EarthCare
Terre à coeur
SUDBURY

EarthCare Sudbury
Butterfly Program

Guide for Teachers

TD Friends of the Environment Foundation

Greater | Grand Sudbury

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What is the EarthCare Sudbury Butterfly Program?

The EarthCare Sudbury Butterfly Program offers free **Painted Lady** butterfly rearing kits to schools within the City of Greater Sudbury. Each year, the Rainbow District School Board, Conseil scolaire public du Grand Nord de l'Ontario, Sudbury Catholic District School Board and Conseil scolaire catholique du Nouvel-Ontario are allotted butterfly rearing kits. Educators are given the opportunity to have a local expert visit their class when the butterflies are ready to release. A notice is sent via email early in the year to the four school boards requesting that interested educators call or email the EarthCare Sudbury Co-ordinator. The butterfly rearing kits are available on a first come, first served basis. Schools that have not yet participated in the program will be given priority over schools that received kits in previous years.

Why rear butterflies?

Butterfly rearing offers multiple learning opportunities that complement the curriculum. Rearing the **caterpillars** helps Grade 1 students learn about **stewardship** and the basic needs of living things. Observing a caterpillar change from **chrysalis** to a butterfly helps demonstrate the life cycle to Grade 2 students. Older students may also appreciate the experience and the final event can be geared towards their curriculum: plant characteristics and pollination specific to butterflies; how we rely on **insects** for pollination; habitat and habitat conservation. In one case, Grade 6 students at a local school used the experience to develop their communication skills by bringing in younger classes and becoming the teachers themselves. This program also supports the integration of other curriculums, such as language and the arts.

What grades should apply?

This program is intended to offer a hands-on learning opportunity for elementary school students and, in many cases, there are multiple grades participating within one school. If a secondary school is interested in a hands-on learning opportunity in biology, please contact EarthCare Sudbury to learn more about the Owl Pellet Dissection Program or other advanced initiatives.

Can someone come to our school for the release?

EarthCare Sudbury can help co-ordinate for a local speaker or **entomologist** to visit a small number of schools for a French or English presentation followed by the release. A subsequent nature walk and insect collection in the schoolyard is an engaging way for students to learn about the **biodiversity** of the school grounds.

I was not one of the schools allotted a kit. Can I buy one myself?

EarthCare Sudbury welcomes interest from individual schools in purchasing their own kits and adding these to the overall shipment to reduce the cost for the schools. Once again, there are a limited number of schools that can participate in this program, therefore schools are chosen on a first come, first served basis.

Schools can also purchase their own kits independently from this program. Please see below for companies that sell Painted Lady and/or Monarch rearing kits in Ontario:

Lucy's Butterfly Farm (Apsley, Ontario)
http://www.lucysbutterflyfarm.com

Cambridge Butterfly Conservatory (Cambridge, Ontario)
https://www.cambridgebutterfly.com/conservatory/monarch-rearing-kits

Butterflies and Roses (Lakefield, Ontario)
http://www.butterfliesandroses.com

Notes:

How to Rear Butterflies

These instructions were reproduced and adapted with the permission of Lucy's Butterfly Farm. Instructions from your butterfly supplier may differ and should be followed.

Equipment that may be provided by butterfly supplier:

- Caterpillars
- Caterpillar food
- Caterpillar individual containers
- Paintbrush
- Filter paper

Equipment to purchase:

- Flight cage (can be purchased from the butterfly supplier or used from past years)
- Food and drink for adult butterflies

Arrival and transfer

There are a variety of choices in the dates of shipments, however, if you are part of EarthCare Sudbury's program, the shipment should arrive the second week of May, for butterfly emergence the first or second week of June. The Painted Lady larvae may come together in a larger container with food. For some suppliers, the food is a combination of soy, wheat germ and other nutrients. After a few days, when they are larger and less fragile, they must be gently transferred one-by-one to smaller, individual containers using a soft paintbrush. Never use fingers or forceps to transfer them.

Avoid transferring motionless individuals since they may be going through a moult (shedding old skin) to develop into a larger **instar**. When they start moving again after their moult, they are ready to be moved.

Individual homes

The individual containers should have small holes in the lid for air exchange. Remember to keep the lids on the containers at all times, as caterpillars are little "escape artists." Divide the food to provide equal amounts for each caterpillar. The food may be heavy enough to damage the small caterpillars so avoid moving the containers once the food and larvae are inside.

Filter paper under the lid provides a substrate for the caterpillars to attach the **pupa**. Place the paper over a lidless container. Spraying the paper very lightly with water helps the lid slide down over the paper more easily. Do not spray the caterpillars or push the lid down onto the container. With your thumb on top and fingernails under the ridge of the container, squeeze together and repeat all the way around.

Waiting for pupation

Leave the containers on a shelf at room temperature away from direct sunlight for several days. Sunlight will cause condensation of the food and moisture is not good for the caterpillars. Use a paintbrush to clean out the **frass** and webbings when a build-up occurs, usually after half the food has been eaten. If the filter paper is soaking wet replace it with clean coffee filter paper.

When you see red frass balls, the caterpillars have finished eating. They will soon attach themselves to the filter paper, hang upside down in a "J" form and transform into a **chrysalis** (pupa) without your help. When this happens, do not disturb the caterpillar or pupa for at least 48 hours, until they have dried and hardened. Butterfly larvae form chrysalises (singular chrysalis), characterized by a hard casing surrounding the pupa. Some moths spin silken **cocoons** instead of chrysalises.

Transferring the pupa

Do not pull the pupa away from the paper. After hardening, take the paper with the pupa attached from the container and pin the paper onto the side of a flight cage, hanging down in a natural position. You should line the bottom of the cage with paper towels. If your pupa does not attach itself properly to the paper or falls off, just rest it on the bottom of your flight cage and the butterfly should emerge as usual. The pupal stage will last eight to ten days, depending on how warm the room is. Never leave the insect in direct sunlight without shade.

Notes:

How to Rear Butterflies

Emergence

When the butterfly emerges, it will pump its wings to dry them. Do not be alarmed by the red liquid that you see during emergence. It's not blood. It's called **meconium** and is simply a waste product of **metamorphosis**. You may want to add several layers of paper towels on the bottom of the cage to catch dripping meconium.

If the emerging butterfly falls from its chrysalis, it must be able to crawl up again in a hurry to dry its wings, so your flight cage must have a netting wall for it to crawl up. Slippery plastic or glass containers are not suitable. It is also important to avoid any containers of liquid in which they may fall.

Nectar substitute

After emergence, they will take a day or so to dry their wings. The butterflies will usually not feed immediately after emergence. If you keep them for longer than two days they will need to nectar. Sports drinks, such as Gatorade or Powerade, can act as a nectar substitute for a few days. Place some of the liquid (orange is a popular flavour) on a cotton ball and place it on a plastic lid at the bottom of the flight cage. This will attract them if they are ready to nectar and provide the sweetness they require. Make sure there is no visible liquid or puddles so that butterflies do not fall in and drown or soak their wings. Sliced fruit, such as banana, peach, orange, watermelon, or fresh flowers, can also help provide food but make sure these are from pesticide-free gardens and sources. You might see their little **proboscis** tube, which they use for feeding. You might also witness mating within two days of emergence. If you see two butterflies attached, they are mating. Please do not disturb!

Release

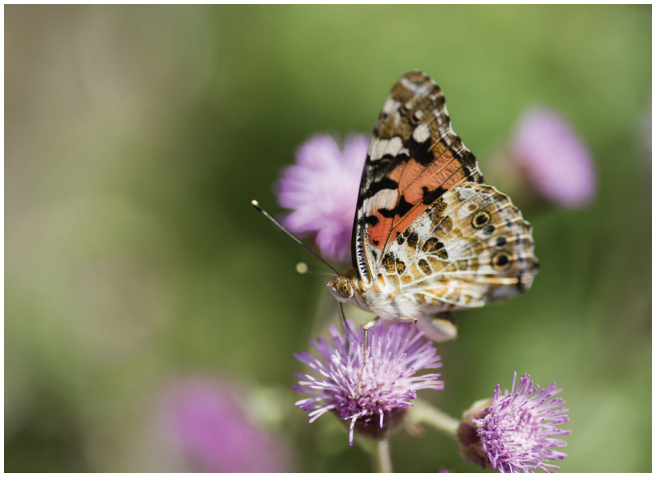
Releases can be planned in time for egg-laying which usually occurs from five to seven days after emergence. At this time, female butterflies will begin to search for appropriate host plants on which to deposit their eggs.
Try to be near a nice bush or flower garden for your release. You may have to physically place some of the butterflies onto branches or flowers.

Please be sure to release the butterflies on a warm day, never in the pouring rain, and well before 6:00 p.m. Fifteen degrees Celsius or below is often too cold but an ideal temperature is 24 degrees Celsius. The butterflies will immediately try to find nectar plants on which to nectar and/or seek shelter in trees for the night.

Expected timing

At normal room temperature, growth of the caterpillars will be quick. By about the third week after you receive the caterpillars they should be butterflies and ready for release. Expected timelines are outlined below:

Day 1/ Week 1:	Arrival (EarthCare's program - usually the second week of May)
Days 7 to 11/ Week 2:	Pupate (7 to 10 days as caterpillars)
Days 15 to21/ Week 2 and 3:	Emerge (8 to 10 days as pupae)
Day 17 plus/ Week 3 and 4:	**Release** (a few days for all butterflies to emerge and be ready to release - for EarthCare Sudbury's program, it is usually the first or second week of June)



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Other activities

Do you have suggestions on how to extend students' learning experiences?

Here are a number of activities that can complement the butterfly rearing experience or help if you do not have the opportunity for a kit this year. Please contact EarthCare Sudbury if you would like to showcase your students' efforts. Items such as poems or Bug Hotel posters can be shared online through the EarthCare Sudbury website. Don't forget to take photos to document the learning experience for the students!

1. Find insects that are living on a plant and bring a branch or collect leaves to watch them feed for a few days. Return them back to the original plant after you have examined them. How many leaves did they eat in one day? Are they considered a pest? Do they only eat this type of plant (host plant)?
2. Compare the eating rate of a Gypsy Moth* caterpillar (black, spiny with blue and red dots) to a smaller and less damaging leaf-eater to examine why these introduced moths are such a problem for our trees. This insect was accidently introduced to North America and is now a major pest. It can easily be reared in the classroom on a diet of host leaves (often birch or poplar), but sometimes it does not emerge as an adult until July.

3. Remember that some insects found on plants are actually predators waiting to catch the herbivores. Try demonstrating a mini foodweb using the plant, herbivore and predator.
4. Many schoolyard trees will have ants crawling up them. Follow the ants to see if they are going to the tips of the branches to tend to aphids. What is their relationship?
5. Create a Bug Hotel or Neighbourhood by enhancing or showcasing various microhabitats. Use persuasive language to advertise for insects who may want to move into your schoolyard. Your crabapple tree may be the best in town!
6. Write poems about nature and insects. Enhance the poems with drawings, photographs and pieces of nature attached.
7. Submit questions and answers to our Online FAQ. Was your class able to find answers to some of their own questions? How can they help teach others?

Dear Butterfly

By: Vera Constantineau, Sudbury, Ontario

Dear butterfly,
don't flutter by,
come land upon
my toes.

Together we will
walk and talk
about our
to and fro.

I want to know,
if you please,
do butterflies
ever sneeze?

I do achoo,
do you?

Stephanie the Butterfly

By: Tom Leduc, Sudbury, Ontario

Stephanie Monarch was a caterpillar who lived in a milkweed patch behind an old forgotten garden. She had eight pairs of tiny legs and two antennae. She was covered with yellow, black and white stripes all over. Stephanie was always polite and pleasant to all the bugs in the garden. She considered them all her friends and they all agreed she was the belle of the backyard.

One morning, when Stephanie woke up after a long sleep, called moulting, she no longer had yellow, black and white stripes. She no longer had eight pairs of tiny legs to move around on. Instead, Stephanie had some big beautiful orange and black wings and her antennae grew much longer.

What has Stephanie changed into and what will she do now? Visit www.greatersudbury.ca/butterflies to finish reading "Stephanie the Butterfly".

* *Caution: Gypsy Moth Caterpillars may cause a rash with direct contact to skin.*

Notes:

Insects in Schoolyards

What are some common insects found in Greater Sudbury schoolyards?

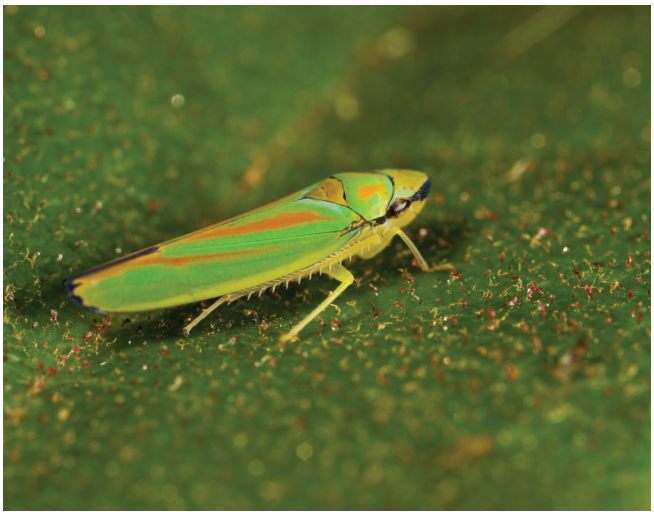
Habitat: Grass, soil and gravel

Click beetle (Order: Coleoptera, Family: Elateridae): Click beetles have a very distinct shape that is elongated with little pointy extensions on the sides of their "necks" (pronotum). If you turn a click beetle over onto its back, it will use a clicking mechanism to pop high up into the air to try to right itself.

Ants (Order: Hymenoptera, Family: Formicidae): There are many types of ants in our region. One fun species is called the Citronella, or Lemon Ant. They are yellow, not red or dark orange, and they smell like lemonade! The smell can deter predators, but also helps communicate danger to other ants.

Grasshoppers (Order: Orthoptera): We have many types of grasshoppers. Grasshoppers have incredibly strong jumping legs but also have wings that you may notice when they jump or fly longer distances.

Leafhoppers and Froghoppers: (Order: Hemiptera, Families: Cicadellidae and Cercopidae): These are tiny insects that you may see hopping in the grass. They are so fast that they seem to disappear from your hands. Many froghoppers are what we call "Spittle Bugs" on long grass. If you look inside the bubbly mass, you will find a young nymph being protected by the sticky substance.



Habitat: School foundation and walls

Moths (Order: Lepidoptera): Moths will often go to lights at night, and rest in the shade on buildings during the day. Male moths often have very big feathery antennae that help them find females by "smelling" their pheromones. Some large moths, like Luna Moths, do not have mouthparts as adults. They feed as caterpillars and then only live long enough (a few days) to mate as adults.

Spiders (not insects, Class: Arachnida, Order: Araneae): Male spiders often have big "boxing gloves" near their mouths, while females have thin "feelers." If you see a spider on a wall or window, approach it cautiously to see if you can determine if it's a boy or girl.

Daddy Longlegs (not insects or spiders, Class: Arachnida, Order: Opiliones): Their legs are so long and fragile that they may have six legs when they should have eight. They do not have the "boxing gloves" like spiders do and are often found along the foundation of buildings.

Habitat: Gardens and trees

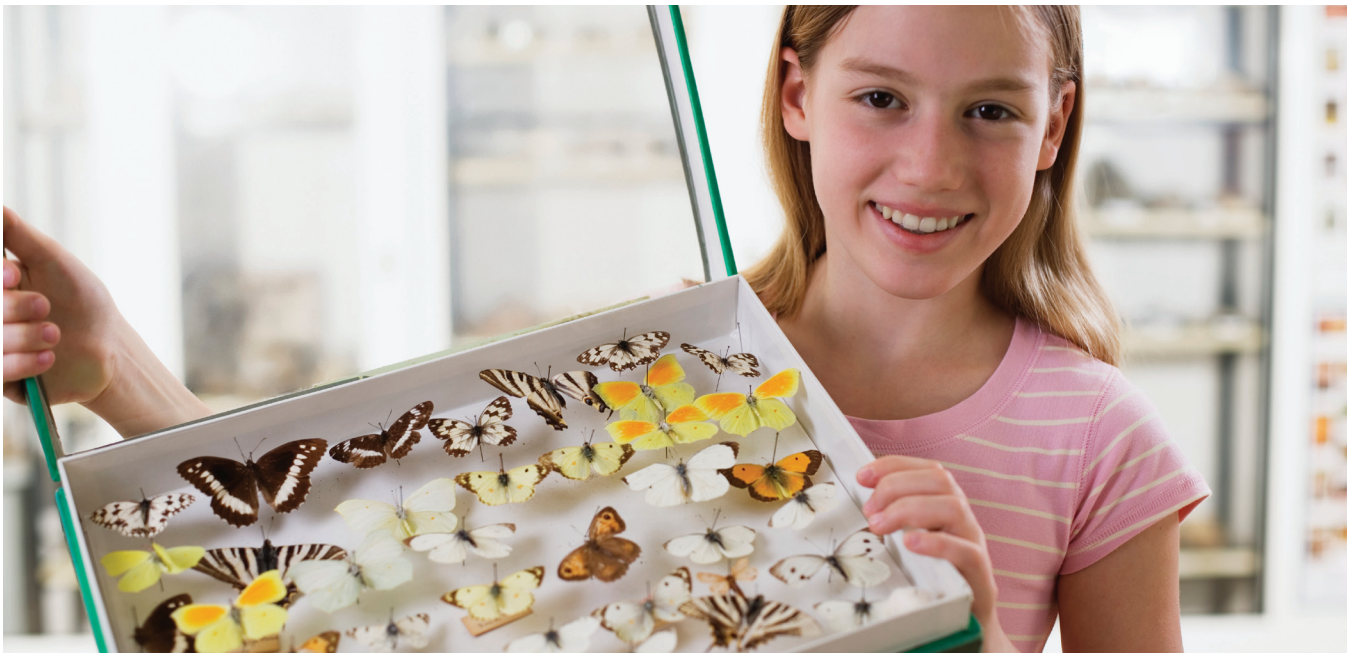
Hoverflies (Order: Diptera, Family: Syrphidae): These flies mimic wasps so that other animals stay away from them. They have yellow and black stripes but they do not sting. They have big eyes that may touch each other on the top of their head, two wings, and do not have a thin "waist" like wasps. They often hover over flowers.

Dragonflies (Order: Odonata): These are amazing predators that often eat mosquitoes. They have powerful wings, jaws and claws. We should celebrate our wonderful dragonflies and protect the lakes where their young nymphs live.

Aphids (Order: Hemiptera, Family: Aphididae) Look at the tips of tree branches. Are there small insects around the base of the leaves? Aphids sit and sip plant juices. They drink so much that they must release the excess liquid as a honeydew. This sweet liquid is often used as a food source for ants that come and drink from the aphids, while protecting them from predators.

Notes:

Glossary



Biodiversity: the number and variety of species in a given area.

Butterfly: an insect in the Order Lepidoptera. Butterflies can be distinguished from moths by having clubbed antennae. Moths tend to have feathery antennae. Butterflies also tend to be diurnal (active during the day) and more colourful than moths, which are most active at night and may have duller colours.

Caterpillar (Order: Lepidoptera): The common term for the larva of moths and butterflies.

Chrysalis (pl. chrysalises or chrysalides): The common term for the naked pupa of a butterfly.

Coccoon: The common term for the pupa of a moth that is protected by a silk covering.

Entomologist: A person who studies, collects or rears insects.

Frass: A term used for caterpillar faeces

Insect: An invertebrate animal in the Class Insecta that is characterized by having six legs, one pair of antennae, an exoskeleton and three body segments; the head, thorax and abdomen.

Instar: The growth stage of an insect larva or nymph that occurs between moults. Many immature insects have several instars before reaching the final adult stage.

Larva (pl. larvae): Immature insect, often worm-like. Larva is the term used in insects that have complete metamorphosis (see also nymph). Examples are beetles, butterflies and wasps.

Meconium: The liquid waste accumulated during pupation.

Metamorphosis: The process in some animals, like insects, where the young have an abrupt transformation of their body form into a different adult form. Complete metamorphosis of insects includes a larval stage (young), a pupal stage (resting transformation) and adult stage that may have completely different form, habitat and behaviour from the larva.

Nymph: Immature insect. Nymph is the term used in insects that do not have complete metamorphosis but instead have gradual changes to develop from young to an adult. Examples: grasshoppers, dragonflies and aphids.

Painted Lady Butterfly: An orange, black and white species of butterfly (*Vanessa cardui*), that can be distinguished from the American Lady Butterfly (*Vanessa virginiensis*) by having four smaller hindwing spots instead of two large ones. The Painted Lady is found further north than the American Lady and occurs in Sudbury, Ontario. V. cardui is also found further North than V. virginiensis, and is found in Sudbury, Ontario.

Proboscis: The elongated mouthparts of a butterfly that have been modified into a coiled feeding tube.

Pupa (pl. pupae): The inactive stage between larva and adult for insects that have complete metamorphosis. Within this stage, metamorphosis occurs.

Stewardship: The care and feeling of responsibility for another. Protecting and taking care of nature is a type of stewardship that helps children feel empowered while learning about the natural environmental around them.

Notes:

What are teachers saying about this?

« Ta présentation fut un grand succès. Les élèves de la maternelle parlent souvent de toi en disant : Mme Jennifer a dit… »
Carole Patry-Landry, Conseil scolaire public du Grand Nord de l'Ontario

"I would like to express my gratitude for all the wonderful work you did with the butterfly kits. I can't believe how much my students have learned from the day the caterpillars arrived until the day we released our beautiful painted ladies. What an incredible learning opportunity!"
Tammy Veevers, Rainbow District School Board

"My students are so excited about these butterflies and the learning has been unbelievable!"
Megan Bischoff, Rainbow District School Board

"I just wanted to say thank you again for the butterfly kit!
It was very easy to get the caterpillars set up and their growth is amazing.
My students are really engaged in writing about and discussing their caterpillars!"
Chelsey Ouimet, Rainbow District School Board

Other resources

The Teacher's Guide: Free worksheets, SMARTboard templates and lesson plans for teachers about butterflies.
http://www.theteachersguide.com/butterflies.htm

Butterflies and moths: Teacher's guide, Classroom **activities http://www.pedagonet.com/Insectclopedia/butterfly-guide.pdf**

Other insect-related lesson plans: under "resources: lessons": **http://www.insectclopedia.com/**

Contact

Where can I find more information?

Contact Dr. Jennifer Babin-Fenske, Co-ordinator of EarthCare Sudbury Initiatives, at 705-674-4455, extension 4398, or earthcare@greatersudbury.ca.

www.greatersudbury.ca/earthcare

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