

## Insects Attracted Towards Light

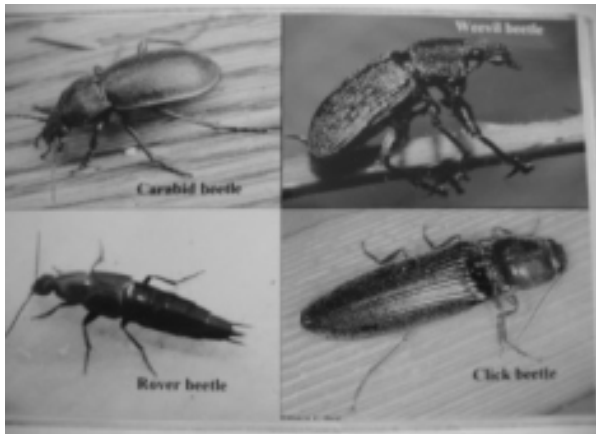
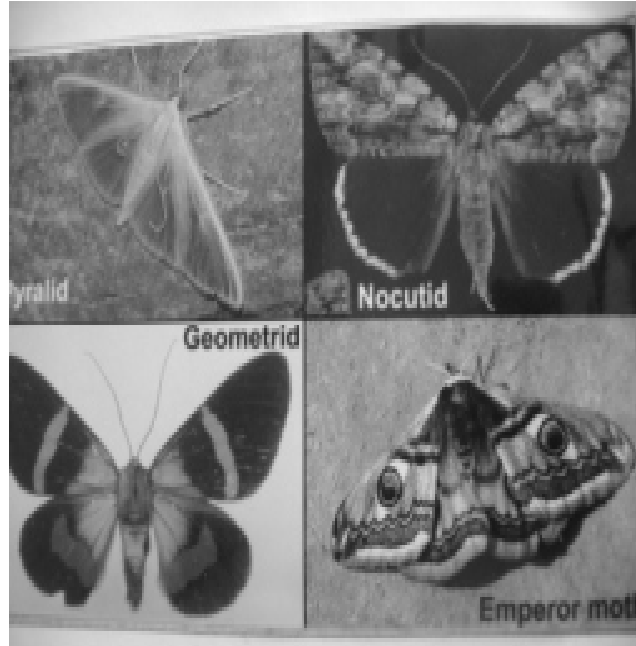
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The attraction to light is a response called positive photo taxis.

### Following insects are attracted to light -

Moths are the common insects attracted to light. Click beetles, longhorn beetles, weevils, moon beetles, emperor moths, owl moths, Pyralid moth, Noctuid moth, Geometrid moth, may flies, rove beetles, leafhoppers, water beetles, tiger beetles, winged beetles, ground beetles, Carabid beetles.



### Why they get attracted?

Some theories have been given as follows :

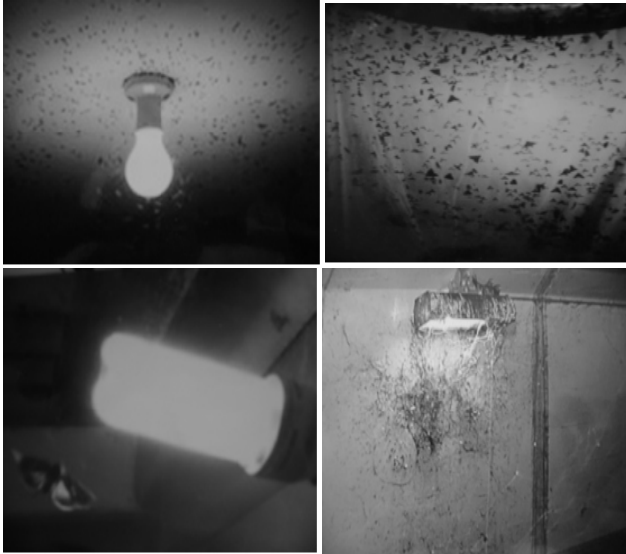
1. A moth's up-down orientation might depend in part on the brightness of the sky relative to the ground.
2. If they are disturbed on ground they move upward towards sky or light, it is advantageous for their safety.
3. When insects fly at night they use light sources such as the moon for navigation.

### Why they take spiral path?

When light from a distant source reaches both eyes of insect, it has same intensity. This enables the insect to fly in a straight line with both wings beating at the same rate.

If the light is from a closer source such as a candle or lantern, it changes the insect's perception. The light is perceived stronger in one eye than in the other eye. This causes the wings on one side to move faster. The insect then begins to approach the light in a spiral path, eventually drawing them into the light itself. Sometimes they die in the flame of light. Once the moth comes close to a bright light, it might have a hard time leaving the light since going back

into the dark renders it blind for so long. In the case that the moth escapes, it won't remember the problem with flying too near the light and will probably find itself in the same dilemma all over again.



**Light traps are used for —**

1. Studying and identification of the insects.
2. for killing pest insects.
3. Population estimation.
4. Capturing insects for Male sterilization techniques.
5. Light are avoided in the areas where insects are undesirable.

**Types of light traps –**

**Traps are made using different types of lights.**

Yellow light – made by wrapping a yellow gelatin paper cover.

White light- tungsten bulbs are used.

U.V. light also known as black light

Cool light – tube light also known as black light

- Moths are more sensitive to some wavelengths of light — ultraviolet, for example — than they are to others. A white light will attract more moths than a yellow light. Yellow is a wavelength moths don't respond to.
- U.V. light black light important tool for attracting green stink bugs, both sexes of bollworm adults as well as some other a few other insect species.

## Insect Communication

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### Acoustic communication

Since sound waves move rapidly through air (about 333 m/sec), acoustic signals can be quickly started, stopped, or modified to send a time sensitive message.

**Advantages:** -Not limited by environmental barriers, effective over distances and around corners.

**Disadvantages:** -May reveal location of sender to a potential predator. May be metabolically "expensive" to produce.



Cicada- Produce sound

### Visual communication

These are in form of light flashes produced or in form of some action, for example – different types of dances performed by bees.. There are several theories on how fireflies control the "on" and "off" of their photic organs. However, the exact mechanism(s) has to yet to be worked out.

**Advantages:**-It is effective over long distances. It can be produced while moving, it is fast; same as speed of light. It is effective in all directions (independent of wind).

### Disadvantages

It requires a clear line of sight. Visual signals may be intercepted by predators. Only effective in daylight (in fireflies, only at night). Active signals may be metabolically "expensive" to produce.



Firefly producing light signals.

### Chemical communication: -

Some chemicals or info chemicals, serve as a form of language that helps. They can act at a very low concentration. In some cases, a few molecules may be enough to elicit a response.

Pheromones or external hormones of different types are useful in communication.

Sex pheromones attract the opposite sex.

Alarm pheromones give warning of the danger.

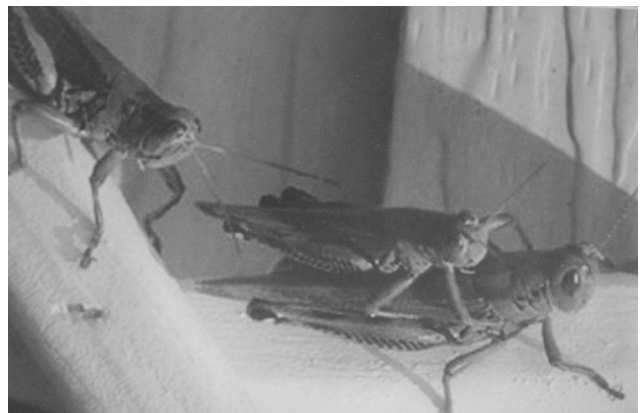
Recruitment pheromones maintain social life in the colony.

### Advantages

Not limited by environmental barriers. It is effective over distances around corners.

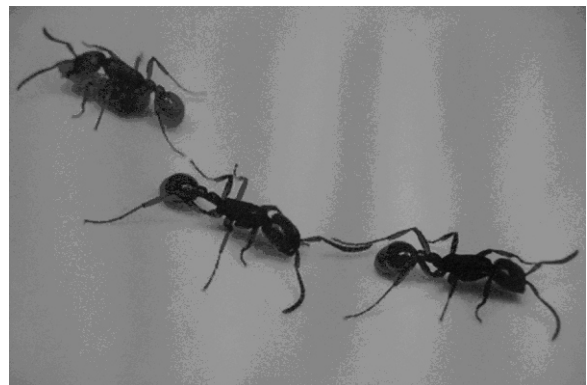
### Disadvantages

It is not effective in an upwind direction. It has low information content (presence /absence)



**Advantages:**-It is instantaneous feedback. It occurs in localized area. It is individual recipient.

**Disadvantages:**-It is not effective over distance. Organisms must stay in direct contact



Tactile communication- Communication by contact.

## Range Extension of Humming Bird Moth *Macroglossum prometheus prometheus* Boisduval, 1875 The first record of the moth in Mumbai region.

Sachin Vijay Chorge  
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### Introduction

A hawk moth (Hummingbird Hawk moth) of species *Macroglossum prometheus prometheus* of family Sphingidae is found in Mumbai, Maharashtra, India. The location is very close to Sanjay Gandhi National Park. This moth is having range in Southern East Asia including north Australia and in India records are from southern region and South East coast but no record of Mumbai region

This is the first record of this moth in Mumbai region, indicating range extension of this moth towards north side from previous known range.

### Diagnosis

The adult moth of this species is brown, with a bright orange bar across each hind wing. The wingspan is about 5 cms. The oblique, slightly curved edge to the forewing ante medial, with dark grey to almost black distal, grading away paler, is the most distinctive feature of this species.

### Biology.

The larva was described by Dupont & Roepke (1941). When young it is pale yellowish green with a long, thin, straight horn. When fully grown it is pale green, with white spots in the dorsal area that is enclosed by the pale yellow dorsolateral stripes. The head and horn are green, the latter slightly upcurved. There are grey and brown variants with black dorsolateral stripes, and black ones that are white-spotted.

### Geographical range.

Indian Subregion through S.E. Asia to New Guinea and Queensland.

### Host Plant

The host-plant recorded was *Morinda* (Rubiaceae). Other are beans and peas, sesame, tobacco, jasmine and cucurbits.

Taxonomy:

**Phylum:** *Arthropoda* - Latreille, 1829 - arthropods

**Class:** *Insecta* - C. Linnaeus, 1758 - Insects

**Subclass:** *Dicondylia*

**Infraclass:** *Pterygota*

**Cohort:** *Myoglossata*

**Order:** *Lepidoptera* - Linnaeus, 1758 - Butterflies, Moths

**Infraorder:** *Heteroneura*

**Superfamily:** *Bombycoidea*

**Family:** *Sphingidae*

**Sub Family:** *Macroglossinae*

**Genus:** *Macroglossum*

**Specific name:** *prometheus* - Boisduval 1875

**Sub Species:** *prometheus* - Boisduval 1875

**Scientific name:** - *Macroglossum prometheus prometheus* Boisduval 1875

*Nat. Hist. Insectes, Spec. Gen. Lep.*, 1: 355.

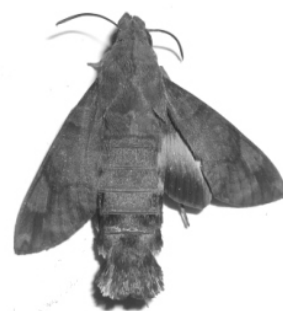
**Acknowledgement**

*Special thanks to*

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Conservation Education Centre, Near Filmcity, Goregaon (East), Mumbai - 400065. Maharashtra, India.

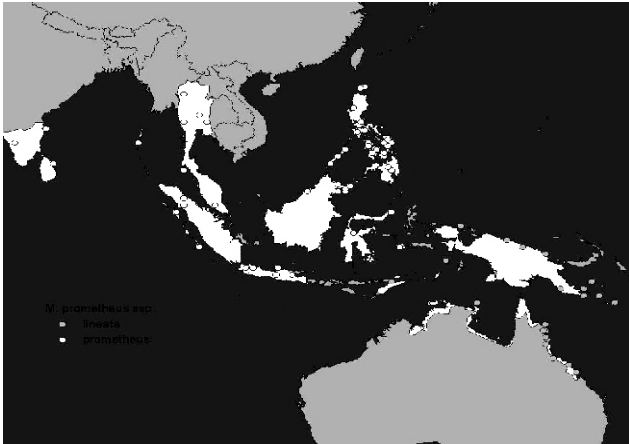


Ventral

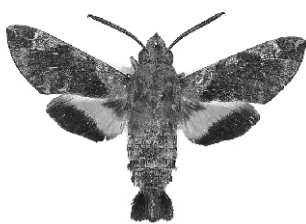
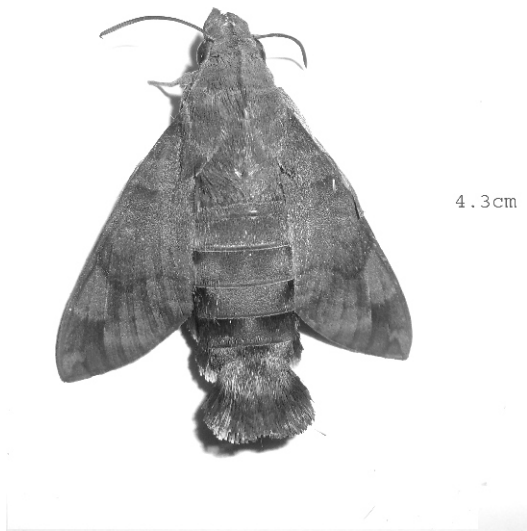


Dorsal

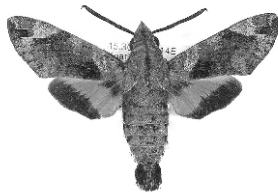




Distribution Map (Yellow Dots Indicate regions of occurrence of *M. promatheus*)



**Male**



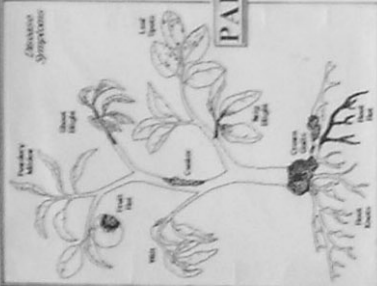
**Female**

A decorative rectangular box with a double-line border and rounded corners, containing the text "Section D Posters".

**Section D**  
**Posters**



## DAMAGE CAUSED TO PLANTS BY DIFFERENT TYPES OF INSECTS



❖ Insects and mites can destroy or greatly reduce the yield potential of a number of our plants, vegetables, fruits

❖ These insects may damage the plants by eating the foliage, boring in stems or roots, sucking plant juices, or attacking the fruit.

### PARTS OF TREE WHICH CAN GET DAMAGED

## Chewing & Cutting Insects

### ❖ INSECTS HAVE TWO TYPES OF MOUTHPARTS:-

- 1] Cutting & Chewing mouthparts.
- 2] Sucking & Piercing mouthparts.

### BEAN LEAF BEETLE

- Adult beetles often feed on the underside of the leaf, creating holes.
- If disturbed the beetles will drop to the ground and remain motionless for several minutes.



### COLORADO

#### POTATO BEETLE

- Both adults and immatures damage the plant by feeding on leaves and new growth.



### CUTWORM

- The immature or worm is the damaging stage of this insect.
- It will generally cut young plants in two right at the soil line, while other types will climb plants and feed on leaves and buds.
- Most damage occurs in early spring shortly after plants have emerged from the soil.



### BLISTER BEETLE

- Blister beetles rarely do extensive damage in gardens.
- However, some years you will find many beetles feeding in large groups.
- During these periods, they may defoliate a number of garden plants.



### CABBAGE WORM

- These insects are often found on the same plant, and they damage the plant in the same manner.
- The outer leaves will be covered with large irregular shaped holes, along with damaged heads.



### TOMATO

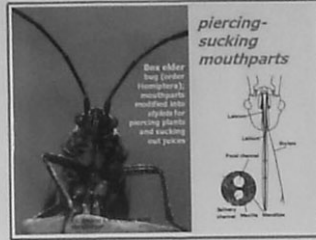
#### FRUITWORM

- In early season, this insect will feed in the whorl of young corn plants, giving the leaves a ragged appearance.
- They rarely cause significant damage during this period.



## Piercing & Sucking Insects

Piercing Insect →



← Mouth Parts

### CORN LEAF APHID

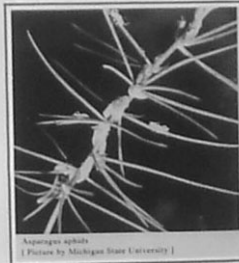


- Maize dwarf mosaic virus may be spread by the corn leaf aphid, though the most important vector for this disease is the green peach aphid.
- The presence of high aphid populations or honey dew on corn ears can render the ears unmarketable.

### MEALY BUGS



- As they feed by sucking plant juices, some species inject toxins that damage plant tissues.
- They're oval in shape, with a grainy, dusty surface that is actually a protective waxy coating.
- Large clumps of mealybugs may resemble fur or lint.
- Symptoms of their presence include yellowing leaves and dark, dirty patches on leaves, which is actually sooty mold growing on the sweet mealybug excretion, or honeydew.



Asparagus aphid  
[Picture by Michigan State University]

### ASPARAGUS APHID

- Aphid feeding causes a shortening of the internodes and a rosetting or brush-like appearance of the foliage, especially near the tips of the lower branches.
- High aphid populations will reduce plant vigor and yield or kill seedlings.

→ Swapna .K. Pawar  
Rajesh Jawale  
Amol Gaikwad



## USEFUL INSECTS

### Honey bee



- Honey is antiseptic, antioxidant and medicinal.
- Bee venom is used on skin, kidney, throat infections and rheumatic diseases.
- Bees are most important as pollinators. They increase crop, fruit yield.

### Silkworm



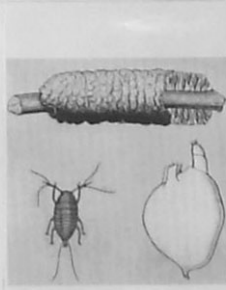
- Silk is a natural protein fibre obtained from cocoons made by the larvae of the mulberry silkworm *Bombyx mori*
- Silk is excellent for use in warm weather and also in cold because of its low conductivity.
- It is also used in racing car tyres to make them tough.

### Wasps



- Parasitic wasps are becoming successful biological control agents and do not injure the plant or other beneficial insects.
- They attack whiteflies by laying their eggs on the whitefly nymphs and destroy the whiteflies and emerge as adult wasps.

### Lac insect



- Shellac (the refined form of lac) is used in several industrial applications, such as Surface coatings, Textiles, Printing pharmaceuticals, Cosmetics, Adhesives, Electrical industry.
- It is used in medicine as antiobesity drug.

### Mantis



- Many gardeners consider mantids to be desirable insects, as they prey upon prey upon many harmful insect species.
- Organic gardeners who avoid pesticides may encourage mantids as a form of biological pest control.
- Mantis egg cases are sold in some garden stores for this purpose.

### Dragon fly



- It is commonly seen around lakes, ponds, streams, swamps, and marshes, feeding on aquatic insects and their larvae.
- It captures flies, mosquitoes, and other small insects with its basketlike legs as it flies above the water surface.
- They have an aquatic larval form up to two years on bottoms of lakes.

# HARMFUL INSECTS

## PLANTS



## LOCUST

- Rapidly stripping fields and greatly damaging crops.
- Some countries lost significant portions as much as half of its harvest.

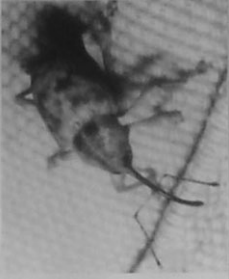
## ANIMALS



## HORSE FLY

- Adult horse flies feed on nectar and sometimes pollen. Females require a blood meal for reproduction.
- Horse flies have tiny serrated scimitars, to rip flesh apart. This causes the blood to seep out as the horsefly licks it up.

## STORED GRAINS



## Weevil

- Weevil is a beetle with snout. There are different types of weevils. *Sitophilus species* damage stored grains. *Anthrenus species* damage cotton bolls.
- *Sitophilus species* makes grains useless for consumption and sowing. They breed in short time causing heavy loss.



## APHID

- Aphids are plant pests, capable of causing major agricultural damage.
- They feed on plants by piercing them with syringe-like mouthparts and sucking the sap out of the phloem.
- Because plant sap contains little protein and aphids cannot produce ten amino acids



## SCREW WORM FLY

- Screw-worm flies lay their eggs along the margin of fresh wounds (man, cattle, etc.). Their larvae enter the wound and chew their way into healthy underlying flesh causing extensive tissue damage.
- If wound is on head, the larvae may enter sinuses, brain leading to death of animal. In America they caused sheep loss of over 40 million dollars per year.



## MAN

## FLEA

- Fleas attack a wide variety of warm blooded vertebrates including dogs, cats, humans etc.
- Fleas can also lead to hair loss and are carriers of diseases such as plague.
- Fleas are a nuisance causing an itching sensation.



Moth mimicking with lichens pattern



Caterpillar of Hawk moth mimics Snake head



Larva of common Barron Camouflages with the leaf background



Bee Hawk moth



Spider eating honey bee



Chrysocoris bug. Live bug is golden yellow, when it dies changes to blue. Probably some chemical reaction is responsible.



Leaf gall insect female



Waxy secretion of White fly



Pape wasps colony

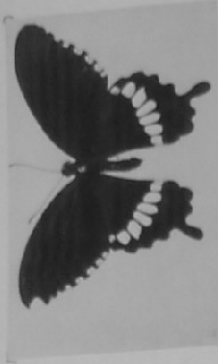


Leaf galls of Lace wing

By Dr. P.V. Joshi



Caterpillar of common Mormon



Common Mormon (male)



Pupal stage of common Mormon



Egg mass of tortoise beetle.



Tortoise Beetle



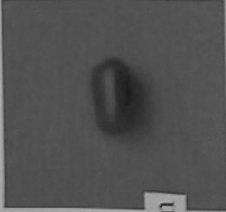
Pupae of Tortoise Beetle



Larva of Tortoise Beetle (oligopod larva)



Eggs of American boll worm



Egg mass of cockroach.



Eggs of Leaf bug



Egg mass of praying mantis.



Eggs of Golden Lace wing



Caterpillar of Striped Tiger



Larva of Diving Beetle (oligopod larva)



Slug Caterpillar (polypod)



Tussock Moth Caterpillar



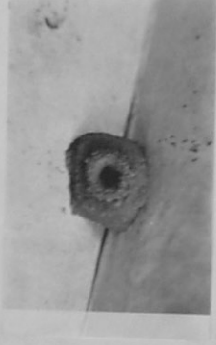
Caterpillar of Convolvulus Hawk Moth



Pupa (chrysalis) of Plain Tiger



## लाल कुंभार माशी (*Eumenes conica*) Red Potter Wasp



लाल कुंभार माशीचे पाळणा दालन

कुंभार माशी पाळणावर बांधावयाची जागा शोधण्यासाठी खूपच जागरूक असते. कोणाच्या सहज दृष्टीत पडणार नाही, कोणाच्या हाती सहजपणे लागणार नाही, शिकारी प्राणी सहसा तेथे पोहोचणार नाहीत अशी जाग निवडून तेथे काळजीपूर्वक कुंभ करून बांधण्यास ती सुरुवात करते तिचे घर अनेकदा दालनाचे असते व एक एक दालन बांधण्यास, पिछाल लिपण्यास तिला खूप भ्रम घ्यावे लागतात.

कुंभारमाशी प्रत्येक दालनात एक लंबगोल अंडे रेशीम धार्याने लटकविते व त्यावाली पुलपाखरांच्या ३-४ अळ्या उडवतात, बेशुद्ध करून आपणू देवते. अळ्या पिवंता राहिल्याने कुजत नाहीत. कुंभारमाशीची अळी ह्या साठवलेल्या खाटावर वाढते. पूर्ण वाढ झाल्यावर कोपावस्थेत जाते. पुढे प्रौढावस्थेत उडून जाते.



लाल कुंभार माशीचे अंडे



लाल कुंभार माशीची अळी (Larva)



कुंभारमाशीने उंखमारुन निद्रिस्त केलेल्या पुलपाखरांच्या अळ्या.  
कुंभारमाशीची अळी हे खाद्य खाऊन वाढते.



लाल कुंभार माशीची प्रौढावस्था  
(Adult)



लाल कुंभार माशीची कोषावस्था  
(Pupa)

निळी काळी गांधील माशी *Sceliphron violaceum*  
Pin-hole wasp



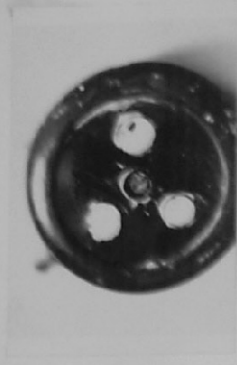
गांधील माशीची प्रौढावस्था



डंख मारुन बेशुध्द केलेल्या कोळ्यावर (Spider)  
चिकटविलेले गांधील माशीचे अंडे (E)



गांधील माशीची अळी कोळी (Spider) खारुन  
वाढते.



गांधील माशीने वीजेच्या बटनाच्या भोकात केलेले घर.



गांधील माशीची कोषावस्था कोषाचे आवरण व कोष

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