TYPES OF LARVAE AND PUPAE

EGGS

The first stage of development in all insects is egg. Majority of insects are oviparous. Egg stage is inconspicuous, inexpensive and inactive. Yolk contained in the egg supports the embryonic development. Eggs are laid under conditions where the food is available for feeding of the future youngones. Eggs are laid either individually or in groups. The outer protective shell of the egg is called chorion. Near the anterior end of the shell of the egg, there is a small opening called micropyle which allows the sperm entry for fertilization. Chorion may have a variety of textures. Size and shape of the insect eggs vary widely.

Types of eggs

a) Singly laid

1) Sculptured egg: Chorion with reticulate markings and ridges. Eg: castor butterfly



2) Elongate egg: Eggs are cigar shaped. Eg: Sorghum shoot fly.



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3) Rounded egg: Eggs are either spherical or globular. Eg: Citrus butterfly.



4) Nit: Egg of head louse is called nit. It is cemented to the base of the hair. There is an egg stigma at the posterior end, which assists in attachement. At the anterior end, there is an oval lid which is lifted at time of hatching.



5) Egg with float: Egg is boat shaped with a conspicuous float on either side. The lateral sides are expanded. The expansions serve as floats. Eg: Anopheles mosquito. Turbo



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b) LAID IN GROUPS

1) Pedicellate eggs: Eggs are laid in silken stalks of about 1.25 mm length in on groups plants. Eg: Green lace wing fly.



2) Barrel shaped eggs: Eggs are barrel shaped. They look like miniature batteries. They are deposited in compactly arranged masses. Eg: Stink bug.



3) Ootheca: Eggs are deposited by cockroach in a brown bean like chitinous capsule. Each ootheca consists of a double layered wrapper protecting two parallel rows of eggs. Each ootheca has 16 eggs arranged in two rows. Oothecae are carried for several days protruding from the abdomen of female prior to oviposition in a secluded spot. Along the top, there is a crest which has small spores which permit gaseous exchange without undue water loss. Chitinous egg case is produced out of the secretions of collaterial glands.

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4) Egg pod: Grass hoppers secrete a frothy material that encases an egg mass which is deposited in the ground. The egg mass lacks a definite covering. On the top of the egg, the frothy substance hardens to form a plug which prevents the drying of eggs.

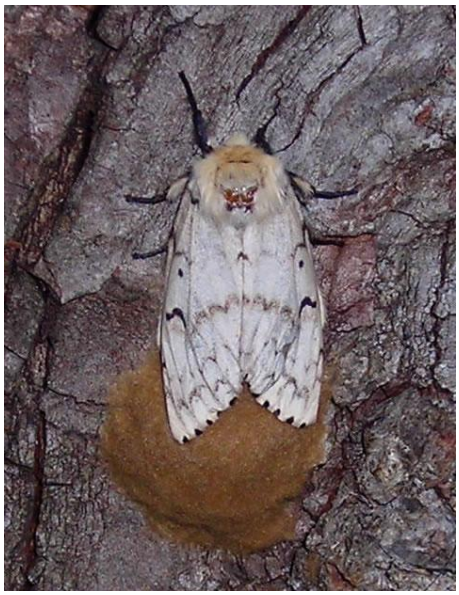


5) Egg case: Mantids deposit their eggs on twigs in a foamy secretion called spumaline which eventually hardens to produce an egg case or ootheca. Inside the egg case, eggs are aligned in rows inside the egg chambers.

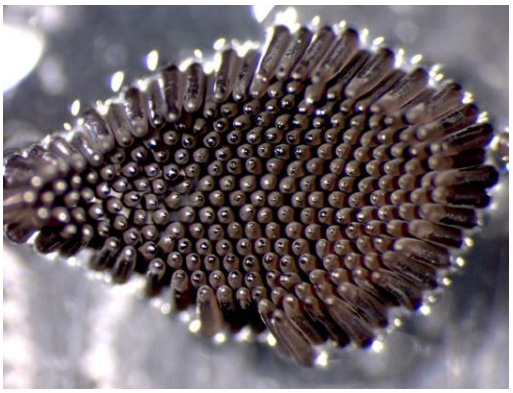


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6) Egg mass: Moths lay eggs in groups in a mass of its body hairs. Anal tuft of hairs found at the end of the abdomen is mainly used for this purpose. Eg: Rice stem borer. Female silk worm moth under captivity lays eggs on egg card. Each egg mass is called a dfl (disease free laying).



7) Egg raft: In culex mosquitoes, the eggs are laid in a compact mass consisting of 200 – 300 eggs are called egg raft in water.



II) LARVAE

There are three main types of insects larvae namely oligopod, polypod and apodous.

1) OLIGOPOD: Thoracic legs are well developed. Abdominal legs are absent. There are subtypes:

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a) Campodeiform: They are so called from their resemblance to the dipluran genus campodea. Body is elongate, depressed dorso ventrally and well sclerotised. Head is prognathous. Thoracic legs are long. A pair of abdominal cerci or caudal processes is usually present. Larvae are generally predators and are very active. Eg: grub of ant lion or grub of lady bird beetle.



b) Scarabaeiform: Body is 'C' shaped, stout and subcylindrical. Head is well developed. Thoracic legsa re short. Caudal processes are absent. Larva is sluggish, burrowing into wood or soil. Eg: grub of rhinocerous beetle.



2) POLYPOD OR ERUCIFORM: The body consists of an elongate trunk with large sclerotised head capsule. Head bears a pair of powerful mandibles which tear up vegetation. Two groups of single lensed eyes found on either side of the head constitute the visual organs. The antenna is short. Three pairs of thoracic legs and upto five pairs of unjointed abdominal legs or prologs are present. Thoracic legs are segmented and they end in claws which are used for holding typically bears rows or circlet of short hooked spines or crochets which are useful in clinging to the

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exposed surface of vegetation and walking. Abdominal segments three to six and ten typically bear prologs. Eg: caterpillar (larvae of moths and butterflies).

a) Hairy caterpillar: The body hairs may be dense, sparse or arranged in tufts. Hairs may cause irritation, when touched. Eg: Red hairy caterpillar.



b) Slug caterpillar: larva is thick, short, stout and fleshy. Larval head is small and retractile. Thoracic legs are minute. Abdominal legs are absent. Abdominal segmentation is indistinct. Larva has poisonous spines called scoli distributed all over the body. Such larva is also called platyform larva.



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c) Semilooper: either three or four pairs of prologs are present. Prologs are either wanting or rudimentaly in either third or third and fourth abdominal segments. Eg: Castor semilooper.



d) Looper: They are also called measuring worm or earth measurer or inch worm. In this type only two pairs of prologs are present in sixth and tenth abdominal segments. Eg: Daincha looper.





3) APODOUS

They are larvae without appendages for locomotion. Based on the degree of development and sclerotization of head capsule, there are three subtypes.

a) Eucephalous: larva with well developed head capsule with functional mandibles, maxillae stemmata and antennae. Mandibles act transversely. Eg: Wriggler (larva of mosquito) and grub of red palm weevil.

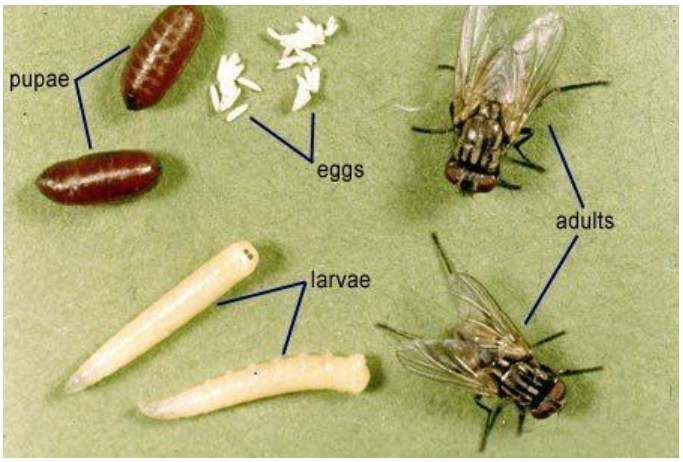
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b) Hemicephalous: Head capsule is reduced and can be with drawn into thorax. Mandibles act vertically. Eg: Larva of horse fly and robber fly.



c) Acephalous: Head capsule is absent. Mouth parts consists of a pair of protrusible curved mouth hooks and associated internal sclerites. They are also called vermiform larvae. Eg: maggot (larva of housefly)



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III) PUPA: It is the resting and inactive stage in all holometabolous insects. During this stage, the insect is incapable of feeding and is quiescent. During this transitional stage, the larval characters are destroyed and new adult characters are created. There are three main types of pupae.

1) OBTECT: Various appendages of the pupa viz., antennae, legs and wings pads are glued to the body by a secretion produced during the last larval moult. Exposed surface of the appendages are more heavily sclerotised than those adjacent to body. Eg: moth pupa.



a) Chrysalis: It is the naked obtect pupa of butterfly. It is angular and attractively coloured. The pupa is attached to the substratum by hooks present at the terminal end of the abdomen called cremaster. The middle part of the chrysalis is attached to the substratum by two strong silken threads called gridle.



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b) Tumbler: Pupa of mosquito is called tumbler. It is an object type of pupa. It is comma shaped with rudimentary appendages. Breathing trumpets are present in the cephalic end and anal paddles are present at the end of the abdomen. Abdomen is capable of jerky movements which are produced by the anal paddles. The pupa is very active.



2) EXARATE: Various appendages viz., antennae, legs and wing pads are not glued to the body. They are free. All oligopod larvae will turn into exarate pupae. The pupa is soft and pale. Eg: pupa of rhinocerous beetle.





3) COARCTATE: The pupal case is barrel shaped, smooth with no apparent appendages. The last larval skin is changed into a case containing the exarate pupa. The hardened dark brown pupal case is called puparium. Eg: Fly pupa.



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PUPAL PROTECTION

In general pupal stage lacks mobility. Hence, it is the most vulnearable stage. To get protection against adverse conditions and natural enemies, the pupa is enclosed in a protective cover called cocoon. Based on the nature and materials used for preparation of cocoons, there are several types:

S.No	Types of cocoon	Materials used	Example
1.	Silken cocoon	silk	silkworm
2.	Earthern cocoon	Soil + saliva	Gram pod borer
3.	Hairy cocoon	Body hairs	Wolly bear
4.	Frassy cocoon	Frass + saliva	Coconut black headed caterpillar
5.	Fibrous cocoon	Fibres	Red palm weevil
6.	Puparium	Hardened last larval skin	House fly

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