differences in the different stages, is known as **complete metamorphosis**.

The feeding mechanism, locomotion are different in each stage. The larva feeds on plant leaves while moves using legs. The butterfly feeds on nectar and it flies.

e.g.:- Mosquito, butterfly

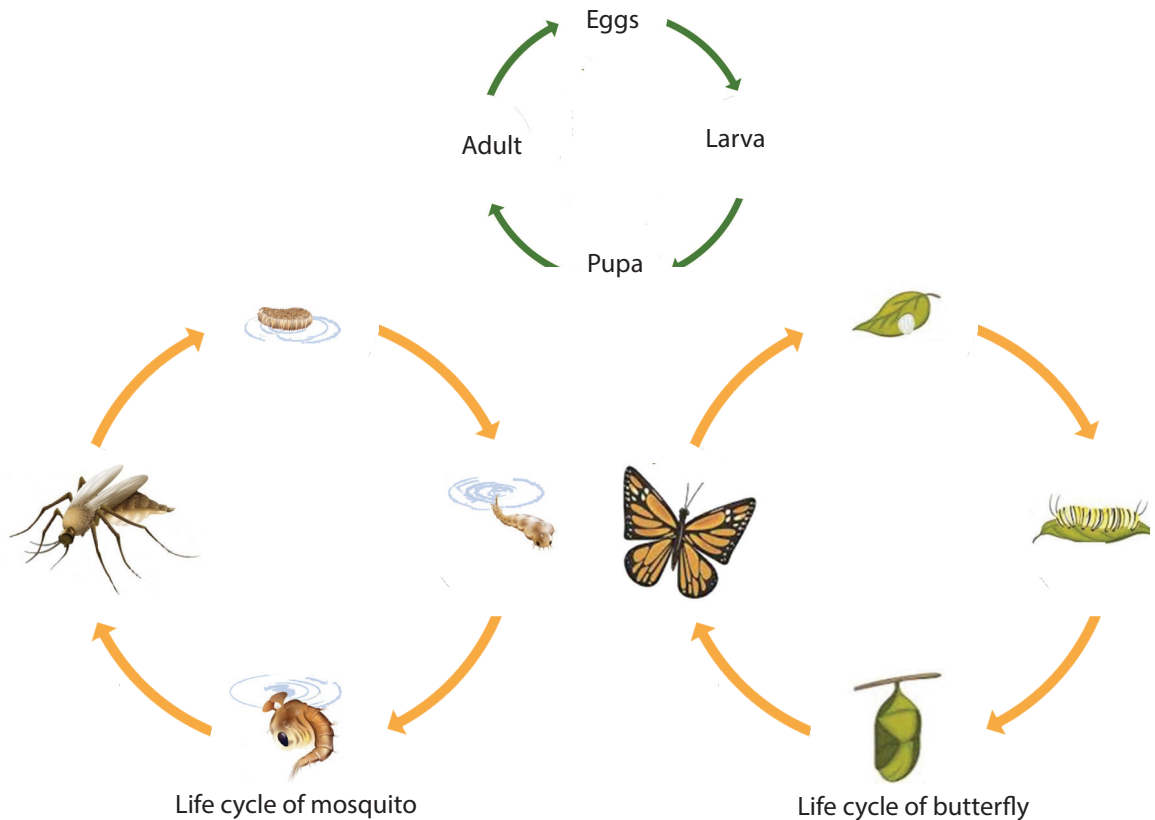


Figure 12.4 ▲ Life cycles of mosquito and butterfly showing complete metamorphosis

Metamorphosis, that does not show any significant morphological and physiological changes in the stages of life cycle is known as **incomplete metamorphosis**.

The young hatched from the egg, which is known as the nymph is morphologically similar to the adult with only slight changes.

e.g.:- Cockroach

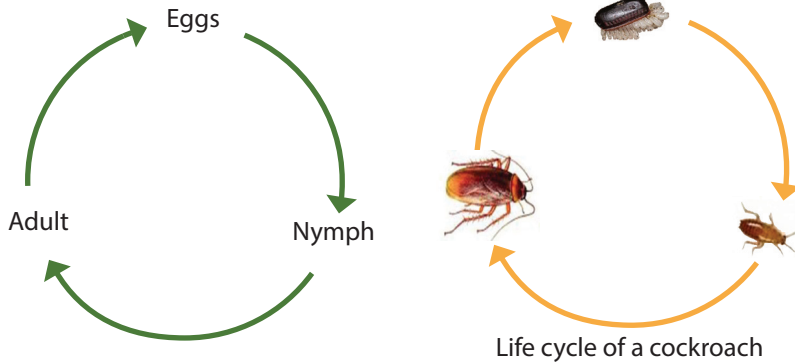


Figure 12.5 ▲ Life cycle of a cockroach that shows incomplete metamorphosis



Assignment 12.1

- List separately creatures that exhibit complete metamorphosis and incomplete metamorphosis.

Frog is a vertebrate that exhibits metamorphosis. Let us study about the life cycle of a frog.

12.1.1 Life cycle of a frog

The female frog lays eggs in water. The eggs are covered with a jelly type layer. A tiny tadpole comes out from a hatched egg. It is similar to a fish. It can swim in water and breaths using gills. It feeds on aquatic plants as a herbivore.

A lot of morphological changes occur within water for the tadpole to become an adult frog (Figure 12.6).



Figure 12.6 ▲ How a tadpole becomes a frog

Compared to the stages of tadpole the adult frog has completely different morphological features. It has got legs for locomotion and lungs for respiration. They feed on small insects. They are insectivores.

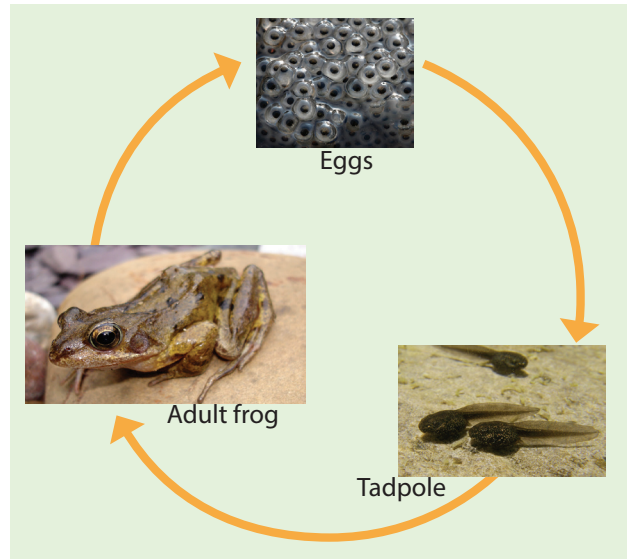


Figure 12.7 ▲ Life cycle of a frog



Assignment 12.2

- Conduct a field visit to a nearest aquatic environment such as a pond.
- Observe the different stages of frog; eggs, tadpoles and adult frog.
- Identify the special characteristics of those stages.

Let us study about the life cycle of a butterfly, an insect that goes through complete metamorphosis.

12.1.2 Life cycle of a butterfly

Butterfly shows complete metamorphosis. The adult butterfly lays eggs. These eggs are hatched and a larva is born. This larva is called a caterpillar becomes a pupa after sometime. Pupa stays inside a cocoon and stays inactively without feeding, but there are changes in the body to become an adult.

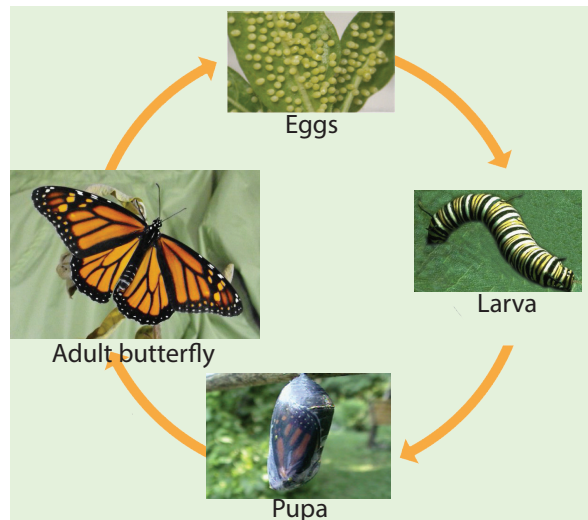






Figure 12.8 ▲ Life cycle of a butterfly

Specific features in each developmental stage of butterfly is given in Table 12.3.

Table 12.3

 <p>Eggs of butterfly</p>	 <p>Larva</p>	 <p>Pupa</p>	 <p>Adult</p>
<ul style="list-style-type: none"> • Eggs stick on the lower surface of plant leaves. 	<ul style="list-style-type: none"> • Caterpillar is the larva of butterfly. • Caterpillars are normally match with the surface they attach to. They use legs for locomotion. • Caterpillar feed on tender leaves and grow. There are specified mouth parts in it. • There are hairs containing venom to protect from others. 	<ul style="list-style-type: none"> • Pupa is an inactive stage in a pupal cocoon. It does not feed. • Every part of butterfly body is formed in the pupal cocoon. • Pupa stick on to a surface. 	<ul style="list-style-type: none"> • Adult comes out breaking the cocoon. • Adult feed on nectar. There is a specialized organ called proboscis to suck nectar.

Let us study about the life cycle of a cockroach, an insect that goes through incomplete metamorphosis.

12.1.3 Life cycle of a cockroach

After eggs are hatched a nymph is born. Although the nymph is smaller in size, is physically similar to the adult. They not possess wings. In nymphal stage they are not sexually matured. Nymphs become adults by passing number of nymphal stages (by shedding their exoskeleton).



Figure 12.9 ▲ Some nymphal stages of cockroach

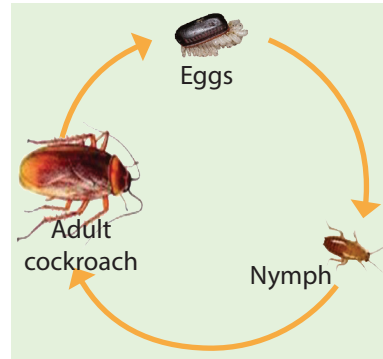


Figure 12.10 ▲ Life cycle of a cockroach

12.2 Life cycles of plants

Flowering plants also pass different stages from seed germination to growing to a mature plant.

Let us do Activity 12.4 to find out more about the life cycles of flowering plants.



Activity 12.4

You will need:- Some pictures showing the life cycles of flowering plants

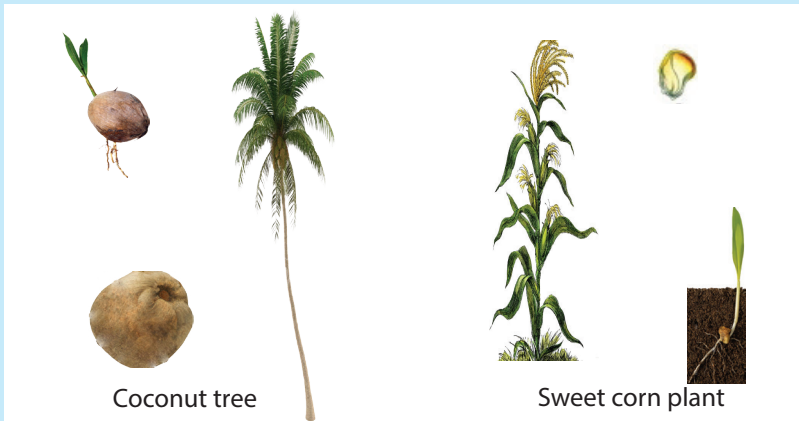


Figure 12.11 ▲ Stages of life cycles of flowering plants

Method :-

- Observe the pictures well. (Get the help of your teacher)
- Write the stages of the life cycles in order.

The stages of a life cycle of a flowering plant can be represented as follows (Figure 12.12).

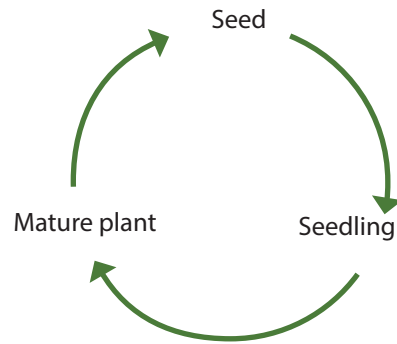


Figure 12.12 ▲



Assignment 12.3

- Collect some seeds and fruits of some plants, that can be easily found (grass, love grass, chillies, tomato)
- Collect the flowers of those plants.
- Press them keeping between the pages of a paper, for some days.
- Use them and try to present the life cycle of each plant.

12.3 Importance of learning the life cycles

The importance of learning about the life cycles are;

- For pest controlling
- For controlling disease vectors
- For conservation of biodiversity

12.3.1 Pest controlling

An insect or other small animal that harms or destroys crops, garden plants or trees that are useful is known as a pest massively harm the crops.

Studying about the life cycles and the behaviour of these pests is important in controlling them.

Let us study the life cycle of a fruit fly, a pest insect that involves in destroying the crops a lot (Figure 12.13).

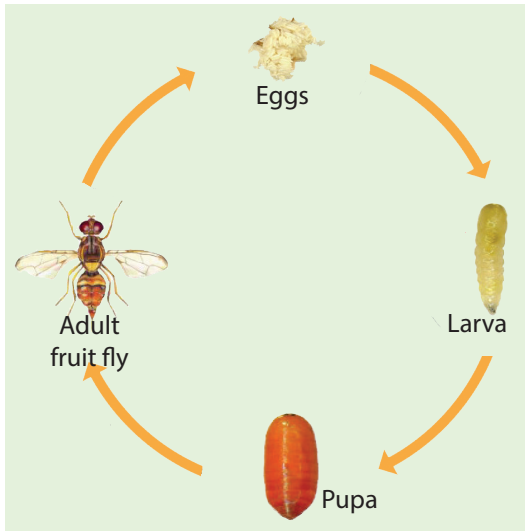


Figure 12.13 ▲ Life cycle of a fruit fly

The adult female fly lays eggs by pricking the fruits such as mango, guava etc. The larva feeds on the flesh of the fruit, gradually moving in by making tunnels in the fruit. So, the fruits get rotten and they become unsuitable for consumption. Also the value of the fruit gets reduced.



Figure 12.14 ▲ The damage of the fruit fly

The larval stage is the most likely and easiest way to control the fruit fly.

- Regular inspection of the harvest can control the fruit fly. If larvae are found in fruits the fruits must be destroyed.
- The fallen fruits that are infected by larvae should be collected and destroyed.



Activity 12.5

You will need:- Articles or magazines written on pests that destroy crops and their life cycles

Method :-

- Make a list of pests that destroy crops.
- Tabulate your findings in Table 12.14.

Table 12.4

Pest insect	Crop/crops affected	Mostly affected place	Stage of life cycle that destroy the crop
Fruit fly			
Coconut red weevil			
Paddy bug			
Mealy bug			

Compare your answer with the following.

Table 12.5

Pest insect	Crop/crops affected	Mostly affected place	Stage of life cycle that destroy the crop
Fruit fly	Mango, banana	Fruit	Larva
Coconut red weevil	Coconut	Fruit, leaves, stem	Larva
Paddy bug	Paddy plant	Leaves, stem	Adult and nymph
Mealy bug	Mango, rose apple, guava, papaya, brinjal, chillies	Leaves, fruits	Adult

The actual methods you can use to control pests and the ways these methods can be used together is based on an understanding of their life cycles. The method used to control the stage of larva can not be used to control the adult pest insect or its any other stage.

Therefore, controlling of pests can be achieved effectively by controlling different phases of their life cycle. Pests can be pest insects and also pest plants that destroy the crops.

e.g.:- 'Bajiri', 'Kudametta', 'Thunessa' are pest plants of rice crop

Many pest controlling methods are used to prevent the harm of pests on crops/harvest. It is our duty and the responsibility to protect the living beings in the environment. This will help to conserve the biodiversity and the environmental equilibrium.

The traditional methods of controlling pests used by our ancestors are eco-friendly and nowadays farmers tend to use these methods to control pests.

Engage in Assignment 12.4 to study about the traditional methods.



Assignment 12.4

- Find and list out the traditional methods used in the past to control different stages of pests.
- Write your ideas on the importance of those traditional methods.

Nowadays there is a special focus on eco-friendly pesticides. Obtaining knowledge about the preparation and usage of such pesticides causes environmental protection. Engage in Assignment 12.5 to study about eco-friendly pesticides.



Assignment 12.5

- Make a list of eco-friendly pesticides that can be used to control the pest insects.
- Write the raw materials needed to prepare these pesticides.

Usage of chemical pesticides can damage the environment by harming beneficial organisms in the environment. This can throw the whole eco-system out of balance. So, chemical control should be referred to when the pests are not controlled by biological control or by simple mechanical methods.

Excessive and unsafe usage of chemical pesticides may affect the water bodies. These chemicals can accumulate in water and consuming this contaminated water may cause cancers, kidney diseases.



For extra knowledge

- When chemical pesticides are used in fruits and vegetables it is very important not to harvest them until the recommended period. If they are harvested before the safe period the toxic chemicals enter the human body. Accumulation of these toxic chemicals for a long time in the body leads to diseases such as cancer, kidney diseases.
- Therefore, it is very important to wash the fruits and vegetables well before consuming.

Let us do Assignment 12.6 to study about the bad effects of using chemical pesticides.



Assignment 12.6

- Design a poster to show the bad effects of using chemical pesticides.

12.3.2 Disease vectors

An agent that carries and transmits pathogens (virus, protozoa) from an infectious organism to a healthy organism, is called a disease vector. Mosquito is a disease vector insect. It acts as the vector of different diseases that human suffers such as dengue, malaria etc.

To control this disease vector it is important to know about the life cycle of mosquito.

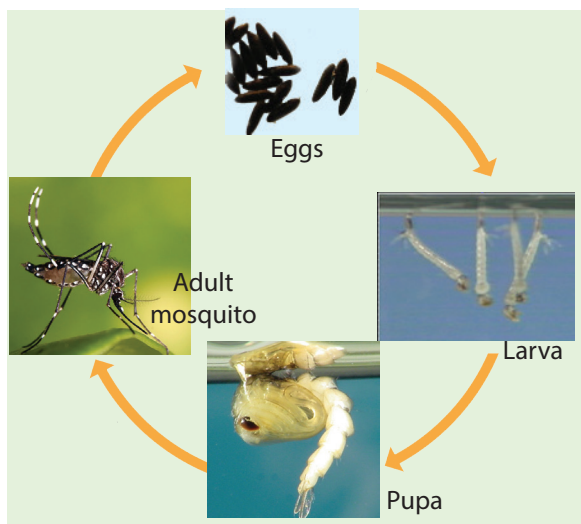


Figure 12.15 ▲ Life cycle of mosquito

To control mosquito larva, fish species that prey on mosquito larva can be bred in water bodies such as ponds. This is considered as a biological control. This way of controlling pests are eco-friendly than spraying chemical to control mosquito.



Assignment 12.7

- List out some diseases that are vectored by mosquito.
- Collect information about fish species that prey on mosquito larvae.
- List the most suitable methods that can be used to control the adult mosquito.
- What are the precautions that can be taken by you to prevent mosquito breeding?
- Design a poster about controlling mosquito breeding.

12.3.3 Life cycles for conservation of biodiversity

Some stages within the life cycles of some animal species have become threatened within their habitat. Some growth stages of animals can be completely destroyed due to becoming victims of animals, unfavourable environmental conditions and scarcity of food. Such stages can be considered as the **sensitive stage** of the particular creature. A species may face total extinction if the sensitive stage is destroyed.

Sensitive stages of some animals are given below.

- Some insects - Larvae
- Fishes - Eggs
- Turtles - Eggs and young turtles
- Frogs - Eggs and tadpoles

To protect the biodiversity it is important to understand about the sensitive stages of particular organisms. If you pay special attention about the sensitive stages of an organism, it would be easier to conserve those organisms. Then, it will help to protect biodiversity.



Summary

- Every living organism has a life cycle with different stages.
- Some organisms have significant differences in the stages of life cycle, but some do not have significant differences in the stages.
- The process with a sequence of morphological changes that some living organisms go through to become an adult is known as metamorphosis.
- Metamorphosis with significant morphological changes in the stages is known as complete metamorphosis.
- Metamorphosis without significant morphological changes in the stages is known as incomplete metamorphosis.
- Flowering plants too go through different stages from growth of the seed till becoming an adult plant in its life cycle.
- The creatures that harm the crops and harvest of human are called as pests.
- For a successful pest control there should be a knowledge about the harmful stage of the particular pest.
- It is important to protect the sensitive stages of the life cycle of organisms for conservation of biodiversity.
- In conservation of endangered species it is important to consider about the sensitive stage of the endangered organism.

Exercise

01. Select the most suitable answer.

1) The animal that goes through a complete metamorphosis is

1. Human 2. Mosquito 3. Cockroach 4. Rat

2) The order of different stages of the life cycle of mosquito is

1. Eggs, pupa, larva, adult 2. Eggs, nymph, larva, adult
3. Adult, larva, pupa, eggs 4. Eggs, larva, pupa, adult

3) The organism that go through an incomplete metamorphosis is,

1. Butterfly 2. Cockroach 3. Mosquito 4. Fruit fly

4) What is the stage that can not be seen in the life cycle of the cockroach?

1. Eggs 2. Larva 3. Nymph 4. Adult

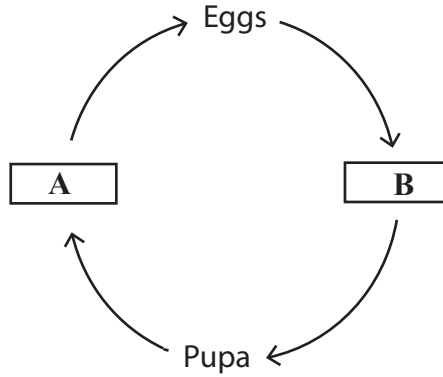
5) It is not important to know about the life cycles of animals for,

1. Controlling pests
2. Conservation of biodiversity
3. Controlling non-infectious diseases
4. Controlling disease vectors

02. Place a tick (✓) if it is correct and a cross (x) if it is incorrect.

1. Rat does not go through metamorphosis. ()
2. The stages of life cycle of cockroach are eggs, nymph and adult. ()
3. The frog spends some stages of its life cycle in water. ()
4. The best method to control pests is using chemical pesticides. ()
5. Going through many different stages in a life cycle ensures the survival of the organism. ()

03. Answer the questions using the diagram given below.



1) What is A and B?

2) Name two insects that go through a similar life cycle as above.

3) Is the above insect go through a complete metamorphosis or incomplete metamorphosis? Give reasons for your answer.

04. State three factors of importance of studying about animal life cycles.

Technical Terms

Life cycle	- ජීවන චක්‍රය	- உருமாற்றம்
Metamorphosis	- රූපාන්තරණය	- நிறையுருமாற்றம்
Complete metamorphosis	- සම්පූර්ණ රූපාන්තරණය	- குறையுருமாற்றம்
Incomplete metamorphosis	- අසම්පූර්ණ රූපාන්තරණය	- பூக்கும் தாவரம்
Flowering plants	- සපුෂ්ප ශාක	- பீடைகள்
Pests	- පළිබෝධයින්	- உணர்நிறன்மிக்க பருவம்
Sensitive stage	- සංවේදී අවධිය	- எதிர்ப்புப் பருவம்
Biological control	- ජෛව පාලනය	- இரசாயனக் கட்டுப்பாடு
Chemical control	- රසායනික පාලනය	- உயிரிப்பல்வகைமை
Biodiversity	- ජෛවවිවිධත්වය	- வாழ்க்கைச் சக்கரம்