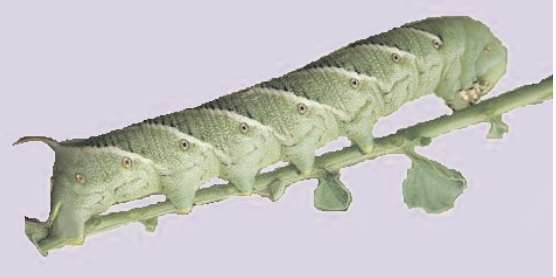
Tobacco Hornworms

Species: *sexta*
Genus: *Manduca*
Family: Sphingidae
Order: Coleoptera
Class: Lepidoptera
Phylum: Arthropoda
Kingdom: Animalia



Conditions for Customer Ownership

We hold permits allowing us to transport these organisms. To access permit conditions, click here.

Never purchase living specimens without having a disposition strategy in place.

- Your state may require that you obtain a USDA end-user permit for this organism. Please contact us for current USDA requirements in your state.
- In order to protect our environment, never release a live laboratory organism into the wild.
- The tobacco hornworm is considered a pest and SHOULD NOT BE RELEASED.

Primary Hazard Considerations

- Always wash your hands after handling the tobacco hornworms.
- Tobacco hornworms are considered docile. They can give a small nip, but they are considered harmless to humans.

Availability

- Tobacco hornworms are generally available year-round.

How Will Animals Arrive and Immediate Requirements

- Your tobacco hornworm larvae will arrive in a plastic container with food. They can live in this shipping container for several days, but you should move them into the separate containers that come with your kit as soon as possible. Tobacco hornworm larvae grow very fast and you can watch their growth better when they are in the kit containers.
- The hornworm larvae shipped to you are usually about 1-2" in length and will complete their life cycle in approximately 4-5 weeks.
- We over-pack each order of hornworms. It is normal to have some deceased hornworms in the container. You will receive at least the quantity of live hornworms stated on the container.

Captive Care

Habitat:

- Our kit comes with everything you need for the full life cycle of your tobacco hornworms. Place one hornworm larvae into each of the plastic containers. If a larva has attached itself to the paper towel in the container they arrived in, simply cut out the portion of the paper towel they are attached to, and transfer the paper and the attached larva to the container.
- Place the containers in a room with a temperature range between 70-85 °F and a daily light exposure of 12 to 18 hours. An artificial light source set up near the hornworms is recommended to meet these requirements.
- Check the larvae daily. Clean the containers as needed by carefully removing the larvae, removing any waste, and wiping the containers out with a paper towel. Keep the containers dry by blotting any excess moisture with a paper towel.

- In 2 to 3 weeks, the larvae will undergo 3 or 4 remaining instars and will reach up to 3 inches in length. If plastic rulers were provided, use them to measure the growth of the larvae. Prior to pupation, a darker pulsating line called the aorta will appear at the dorsal midline of the larva. At this point, the larva will become restless, stop eating, and may appear as if it is attempting to burrow into its food. The larvae you received may reach this stage at various times and should be removed from their plastic containers on an individual basis.
- Gently wipe any food and waste off the larva and carefully place the larva in the pupation box filled with the pupation media (wood shavings). The larvae will then shrink in size and begin the process of pupation. The hornworm larva will take 7 to 10 days to completely form a pupa.
- Prepare a large cage by lining it with paper towels and placing a couple of branches inside for the moths to climb on to allow their wings to develop properly. Place a sheet of newspaper or butcher paper between the lid and the cage to contain the dusty airborne wing scales from the adult moths. For optimum conditions, the cage should be at least 4 gallons in size to allow for the moths to fly.
- Place the fully formed pupae in the prepared cage. A long light exposure of 12 to 15 hours a day will be needed to prevent the pupae from entering diapause (a dormant stage). The temperature should remain around 70-85 °F. In 7 to 14 days under these conditions, the adult hornworm moths will emerge.
- Once the moths emerge, to keep airborne wing scales to a minimum, lightly mist the cage with water every day. A humidifier in the room is also useful. They will mate and begin laying eggs around the third day. The eggs may be carefully collected to start the cycle over again.

Care:

- To prepare the food for the larvae, follow the instructions on the container. The prepared food should be stored in an airtight container in the refrigerator until use.
- Place one spoonful of prepared media in each of the plastic containers. Start out by feeding the larvae one teaspoon of media every other day and increase feeding to once a day as the larvae mature. You will receive enough food for the larvae to fully develop.
- Once the moths emerge, place a shallow dish of cotton soaked in sugar water in the cage for the moths to feed. Use a solution of two teaspoons white or brown sugar to one-cup water.

Information

- Method of reproduction: Sexual. Within the first week as an adult moth, the female produces a pheromone to attract males. The adult moths are nocturnal and will mate only at night. The females, unlike the males, will mate only once. Mating can last several hours. After three days, the female moth will begin laying eggs one by one on the underside of branches or leaves.
- Determining sex: Males are identifiable by their broader antennae.

Life Cycle

- Complete metamorphosis.
  - **Egg:** The tobacco hornworm begins its development as a tiny egg approximately 1/16 of an inch (or 1 mm) in diameter. The egg is pale green in color and gradually turns white when the larva is ready to emerge.
  - **Larva:** The larva emerges 2-8 days after the egg was laid. The larva is solid white when it emerges, but gradually turns a green to blue-green color with white and black diagonal lines along each side of its body. The larva has a characteristic dorsal spine or "horn" on the last abdominal segment. In addition to three pairs of thoracic legs, the larva has five pairs of prolegs on the abdominal segment. The prolegs differ from the thoracics in that they are fleshier and have a number of tiny hooks called crochets that allow the larva to cling onto its host plant. The larva grows by the process of molting: the shedding of the old exoskeleton and expanding and hardening of the new one beneath. The larva undergoes five molts (or instars) in total during a period of about 20 days.
  - **Pupa:** The change from larva to pupa takes place over about 7 days. Once fully formed, the pupa of the hornworm is dark brown to reddish-brown and approximately 40 to 60 mm in length. Although not visible from the outside, the hornworm experiences a period of rapid transformation during this stage. After about two more weeks, the adult moth is ready to emerge.
  - **Adult**: The adult tobacco hornworm is a medium to large, heavy-bodied moth with a wingspan up to 4 inches. The adult moth is dark gray with light bands on the hind wings and six orange spots along each side of the abdomen.

- In nature, the tobacco hornworm usually has two generations per year. One complete life cycle from egg to adult takes place from spring to early summer. The adult moths of the first generation begin laying eggs in early summer. The eggs of the second generation hatch into larvae, feed throughout the summer, and pupate in late summer. These pupae, triggered by shorter days and cooler temperatures, enter diapause (a dormant stage) and their development is suspended over the winter. The adult moths emerge the following spring.

Wild Habitat

- The tobacco hornworm is found throughout the continental United States. Its range extends northward to New York, south to Florida and west to Minnesota, but is more common in the southern region, especially the Gulf Coast.
- Tobacco hornworm larvae feed primarily on plants in the Nightshade family such as tobacco, tomato, and potato plants. Because of their ability to blend in with their surroundings and their rapid growth and feeding in their final stages of development, hornworm larvae often escape detection and can do considerable damage to plants.
- In nature, the tobacco hornworm larva is often attacked by braconid parasites. The braconid wasp inserts eggs beneath the skin of the hornworm, the eggs hatch, and the young braconids feed on the hornworm larva. The braconids eventually form small white silken cocoons on the outside of the caterpillar. This parasite is an important factor in the control of the tobacco hornworm.

Special Notes

- The tobacco hornworm belongs to the order Lepidoptera and the family Sphingidae which includes the Sphinx or Hawkmoths. There are about 125 species of the family Sphingidae in North America.
- The genus name *Manduca* comes from the Latin word for "glutton." This aptly describes the hornworm's voracious appetite during its larval stage. The species name sexta means six-fold, indicating the six pairs of orange spots along the abdomen of the adult moth.

Disposition

- We do not recommend releasing any laboratory animal into the wild, and especially not insects that are considered to be pests or not native to the environment.
- Adoption is the preferred disposition for any living animal.
- If the insects must be euthanized at the end of study, follow one of these procedures
  - Put them into a container or bag and freeze for 48 hours.
  - Place them in 70% isopropyl alcohol for 24 hours.
  - Autoclave them @ 121°C for 15 min.
- A deceased specimen should be disposed of as soon as possible. Consult your school's recommended procedures for disposal. In general, dead organisms should be handled as little as possible or with gloves, and wrapped in an opaque plastic bag that is sealed (tied tightly) before being placed in a general garbage container away from students.

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