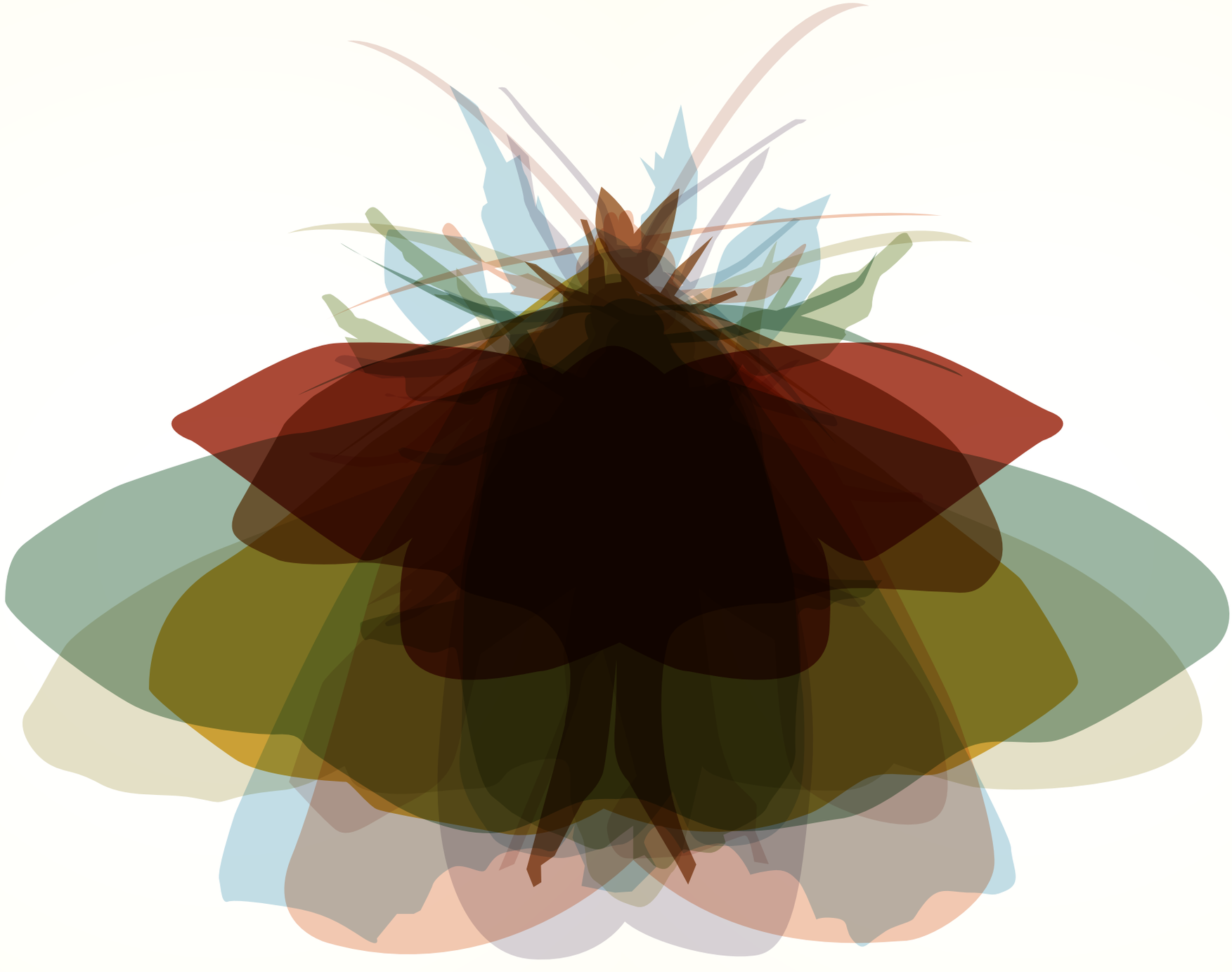
POLLINATORS OF GREEN BAY



PLANTBOT GENETICS

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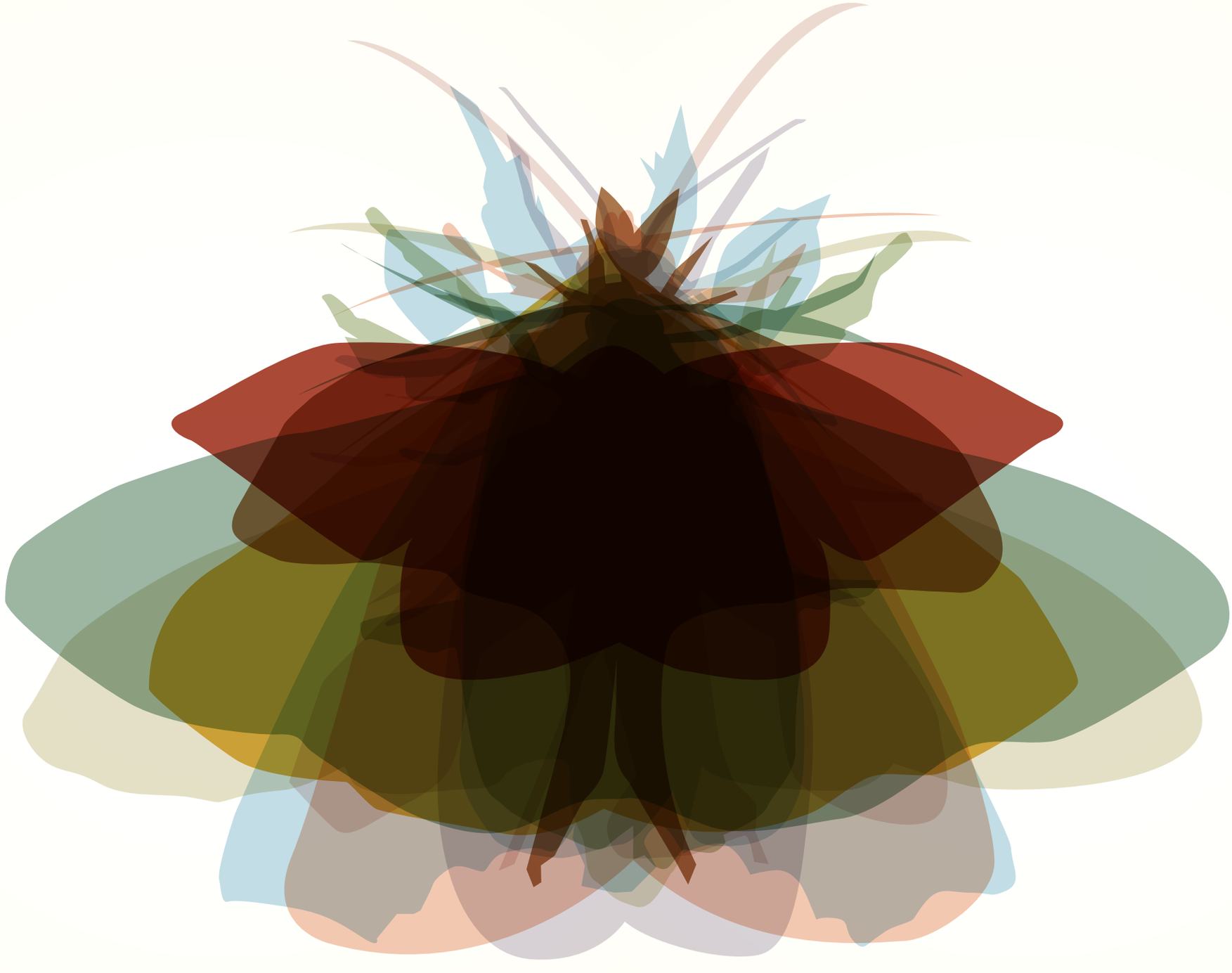
POLLINATORS OF GREEN BAY



PLANTBOT GENETICS

Wendy DesChene +Jeff Schmuki | 2015

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Waved Sphinx
Ceratomia undulosa

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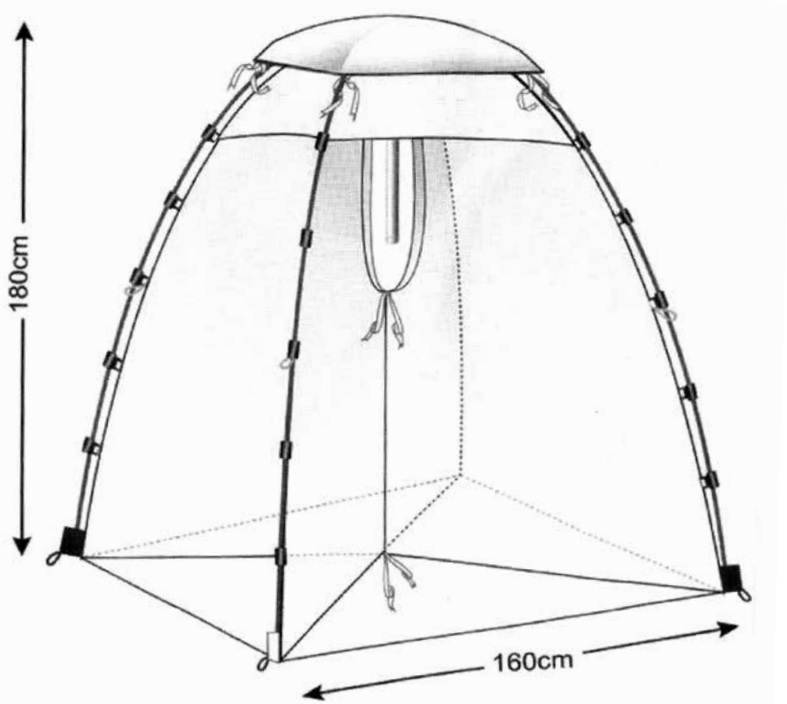
ABOUT THE MOTH PROJECT



Moths play a vital role in telling us more about the health of our environment. They are widespread, found in diverse habitats, and monitoring their numbers and ranges can give us vital clues to changes in our own environment, such as the effects of farming practices, pesticides, air pollution and climate change. PlantBot Genetics *(Wendy DesChene + Jeff Schmuki)* presents The Moth Project, community based art intervention focusing on the importance of pollinating insects in our environment. The Moth Project creates interactive public engagements focusing on environmental education and empowers audiences through creativity and community, citizen science and backyard naturalism that can lead to new conversations and civic action. The Moth Project underscores the decline of the pollinator populations and the need to preserve the environment while short-circuiting doomsday predictions. PlantBot Genetics shares simple actions like this felid guide that anyone can use to foster local pollinators, demonstrates the fragile connection between the natural world and personal action while offering simple, positive changes that can be enacted to increase sustainability—an activity that empowers the community long after the project has ended.

THOUGHTS ON GREENING THE BAY

by Katie Ries

We began with two goals in mind for the Greening the Bay Artist Residency: first, to bring exceptional interdisciplinary artists to Green Bay and second, to support artists whose work would engage directly with our community and ecology. The work of PlantBot Genetics was a perfect fit and in June of 2015 artists Wendy DesChene and Jeff Schmuki traveled to Brown County to stage and share their Moth Project. In addition to giving youth workshops at the Boys & Girls Club, YMCA summer camps, and the ARTgarage, they installed their luminous Nighttime Moth Gardens in and around Green Bay.

At each site visitors would cautiously approach the illuminated tents wondering just what was going on. The PlantBot Genetics team greeted their public wearing lab coats and giving a rundown of the project with the performance savvy and enthusiasm of carnival barkers. Not long after, those same curious and cautious viewers would be walking from tent to tent, flashlight in hand, marveling over and photographing the moths. Such is the captivating magic of the Moth Project.

Half of the genius of the Moth Project is its radical accessibility. The project welcomes us, the public, into the action while simultaneously educating about the complex issue of pollinator decline. We are immediately engaged and empowered as participants who note with new eyes the specific moths of our region. The moths have been there all along, but with the PlantBot Genetics presentation and framing we gain new insight into our world. Even better, the relatively simple mechanism for drawing the moths—essentially a light on a sheet—means that anyone can recreate the mothing experience in our own backyards. Several visitors wrote afterwards to say they'd been inspired to go home and string a bed sheet near their porch light to see what other moths they could find.

The complimentary to the Moth Project's accessibility is its vision and beauty. The illuminated tents and the mesmerizing kaleidoscopic video projections are otherworldly. The stark vision of them is so unexpected and delightful against the static grid of the city that we cannot help but be drawn in. Once inside the world of the Moth Project we discover the startling patterns and gentle beauty of the moths themselves. It is art unlike what we often find in Green Bay. It calls us into conversation and uses familiar examples to give us new vision of the land we thought we knew.

This Pollinator Guide is a result of the many people who were drawn to the project (pardon the pun) like moths to a flame. Their willingness to host the project, to wait for dark, and to study the moths that arrived, contributed data that the artists used to compile this guide. It is yet another way the artists invite us to look closely and see who shares our land. It gives us manageable and concrete steps to further carry out the stewardship of the many pollinators on whom we depend. We hope this guide will help and inspire your efforts to "green the bay" and to care better for this corner of Wisconsin.

Katie Ries, Assistant Professor of Art
St. Norbert College

WHY ARE POLLINATORS IMPORTANT?

In addition to gathering nectar to produce honey, bees perform other vital functions such as the pollination of agricultural crops, home gardens, orchards and wildlife habitats. Bees transfer pollen from plant to plant, blossom to blossom in search of nectar, thus fertilizing the plants and enabling them to bear fruit. It is estimated that about one-third of the human diet is derived from insect-pollinated plants and the honeybee is responsible for 80% of this pollination. Did you know the honeybee is Wisconsin's state insect?

Wisconsin crops requiring pollination from honeybees include cranberries, cucumbers, apples, sweet cherries, strawberries and raspberries as well as the fields of alfalfa that sustain Wisconsin's famous dairy lands. Although honeybees primarily pollinate each of these crops, there are more than 500 species of wild bees native to Wisconsin that also lend a hand in crop production.

Without pollinators, we would be without so many of the things we eat on a daily basis. So the next time you enjoy an apple or have a cranberry muffin, thank a pollinator near you!

SOME GLOBAL CROPS DEPENDENT ON HONEYBEE POLLINATION:

Coffee, Almonds, Apples, Avocados, Cotton, Blueberries, Cranberries, Cherries, Kiwi Fruit, Macadamia Nuts, Asparagus, Broccoli, Carrots, Peaches, Pears, Nectarines, Plums, Soybeans, Cauliflower, Celery, Cucumbers, Onions, Legume Seeds (Beans, Peas, Lentils), Pumpkins, Squash, Sunflowers, Apricots, Strawberries, Canola, Alfalfa, Cantaloupe, Watermelon, Honeydew.

SECOND–SHIFT POLLINATORS

Although bees are our most well known pollinating insects, a wide variety of other insects such as moths, butterflies, beetles, flies and thrips also pollinate a wide variety of plants. Could it be possible to rely on these other insects to pollinate our world if the bees disappear? Butterflies may be better known as secondary pollinators to the bees, but moths are more numerous and better at collecting and distributing pollen. Their furry bodies keep them warm at night and also pick up pollen while locating nectar. What would happen if we created solar powered lights over our gardens at night? Could we encourage moths and other "second-shift pollinators" to lend bees a hand and help pollinate our food crops and cotton fields?

There is still so much to learn about moths and science has been slow to discover all of their mysteries. We do know that there are a lot of them, about 165,000 described species in the world.

Since the end of the 19th century, backyard naturalism has been on the decline. Is it a coincidence that the numbers of our important insects have plummeted along with our interest?

Become a citizen-scientist and explore nature with curiosity and your camera. Are bees, butterflies, and second shift pollinators thriving in your garden? What plants do they like and how many can you identify? Get involved, photograph what you find, and share them with your neighbor and an online database so we can all learn more about these vital insects.

Hickory Hairstreak Butterfly
Satyrium caryaevorus

MOTH VS. BUTTERFLY

Butterflies are actually a group of specialized, day-flying moths in the order Lepidoptera (leh-peh-DOP-ter-ah) but there are other differences that can help you figure out which insect type you may be looking at. Because there are so many species of both there are many exceptions to these rules, but you can use these guidelines to start your exploration on which is which.

Antenna are often feathery or pointed

Rest with wings spread out or at sides

Many have a hairy plump body

Most have subdued coloration

Many are active at night (nocturnal)

Some pupate in a cocoon

Clinton's Underwing: *Catocala clintonii*

Many have antennae that are thin and end with a knob

Many have a thin smooth body

An example of an exception to many of these guidelines is the large group of Skipper Butterflies.

Many rest with wings together and up

Often brightly colored

Pupate in a chrysalis

Most are active during the day (diurnal)

Monarchs Butterfly: *Danaus plexippus*

Pink-Bordered Yellow
Phytometra rhodarialis

INTERESTING FACTS

- Moths can fly up to 3 miles high and use the moon and stars to navigate, but on cloudy nights at least some species rely on the Earth's magnetic field.
- Many can fly fast. The Hawk moth flies faster than 20 miles per hour.
- Many adults don't have moths, and only eat as caterpillars! Luna Moths are an example of this.
- Only a few of the many thousands types of moths will eat your clothes.
- A male moth can smell a female moth 7-8 miles away.
- The Atlas moth's wingspan is about 1 foot, bigger than some songbirds. The largest moth in North America is the Cecropia Moth.
- Moths are an important part of the food chain for many animals like bats and birds. Because of this some moths discourage insect-eaters by looking and acting like dangerous or inedible animals like wasps, spiders, or even birds.
- Moths cannot bite or sting. Some taste terrible, though, and advertise it with bold colors.
- Many moths are well camouflaged as tree bark, twigs, dead leaves, or even bird droppings!
- Moth and butterfly caterpillars are a common food item for people in African countries.
- Moth caterpillars spin a silk cocoon; some like many of the Sphinx moths, pupate under ground.
- In extremely cold or dry climates, some moths like the Arctic Woolly Bear Moth can have a 2-5 year life cycle, depending on the conditions!
- Thousands of tiny scales and hairs, cover moth's wings not powder.

HOW TO MOTH

BLACK LIGHT

Insects see light differently than we do. The spectrum of colors in the ultraviolet spectrum is higher in frequency than what humans can see. Insects like moths see ultraviolet light especially well. Set a common black light in your backyard to lure nighttime insects to where you want them to land. It's also helpful to set out a regular light for 'human' eyes. A regular shop light works great and can hang it near the black light.

MOTH SHEET

Many people use a common bed sheet that reflects the blacklight and serves as a backdrop to see and photograph what insects land. The light and sheet can be suspended between two trees with ropes, or even hung off a clothesline. Just make sure the ropes are tight enough to hold the sheet. More ambitious moth groups use commercial bug tents that are portable and worth the investment if you decide to dedicate many more nights to "mothing."

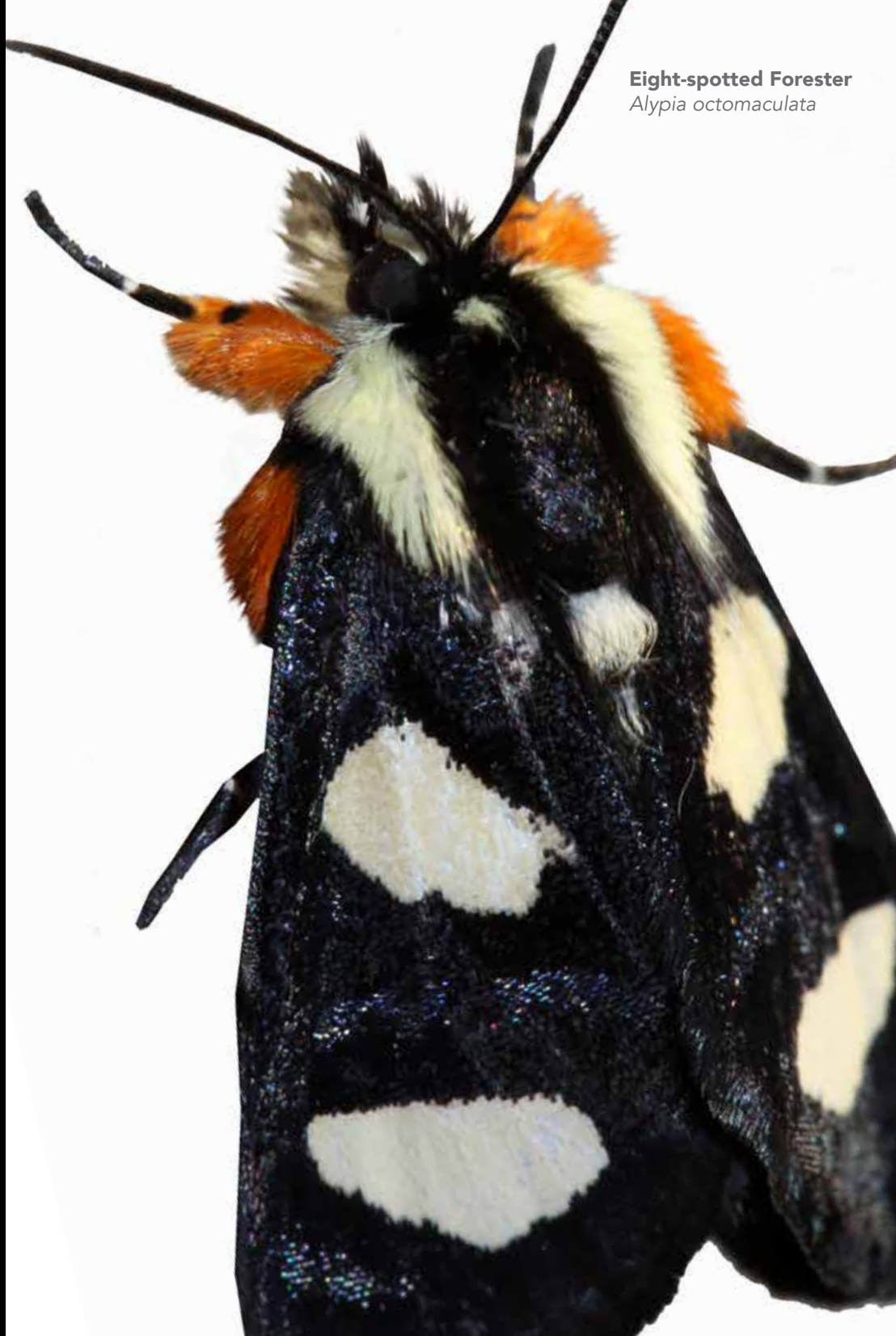
BAIT

There are many recipes for mixing harmless baits to attract moths in your area. Most include a can of flat beer, a couple tablespoons of molasses, sugar, and a banana. Simply blend, and leave to ferment covered for a week or two before use. It is smelly but has no expiration date. Smear it on your local tree trunk and watch the critters come! A rotten watermelon smashed on the side of a tree will also attract insects.

DOCUMENT

Capture your insects without hurting them by using a camera! A small digital camera with a flash and a macro function will do the trick. Many cameras have this ability but you probably don't use it very often. If you have a larger camera with lenses, a flash will be necessary. Assist others in photographing insects and share your photos with an online database for effective Citizen Science for example, The Butterflies and Moths of North America project: *http://www.butterfliesandmoths.org*. Other sites are listed at the back of this book.

Upload photos of moths found to sites like http://www.vlindernet.nl/landkaartje/. More are listed under Citizen Science on the infopage of this book. More are listed under Citizen Science on the infopage of this book.



Eight-spotted Forester
Alypia octomaculata

MOTH IDENTIFICATION

In the United States, there are over 12,000 species of moths. Use these pages to identify moths that are in your area! If your insect is not listed, there are more extensive books/websites you can use for identification. As a Citizen Scientist, you can submit your photographs to online databases listed on the resource page for help in identifying what you have found and learning what might still come your way.

WS = Wingspan
TL = Total Body Length

Eastern Tent Caterpillar Moth
Malacosoma americana
Host: Deciduous Trees like, Apple, Cherry, Crab Apple.
Markings: Hairy looking brown moth with thicker darker line running across both wings. Often confused with Bagworm or Gypsy moths but does not cause long term damage to trees.
TL: 15 - 24 mm

Imperial Moth
Eacles imperialis
Host: Deciduous Trees
Markings: Mustard yellow wings with purplish brown speckles and dynamic larger patches. Females less colorful and have less contrasting patterns than males.
WS: 80 - 174 mm

Black-Rimmed Prominent
Pheosia rimosa
Host: Poplar, Willow
Markings: Creamy grey moth with bold darker grey to black streaks on edges of wings.
TL: 25 - 32 mm

Paler Diacme Moth
Diacme elealis
Host: Unknown
Markings: Yellowish wings with irregular thin purplish brown bands. All wings have a dark brown border near the bottom edges. Also looks like the Darker Diacme Moth, *Diacme adipaloides*
WS: 20 mm

Green Leuconycta
Leuconycta diphteroides
Hosts: Goldenrod, Aster
Markings: Pale Green, with several thin black broken wavy lines across back. Between some lines are white stripes. Two black rectangular spots on middle edges of both wings.
TL: 15 -16 mm

Honest Pero (Male)
Pero honestaria
Hosts: Black Cherry, Black Locust, Tamarack
Markings: Variably grey (male) or violet grey (female), with thick darker wavy line towards bottom edge of wings ending in a light band.
WS: 34 - 36 mm

Banded Tussock Moth
Halysidota tessellaris
Host: Deciduous Trees
Markings: Pale tan with irregular thin bands. Thorax has turquoise and a pair of yellow stripes. Also looks like Sycamore Tussock Moth Halysidota harrisii.
WS: 22 - 25 mm

Pink Bordered Yellow
Phytometra rhodarialis
Host: Unknown
Markings: Yellow wings with bright pink bands near bottom. Two small pink spots near top of front wings.
TL: 10 - 11 mm

Pink-Barred Pseudeustrotia
Pseudeustrotia carneola
Host: Dock, Goldenrod, Smartweed
Markings: Dark brown moth with dramatic cross diagonal white/pink bands ending at a similar color thick band on the bottom edge of its wings.
TL: 11 - 13 mm

Leconte's Haploa
Haploa lecontei
Host: Trees and Shrubs including Apple, Blackberry, Peach, Spearmint
Markings: Very bold black and white angular markings on triangular shaped moth.
TL: 19 - 26 mm

Widow Underwing
Catocala vidua
Host: Hickory and Walnut
Markings: Forewing gray with curved thick blackish outer line and blackish Y-shaped inner mark. Hindwings black with white fringe.
WS: 37 - 44 mm

Oblique-Banded Leafroller
Choristoneura rosaceana
Host: Trees and Woody Plants, like Apple, Pine
Markings: Reddish brown folded over wings which give it a distinct shape, with three thick darker brown bands on wings.
TL: 12 mm

Scarlet Winged Lichen Moth
Hypoprepia miniata
Host: Tree Lichen
Markings: Head, thorax, and wings scarlet; wings with broad dark gray stripes and fringe.
TL: 15 - 21 mm

Blinded Sphinx Moth
Paonias excaecata
Host: Deciduous Trees
Markings: Forewings with scalloped margin; hindwings with blue eyespot. The abdomen "tail" curves upwards when at rest.
TL: 35 - 50 mm

Beautiful Wood Nymph
Eudryas grata
Host: Peppervine, Grape, Virginia Creeper
Markings: White wings with dark red fringe with a thin yellow-green strip between white and red areas. Tufted front legs extend up away from its body.
TL: 24 mm

False Crocus Geometer
Xanthotype urticaria
Markings: Yellow body color with reddish brown variable spots/patches. Very distinct wing shape with all four wings displayed. Often confused with *Crocus Geometer X. Sospeta.*
WS: 30 - 40 mm

Virginia Ctenucha
Ctenucha virginica
Host: Basswood, Hickory, Oak, and Willow
Markings: Black to olive brown wings with blue metallic body and bright yellow/ orange head. Long feathery antennae.
TL: 21 - 25 mm

Pale Beauty
Campaea perlata
Host: Deciduous Trees
Markings: White to pale green/grey white moth. It has two thin lines visible on its wings. The bottom line crosses the entire moth.
WS: 28 - 51 mm

Green Pug
Pasiphila rectangulata
Host: Apple, Blackthorn, Cherry, Pear
Markings: Variable metallic green wings dulled with variable thin black lines and spots. Green color diminishes as it ages.
WS: 19 - 23 mm

Eight-spotted Forester
Alypia octomaculata
Host: Ampelopsis, Grape, Virginia Creeper
Markings: Velvet black wings peppered with blue scales and two large white spots on each wing. Orange leg tufts.
TL: 16 - 20 mm

Rosy Maple Moth
Dryocampa rubicunda
Host: Maple and Oak Trees
Markings: Hairy bright yellow body with bright pink wings that have a thick yellow band.
WS: 26 mm

Luna Moth
Actias luna
Markings: Large apple green wings marked with sleepy eye spots on upper wings. Feathery antenna. Back wings have long tails twisted near the tip.
WS: 75 - 105 mm

Sharp-Lined Yellow
Sicya macularia
Host: Trees and Shrubs like Alder, Blueberry, Poplar, Willow
Markings: Yellow moth rests with wings tented. Large cinnamon brown patch near center and back of wings and two thin matching lines running across.
WS: 24-35 mm

Tufted Bird Dropping Moth
Cerma cerintha
Host: Fruit-bearing Trees
Markings: Mosaic pattern of earthy colors. Front wings with greenish blue scallops across wings on broad, irregular white band.
TL: 15 - 17 mm

Isabella Tiger Moth
Pyrrharctia isabella
Host: Deciduous Trees and Low Plants like Aster, Birch, Elm, and Sunflower
Markings: Top wings are pale orange-ish with blackish spots. Bottom wings are brighter, body is also furry orange with black spots.
TL: 24 - 33 mm

Cherry Scallop Shell
Rheumaptera prunivorata
Host: Azalea, Meadowsweet, Willow
Markings: Light brown moth with many small darker scalloped lines running across all of its wings giving it a busy but beautiful appearance.
WS: 35 - 41 mm

Clinton's Underwing
Catocala clintonii
Host: Apple, Cherry, Elm, Hawthorn and Plum.
Markings: Hindwings are striped black and golden yellow orange. Top wings are pale gray with thin darker bands on length of wing.
TL: 25 - 29 mm

Polyphemus Moth
Antheraea polyphemus
Host: Trees and Shrubs
Markings: Large cinnamon wings with pink accents. Two mimic eye spots on each bottom wing.
WS: 100 - 150 mm

Wavy-Lined Emerald
Synchlora aerata
Host: Low Plants Like Ragweed.
Markings: Pale green wings have slightly wavy thin white lines running through wings. Narrow white stripe running down back of body.
WS: 13 - 24 mm

Grape Leaffolder
Desmia funeralis
Host: Evening Primrose, Grape and Redbud
Markings: Dark wings with a metallic sheen, are spotted with white ovals. There are two spots on each top wing. The spots on the bottom wings can be fused together.
TL: 16 mm

White-dotted Prominent
Nadata gibbosa
Host: Oak, Birch, Cherry, Maple
Markings: Yellowish orange peppered with brown scales. Two thin darker lines and two small whites dots on each outer wing.
TL: 20 - 30 mm

Little Virgin Tiger Moth
Grammia virguncula
Host: Low Plants like Dandelion, Knotweed, and Plantain
Markings: Black broken dramatic lines on light yellow wings. Underwings are bright yellowish orange with slotted black splashes.
TL: 19 - 25 mm

Gray Furcula Moth
Furcula cinerea
Host: Aspen, Poplar, Willow
Markings: Pale grey with peppery black spots, and subtle metallic blue and yellow spots running into its head. Furry grey body.
WS: 33 - 45 mm

Deep Yellow Euchlaena
Euchlaena amoenaria
Host: Unknown
Markings: Peppery yellowish wings shaded rust brown towards outer edges. Light spots near front wing tips.
WS: 30 - 49 mm

Friendly Probole
Probole amicaria
Host: Sourwood and Probably Other Host Plants
Markings: Light tan moth with darker band on edge of all wings.
WS: 23 - 34 mm

Spiny Oakworm Moth
Anisota stigma
Host: Primarily Oak
Markings: Light orange with peppery spots. White spot on each outer wing. Furry body.
TL: 22 - 38 mm (males are smaller)

Small Magpie
Eurrhypara hortulata
Host: Nettle, Bindweed, Mint
Markings:White wings with brown borders and spotted lines. Orange yellow furry head.
WS: 25 mm

Virginia Creeper Sphinx
Darapsa myron
Host: Virginia Creeper, Grape and Viburnum
Markings: Variable light brown to olive green with a thin orange border. Darker thick bands run across wings. Thick body.
TL: 28 - 38 mm

COLONY COLLAPSE DISORDER (CCD)

Bees are dying. Colony Collapse Disorder (CCD) is the term for this large-scale decline and death of honeybee colonies worldwide. 80% of all plants on earth depend on pollination by bees for reproduction, which makes CCD a cause for concern. This phenomenon (i.e., the sudden disappearance of worker bees from a colony, leading to colony failure) has been around for a long time, and been given many different names. "CCD" was not recognized to be the same thing at first because it was simultaneously worse in intensity (i.e., much higher levels of disease) and scope (i.e., much of N.A. and Europe) than earlier outbreaks. CCD was first reported in 2005 when commercial beekeepers began noticing adult worker honeybees disappeared leading to the rapid death of the colony.

The main causes of CCD include the intensification of agriculture (including the use of pesticides and decline of weeds), the deterioration of natural areas, the growth of the global human population and the introduction of non-native parasites, such as the varroa mite. The annual losses from the winter of 2006-2011 averaged about 33 percent each year.

Some scientists theorize that some chemicals are responsible for the mass die-offs. Most recent research shows CCD is related to pesticides containing neonicotinoids. Neonicotinoids are absorbed into plant tissues and are present in pollen and nectar, making them toxic to honeybees and other important pollinators. Neonicotinoid pesticides can persist in the soil and be absorbed by plants for up to six years with just one application. Commercial growers use seeds coated in insecticides and many plants available at home and garden stores contain neonicotinoid pesticides that are deadly to bees and other pollinating insects. Dozens of different pesticides and fungicides have been found in pollen collected by bees foraging in crop fields, some at dangerously high concentrations. If the use of neonicotinoids and other dangerous pesticides continues and bees decline, our food production will be severely limited.

There is strong evidence that supports the detrimental effects of toxins in our environment. Pesticides in particular have been found in water supplies resulting from agricultural runoff from fields that collect in nearby bodies of water. These toxins not only impact vital insect populations but harm birds, earthworms, and aquatic animals and plants.

WHAT IS CAUSING CCD?

HABITAT LOSS

Although beautiful, lawns do not feed beneficial insects.
Due to urban sprawl and land development there are fewer flowering plants offering nectar and pollen for bees. This lack of food and habitat makes bees scarce and more susceptible to mites, viruses, fungi, and other pathogens. Without bee pollination, many of the world's fruits and vegetables would not exist.

PESTICIDES/FERTILIZERS

Pesticides and fertilizers cause bees great harm, sometimes damaging entire colonies. Neonicotinoids are a "systemic" form of pesticide. What makes them super effective at keeping pests at bay is that they suffuse and "express" themselves in the whole plant when it germinates, including nectar and pollen. The problem is that this kills "nontarget" beneficial insects as well. Interesting fact: at least for almond trees, bees improve crop yield far more than fertilizer or even irrigation!

OVERWORKED BEES

Long-distance transportation of bees to perform pollination services is common in in the USA , but significant stress is caused to bees when transported long distances. Trucking and even flying whole colonies across the nation to pollinate crops with a small area allows contact with other bees from other parts of the country and spreads viruses and mites among colonies that often lead to Colony Collapse Disorder.

CORPORATE FARMS/ INDUSTRIALIZATION

Monoculture is the agricultural practice of producing or growing one single crop over a wide area. Honeybees are the most widely used pollinator of such industrial food crop production. Unfortunately, having only one type of pollen for food leads to certain nutrient deficiencies. Bees fed pollen from a range of plants have a healthier immune system and are better able to protect themselves and their larvae from microbes and pathogens. Additionally, the increased uses of broad-spectrum insecticides kill all kinds of insects, including the beneficial bees.

HOW CAN YOU HELP?

- One of the easiest ways to help is to plant food for our pollinators. Cultivate a pollinator garden.

- Limit grass that does not provide food for pollinators.

- Leave water out for bees to drink and cool their hive. If you leave shallow saucers full of marbles and water they won't drown.

- Let wildflowers grow along a fence or on a balcony or roof to offers food and protection for snacking pollinators. With the exception of water, wildflowers need little maintenance and no fertilizers.

- Produce grown seasonally by local farmers supports community growers who plant a wide array of plant life on their farms. These diverse small farms allow pollinators to find food regardless of season, unlike industrial food corporations that farm only one crop that will flower for only a few weeks each year.

- Don't use pesticides. Most pesticides are not selective. You are killing beneficial bugs along with the pests. If you must use a pesticide, try a natural alternative and use it in the evening when bees are in their hive.

- Make a Bee Hotel.

PLANT A BENEFICIAL POLLINATOR GARDEN

Plant local native plants, heirloom varieties of herbs, and perennials when possible. These plants are easy to grow and four times more attractive to native bees than other plants. Native plants also echo the natural eco-system, allowing foraging for a wide range of species and increasing the biodiversity in the area they are planted. Once established, native plants don't need fertilizers, herbicides, or watering. In addition, they have developed their own defenses against many pests and diseases, allowing the gardener to reduce chemical dependency, labor and costs.

Native and heritage plants also offer the most complete sources of nourishment for pollinators. Local wildflowers have evolved to have a symbiotic relationship with the area's pollinating insect partners. Although no one knows for certain, many believe the shapes of petals found in native plants have adapted to form the perfect drinking cup for local nectar drinking pollinators while exotic plants often have petal shapes that do not allow easy access for these insects. Native plants can also serve as host plants to eggs and larvae of some pollinator species.

Also, beware of plants from retail nurseries. In 2014, testing showed that 51% of plants bought from stores in 18 cities across the U.S., including Home Depot, Lowe's, Walmart, and Orchard Supply Hardware had levels of a group of harmful pesticides known as neonicotinoids that were high enough to kill honey bees, bumble bees, and other pollinators.

PLANT NATIVE

SOME PLANTS FOR BEES IN THE GREAT LAKES REGION:

Butterfly Milkweed
Ascleptas tuberosa

Purple Coneflower
Echinacea purpurea

Wild Bergamot
Monarda fistulosa

Calico Aster
Symphyotrichum novae-angliae

Showy Goldenrod
Solidago spectosa

Sweet Joe Pye Weed
Eupatortum purpureum

Dotted Mint
Monarda Punctata

Cockspur Hawthorn
Crataegus crus-galli

Showy Goldenrod
Solidago Spectosa

Cup Plant
Silphturn perfoliatum

Purple Prairie Clover
Dalea Purpurea

Prairie Blazing Star
Liatris pycnostachya

Rattlesnake Master
Eryngtum yuccifoltum

Virginia Mountainmint
Pycnanthemum virginianum

Chose several colors of flowers. Bees have a color vision that allows them find colors such as blue, purple, violet, white, and yellow. Interestingly, they can't see red!

Flower clustered into clumps of one species attract more pollinators. Include flowers of different shapes that bloom all season. There are 4000 different species of bees in the United States, each of various sizes and tongue lengths that feed on different shaped flowers throughout the year. Planting diverse flower shapes with different bloom times means more bees can benefit all season long.

Plant where bees will visit. Bees favor sunny spots over shade and need water and shelter from strong winds.

Plant organic seeds or use plants from a trusted source that have not been genetically modified or have not been produced with pesticides that can last for years in the plant and soil. Many beautiful plants sold at the big hardware store or nurseries have pesticides present within the plants! These poisonous plants are not labeled in any way. It is best to grow plants from organic seeds purchase plants from a trusted source.

BEE HOTEL

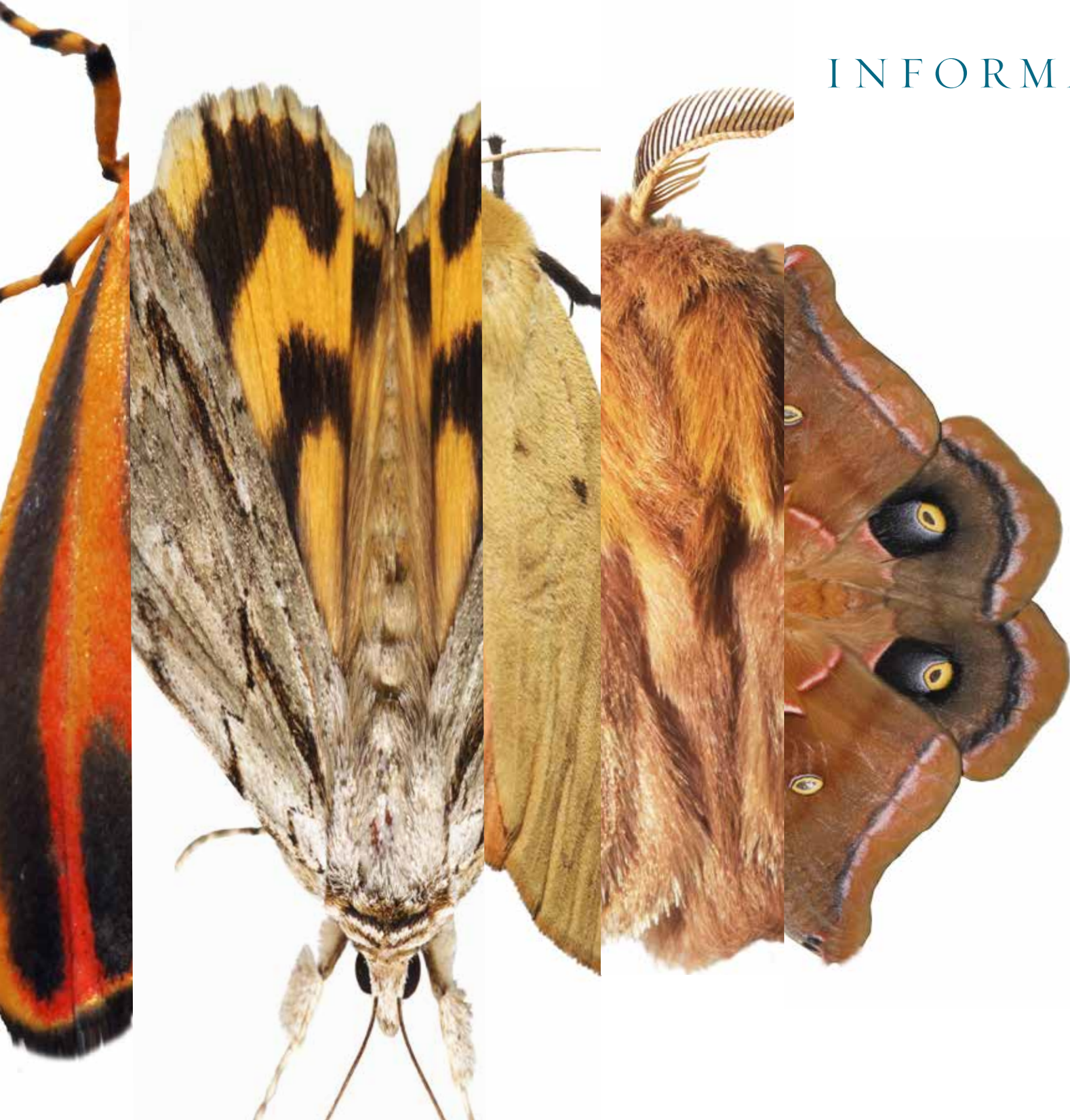
Pollinators evolved alongside native plants and some only emerge and forage for short periods when their favored plants are in flower. You can further encourage native bees into your area by offering them homes. Most native bees usually don't build hives like honeybees. Bee hotels provide a selection of natural tubes and can be purchased or made at home.

Bundles of short (4"-8") twigs, wood chips, rolled up paper, thin cardboard tubing, blocks of wood with holes drilled into them. Hollow reeds (bamboo) can also make great bee hotels and can be made from waste materials. Some bees will only use such tubes.

Simply bundle a handful of natural tubes, of different diameters together. Secure them in place with string and place in a covered, sheltered, undisturbed situation. They must stay dry. You can also build an open sided box to house the bundle of tubes and add a simple rain-deflecting roof for your simple bee hotel. Other insects such as Ladybirds may also move into the bee hotel. They are also beneficial for your garden as they eat plant-sucking aphids.

More information on how to make various types of bee hotel can be found here: http://www.inspirationgreen.com/insect-habitats.html

***Hortus Botanicus Garden** in Amsterdam*



INFORMATION

CONSERVATION GROUPS

- *www.xerces.org*
- *bumblebeeconservation.org*
- *http://www.ent.uga.edu/bees*
- *http://beeraw.com/savethebees*

HELP WITH IDENTIFICATION

- *https://energy.wisc.edu/bee-guide/*
- *bugguide.net*
- *www.butterfliesandmoths.org*
- *www.projectnoah.org*
- *mothphotographersgroup.msstate.edu*
- *www.discoverlife.org*

CREATING A HABITAT

- *http://hort.uwex.edu/articles/pollinators/*
- *http://extension.uga.edu*

MOTH UPLOAD SITES / CITIZEN SCIENCE

- *www.butterfliesandmoths.org*
- *www.projectnoah.org*
- *www.bugguide.net*

OTHER GREAT WEB SITES

- *http://sos-bees.org*
- *www.nature.org*
- *www.livescience.com*

FOR CHILDREN AND TEACHERS

- *www.biokids.umich.edu/critters*
- *http://www.wihoney.org/education*
- *http://www.vitaminbee.tv*
- *http://www.greatsunflower.org*

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