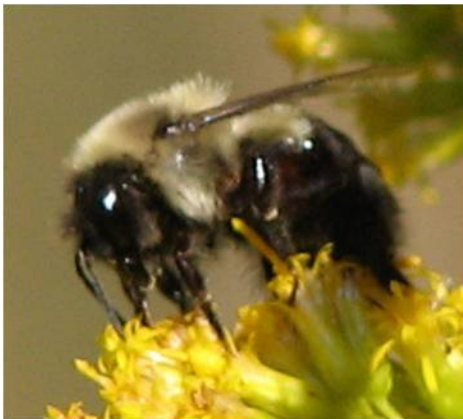


# The Pollinator Profiles

Volume 1



[www.pollinators.info](http://www.pollinators.info)

# Contents

Introduction.....	3
Bees.....	4
Bumble Bees.....	4
Franklin's Bumble Bee.....	6
Mason Bees ( <i>Osmia</i> ).....	7
Small Carpenter Bees.....	9
Squash Bees.....	10
Stingless <i>Melipona</i> Honeybees.....	12
Stingless <i>Trigona</i> Honeybees.....	13
Sweat Bees (Halictid Bees).....	14
Valley Carpenter Bee.....	16
Beetles.....	17
Masked Chafer Beetle.....	17
Soldier Beetle.....	18
Valley Elderberry Longhorn Beetle.....	19
Birds.....	21
'Apapane.....	21
Lucifer Hummingbird.....	22
Purple Honeycreeper.....	23
Ruby-throated Hummingbird.....	25
Rufous Hummingbird.....	26
White-winged Dove.....	27
Flies.....	29
<i>Bactrocera</i> Fruit Flies.....	29
Bee-flies.....	31
Delhi Sands Flower-loving Fly.....	32
Long-tongued Flies.....	33

Lepidoptera (butterflies and moths).....	35
Ailanthus Webworm Moth.....	35
Bay Checkerspot Butterfly.....	36
Senita Moths.....	38
Sphinx Moths.....	40
Yucca Moths.....	41
Mammals.....	43
Greater Long-nosed Bat.....	43
Kinkajou.....	45
Lesser Long-nosed Bat.....	46
Lesser Short-nosed Fruit Bat.....	47
Mariana Fruit Bat.....	49
Spiny Mice.....	50
Tube-lipped Nectar Bat.....	51
Reptiles.....	53
Blue-tailed Day Gecko.....	53
Madeiran Wall Lizard.....	54
Round Island Skink.....	55
Wasps.....	57
Pollen Wasps.....	57
Tarantula Hawk Wasp.....	58

# Introduction

Hi there! I'm Athena, the author of **pollinators.info**, and I want to thank you for supporting the site, for however long you've been a subscriber!

I'm really excited to share this with you, because it represents the best of Pollinators Info's first year! I hope this booklet will be a quick reference for you for some of the world's neatest animals: pollinators! In the following pages, you'll find all of the Pollinator Profiles from the first year of Pollinators Info, all organized by animal group, and easy for you to locate with the preceding table of contents.



Enjoy!

I always welcome your input and questions, whether you post them as comments on the site or email me directly at [athenarayne@yahoo.com](mailto:athenarayne@yahoo.com).

Warm regards,  
*Athena Rayne Anderson*

# Bumble Bees

Bumble bees are in the Order Hymenoptera, along with wasps and ants. Their genus, *Bombus*, is found all over the world and is most diverse in northern temperate regions. The characteristic large, fuzzy bodies, gentle nature, and "bumbling" flight have made them favorites of naturalists for centuries.


Bumble bees have an annual life cycle in which queens that spent the winter in hiding emerge in early spring to start their nests. These queens mated the previous summer or fall and start laying eggs as soon as they find a suitable nesting place. Bumble bees appear to nest in any sheltered cavity with insulating material- an abandoned rodent burrow, mouse nest, or the insulation in your wall.

The queen builds a small wax pot in which she stores nectar to feed herself when she can't search for food (forage). She then lays eggs and provides them with a mixture of nectar and pollen on which to feed. This might come as a surprise, but queen bumble bees actually incubate their eggs! Bumble bees are one of a few groups of insects that can increase their body temperature at-will. By doing this, the queen speeds the development of her offspring and regulates the temperature inside her nest.

The first set of offspring are all female, and are called workers. They take over foraging and nest maintenance duties so the queen can devote herself to laying and incubating eggs. Depending on the species and location, a bumble bee nest can live for a few weeks or several months. The queen produces young queens and males (drones) near the end of her life, which leave the nest and mate. The old queen, and all workers and drones die before winter. The newly-mated queens then find a shelter in which to hibernate for the winter and start the cycle again in spring.



Photo © Athena Rayne Anderson 2007



Bumble bees are considered generalist pollinators because they feed from a wide variety of plants. They are especially important for plants in the bean (Fabaceae), tomato (Solanaceae), and blueberry (Ericaceae) families. Many bees will not go through the work necessary to pollinate the complicated flowers of pea plants, but bumble bees have no trouble with them. Plants in the Solanaceae and Ericaceae must be sonicated (buzz-pollinated) for pollen to be released. Bumble bees are one of only a few bee genera that can do this. For these reasons, bumble bees are some of the most important pollinators for beans, clover, tomatoes, and blueberries, to name just a few crops.

# Franklin's Bumble Bee

## Critically Endangered!

Franklin's bumble bee (*Bombus franklini*) has (had?) the most restricted range of any bumble bee in the world. It was found only in a sliver of land between the Coast and Sierra-Cascade mountain ranges in southern Oregon and northern California, USA. Its populations have been dropping since 1998; one individual was found in 2006, but none have been seen since then.

Who cares if one bumble bee disappears? Well, bumble bees are amazing native pollinators. They're one of a few groups of bees capable of pollinating tomatoes, blueberries, and cranberries. They also pollinate wild plants, helping to keep ecosystems productive.

Bumble bees are also part of our native wildlife, and their decline could indicate environmental distress, much like Rachael Carson pointed out in [Silent Spring](#).

Stay tuned for podcast episode 6 (January 1, 2012), in which I talk with Dr. Robbin Thorp about his research on this and other bumble bees.



Photo © Robbin Thorp

# Mason Bees (*Osmia*)

Bees in the genus *Osmia* are commonly called “mason bees” because they line their nests with mud. The genus *Hoplitis* shares this common name, but we’ll focus on *Osmia* here...

Thanks to Valerie for asking whether mason bees are native to Virginia—hopefully I’ll answer that question and others you may have below!

*Osmia* is a genus in the family Megachilidae, the members of which are commonly called “leaf-cutter bees,” because many of them use leaf bits to line their nests. Mason bees use mud instead, which they collect and store in their mouths for transport to their nests.

Mason bees nest in stems or other previously-excavated tunnels in wood, bamboo, hoses... even wall sockets! The female lines the inside of the tunnel with mud, creating individual rooms for each of her eggs. Masons are also solitary, meaning that they don’t nest in family groups (like honey bees). Instead, each female takes care of her own nest, and dies before her offspring reach adulthood.

Mason bees come in a variety of colors, including black and metallic green or blue, like the one in the photo here. *Osmia* are about the size of a honey bee, or a little smaller, and their bodies are more rounded. Females also have a bush of hair on the underside of their abdomens (a [scopa](#)) that they use for collecting pollen. Mason bees are sometimes confused for flies, especially the metallic bottle flies (*Calliphora*).

*Osmia* species are native all over the northern hemisphere, and there are more than 130 native to North America. Most of these are in the western half in the USA, but there are about 27 species native East of the Mississippi River. In other words, you almost certainly have at least one species native to your region!

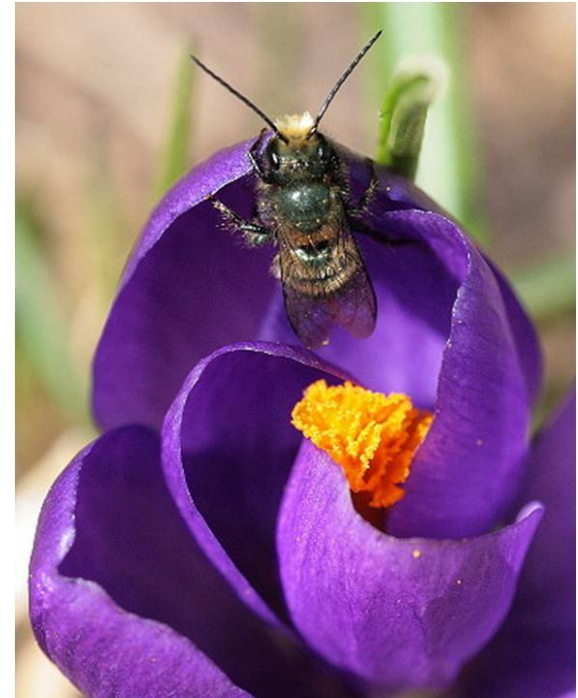



Photo © SeabrookeLeckie.com 2010





Mason bees, especially the one called the “blue orchard bee” (*Osmia lignaria*) are being managed for commercial fruit tree pollination. These bees visit a wide variety of plants, so let us know what they prefer in your neighborhood!

Many species of *Osmia* readily nest in man-made wooden blocks or stem bundles, which can be placed near crops or in your garden to facilitate pollination. Look for these bees in the spring months, which is the peak of their adult active season.

**Warning: always use natives!**

Research shows that bees can spread diseases to each other when brought into regions where they’re not native. Be careful if you decide to order live mason bees- ask which species they are and find out where they’re native. *Osmia lignaria* is only native to the western USA. If you can’t find a supplier of mason bees native to your area, you can still support your native bees by putting out nesting blocks for them! You’ll likely get mason bees, and many others, in your blocks, and they’re all fun to watch!

# Small Carpenter Bees

Bees in the genus *Ceratina* are commonly known as “small carpenter bees”, and are around 8mm in length. This is in contrast to their relatives, the “large carpenter bees,” in the genus *Xylocopa*, which are closer to 20mm long. Small carpenter bees tend to be dark and iridescent in color. These tiny bees look very similar to the common “sweat bees” in the family Halictidae, but often can be distinguished by yellow on the faces of both sexes.

Small carpenter bees also earned their common name because of their nesting habits; they chew tiny tunnels in stems and build chambers inside them for their offspring! The mother bee collects pollen in her [scopa](#) on her hind legs, and carries it to her nest tunnel. Inside, she adds pollen and nectar together to make a little food ball for her young. Each developing larva has its own room and food inside the nest tunnel.



Photo © wwwwebber 2009

Some species of *Ceratina* are social, sharing nesting responsibilities, and others are solitary and do all the work themselves. Unlike with honey bees, mother *Ceratina* do not interact with their offspring after they reach maturity. Here's something you might not have known: there are several species of *Ceratina* that are parthenogenetic. Huh? That means that females can produce eggs without mating... their offspring are clones when they reproduce that way! One well-known example is *Ceratina dalle Torreana*, a native of Europe.

How can you help out these small carpenter bees? One great way is to plant wildflowers that are native to your area! Because they're so little, these bees often visit tiny flowers that go unnoticed by larger pollinators.

# Squash Bees

Squash bees are fun little critters. They're in the genus *Peponapis*, and they earned their common name from their dependence on flowers in the squash family (Cucurbitaceae). These bees only visit flowers of squash, cucumbers, gourds, and their relatives! If the right habitat is available to them, these bees can completely pollinate all cucurbits in an agricultural system. Indeed, they did so for Native American cultures long before Europeans brought honey bees to the Americas.


Squash bees start moving around right before or at sunrise, when most squash flowers open. A squash flower only stays open for several hours, so the bees have the best chance of collecting nectar and pollen at first light.

Being the first bees to visit squash flowers is likely an adaptive strategy for them. Many other bee species that visit the same flowers aren't active until later in the morning, so competition for nectar and pollen is lower around sunrise.

Where I live, we're already reaping the benefits of *Peponapis* pollination in the form of beautiful summer squashes and cucumbers. But if you live in a region in which cucurbits are still blooming, you might enjoy getting up early one morning to look for these bees. They're about the size of a honey bee, and have yellow-whitish hair on their [thorax](#). Both males and females visit squash flowers, and both sexes have whitish stripes on their [abdomens](#). The bee in the photo above is a male- he has a little bump on his face with a yellow spot on it (isn't that cute!?). You can also recognize them by their flight behavior- once they're finished in a flower, these bees zip off to another so fast they're hard to see. This is much different from honey bees and bumble bees, which move slow enough that you can follow them with your eyes as they travel between flowers.



Photo © Carol Hoffman



Squash bee females are ground-nesters, each digging her own tunnel and constructing chambers for her eggs. Like other ground-nesting bees, their nests can sometimes be found in large numbers when many females locate the same quality habitat. Leaving bare patches of soil on your property could provide vital nesting habitat for these and other native bees.

# Stingless *Melipona* Honeybees

Stingless honeybees, you ask? Indeed! Well...they actually DO have stingers, but they're so small that they don't work! AND they make honey!

There are at least two genera (plural of genus) of stingless honeybees, and I'll talk about another (*Trigona*) in another post. The *Melipona* are found all over the New World tropics- from Mexico into Argentina! They're important pollinators of *Vanilla planifolia*... the orchid from which we get vanilla! So thank these little bees the next time you make cookies or enjoy ice cream!

These bees live in hives, similar to European honeybees, with a queen as the mother and the only one that reproduces. Her daughters are the workers that take care of all the hive maintenance, feeding, and cleaning. And there are males, the drones, that spread the queen's genes to other hives (i.e., all they do is mate).

*Melipona* were kept by the Maya for their honey and crop pollination services. This practice is called Meliponiculture and, unfortunately, it is now rarely found outside a few villages on the Yucatán peninsula. Check out Dr. Stephen Buchmann's beautiful [video about Mayan beekeeping](#) that I linked to in a previous post to learn more.

Don't forget to visit the [pollinators.info YouTube channel](#) to see some clips I made of *Melipona* in Costa Rica!



Photo © Athena Rayne Anderson 2008

# Stingless *Trigona* Honeybees

These neat little bees can be found in the neotropics and Indo-Australian tropical region. This is another genus, like *Melipona*, that contains social bees that make honey and don't sting. All female bees have stingers, but the stingers on these bees are so small that they don't work for stinging. Check out the [post on \*Melipona\*](#) to learn more about this group of bees!

Species of *Trigona* live in hives, like European honeybees, and can be found in cavities in trees or underground. The queen is the mother and the only bee in the hive that reproduces. The workers are her daughters, which do all the nest maintenance, bring home food, and raise their sisters. Males are only produced at a certain time of year, when new queens are produced. Males and new queens leave the nest to find mates, then the males die and the mated queens start their own hive.

Meliponiculture is the management of bees in the genera *Melipona* and *Trigona*, and was traditionally important to Mayan culture in Mexico. Beekeepers would locate wild hives of these bees and bring them to their homes, where they provided the hive with a log in which to nest. The bees provided honey and pollination services for agricultural crops. Sadly, this beekeeping practice has become very rare. Watch a beautiful video about meliponiculture in this post: [Mayan beekeeping video](#).

Nowadays, *Trigona* species are important pollinators for wild plants and agricultural crops in the tropics. They are key pollinators of macadamia, coconut, mango, and chayote. These bees also play a smaller role in pollination of coffee, avocados, and guava (to name just a few). The *Trigona* worker in the photo above is visiting an aloe flower (yep, the stuff in lotion) in Costa Rica. Read an [article on \*Trigona\* as crop pollinators](#) for more information!



Photo © Athena Rayne Anderson 2008



# Sweat Bees (Halictid Bees)

Bees in the Family Halictidae are commonly called "sweat bees" because of their habit of landing on your sweaty skin and licking up the salt. (Bees need salt in their diets too!) They come in several colors: black, dark blue, and green, and often have a metallic sheen. Some are very tiny, while others are larger, but rarely are they even the size of a honey bee.

Halictid bees are usually solitary, meaning that they nest individually and do not interact with their adult offspring. Only a few species share nest entrances and are classified as social. Depending on where you live, the first Halictids emerge from their nests as adults in early summer. Females immediately mate and then search for a suitable nesting site. These bees most often nest in soil, but some nest in hollow stems.

Whether the bee builds her nest tunnel in soil or a stem, the structure is similar. The mother bee deposits a ball of pollen moistened with nectar at the end of her nest tunnel, then lays an egg nearby. The food she leaves must be enough to sustain her offspring as it grows. She then seals off the segment, so that the developing bee has enough space to grow to its full size, and moves forward in the tunnel. She continues constructing these "chambers" in sequence, then seals the nest tunnel entrance when she's finished.

One of the most interesting things about bee reproduction is that all females can choose the sex of their offspring by fertilizing eggs or not. Unfertilized eggs develop into males, while fertilized eggs develop into females. Male bees develop faster than females, so the mother lays female eggs deepest in her nest, and males near the entrance. This way, males emerge from the nest first, without disturbing their sisters who are still developing. Usually females emerge one to a few days later than males, at which time males attempt to mate with as many females as possible.



Photo © Athena Rayne Anderson 2011

Halictid bees tend to have a short active season, especially when compared to [honey bees](#) or [bumble bees](#). You might only see one species flying for a couple of weeks during the year. Underground or in their stem nests, however, young bees spend the rest of the year developing and hibernating until they emerge as adults the next year.

If you have a "congregation" of these bees nesting in your yard, consider yourself lucky! (Check out my post on [nests in the ground](#)). Basically, these bees have a hard time finding patches of bare soil to nest in, so when one discovers a spot, many others might nest nearby! Not to fear, though, these bees are very gentle.



# Valley Carpenter Bee

Valley carpenter bees are one of 10 species of “large carpenter bees” in the genus *Xylocopa* in North America. This species, *Xylocopa varipuncta*, is common in valley and foothill areas from Texas to California, USA. Females, like the one in this photo, are glossy black, while males are bright golden with green eyes! How’s that for sexual dimorphism!?

Carpenter bees are one group of bees that can buzz-pollinate, or sonicate, flowers in the tomato family (Solanaceae). In the photo here, a female grasps the anthers of a wild nightshade and vibrates her body. The frequency of her vibration releases pollen from the specialized anthers, which she collects and inadvertently spreads to flowers she visits later. Valley carpenter bees are important pollinators of many wild plants in the desert southwest.

Like the eastern carpenter bee (*Xylocopa virginica*), found where I live in Georgia, valley carpenter bee females also chew tunnels in soft plant material. These bees are solitary, so each female excavates her own nest tunnel. She then lays an egg on a little ball of pollen, mixed with nectar, at the end of the tunnel and seals off the chamber. The mother does this repeatedly, creating a line of nest chambers in sequence from the back of the tunnel to the front.

Fortunately for homeowners in the southwest, plants like sotol provide great nesting habitat for carpenter bees. In many cases, adult carpenter bees will share an abandoned nest and several can be found resting inside together at one time. This was the case in the photo here of a female poking her head out at me to figure out what had been disturbing the entrance hole.



Photo © Athena Rayne Anderson, 2011

# Masked Chafer Beetle

Masked chafer beetles (*Cyclocephala*) have a bad reputation as turfgrass pests, but they are important pollinators of some tropical plants!

These scarab beetles (family Scarabaeidae) are native to the Americas, and are commonly called “June bugs” in the southern USA. Adults are nocturnal, and frequently collect around house lights during their active season. There are more than 300 known species in this genus, and new species are discovered often! The genus name means “rounded head” in Greek, and their common name comes from the black area between their compound eyes, which makes them look like they’re wearing a mask.

Masked chafers are the primary pollinators of tropical aroid plants, in the family Araceae. You’ve probably seen some of these before- they’re common houseplants because they grow well in low light conditions. A few examples are *Dieffenbachia*, *Caladium*, and *Xanthosoma*; these plants have a typical [beetle pollination syndrome](#).

How does it work? So glad you asked!

Like most beetle-pollinated plants, these genera produce lots of pollen and a strong smell that attracts the beetles at night. Some, like *Xanthosoma*, also produce heat that encourages the beetles to stay longer! These plants flower in an inflorescence, and contain some sterile flowers that are food rewards for the beetles. As the beetles roam around, munching on flower parts, they unwittingly collect and distribute pollen. Ta-da! Pollination!



Photo © Anaxibia 2010

# Soldier Beetles

Soldier beetles seem to come out of nowhere in my neck of the woods right around the time the goldenrod starts to bloom. They'll drink nectar and eat pollen from many plants, but goldenrod is such an insect magnet that you can find a lot of species of these beetles on it too. Soldier beetles are in the family Cantharidae, and one species in the UK is bright red. One story is that their color reminded locals of the "redcoats" of British soldiers, hence the beetles' common name.

The species in the photo here is *Chauliognathus pennsylvanicus*, and it's commonly called the 'goldenrod soldier beetle.' You can find it all over the eastern and central US, eating, sleeping, and mating on fall flowers. As they walk around on flowers, adult beetles inadvertently pick up and drop off pollen all over the place, which pollinates some of the flowers in the process.

Larval soldier beetles are great pest control, because they eat the eggs and larvae of leaf-munching critters like grasshoppers and aphids. Adults will also eat aphids! It's a pollinator AND a pest control! How cool is that!?

If you live in Kentucky and/or Indiana (USA), you get a chance to see something really neat! The endangered Short's goldenrod (*Solidago shortii*) only lives in your states, and is primarily pollinated by the goldenrod soldier beetle! For more detailed information about the study that was published on this interaction, click on this text: [solidago shortii paper](#).



Photo © Athena Rayne Anderson 2007

# Valley Elderberry Longhorn Beetle

## Endangered!

Many people are surprised to learn that there are endangered insects, but it's true! The valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) is one of North America's endangered beetles.

This species, like many others that are endangered, has specific habitat requirements. Elderberry longhorn beetles spend their entire lives associated with elderberry shrubs (*Sambucus* sp.). They are also only found in California's Central Valley.

These beetles are in the family Cerambycidae, most of which have long antennae (the "horned" part), and whose larvae eat living tree bark. Some beetles in this family can be serious timber pests, but not the elderberry longhorn.

The subspecies name, *dimorphus*, comes from the species' sexual dimorphism- males and females look different. The one in this photo is female; males are more red with green spots.

Habitat conversion is one of the major threats to this beetle's survival. Much of California's wild lands have been converted to agricultural, industrial, or residential use in an attempt to satisfy a growing human population.

Conservation of this beetle is made more challenging by the fact that it can only develop in elderberry stems that are at least 1" in diameter. Young shrubs are therefore unsuitable for the beetle, so mass planting of saplings would not be immediately helpful.

Females of the valley elderberry longhorn lay eggs in bark crevices. The larvae hatch and spend 1-2 years munching on wood before they pupate, then emerge as adults. The adult beetles eat plant tissue, including leaves and flowers. Like characteristic beetle pollinators, they are somewhat destructive in their feeding. But, they pollinate the elderberry's flowers

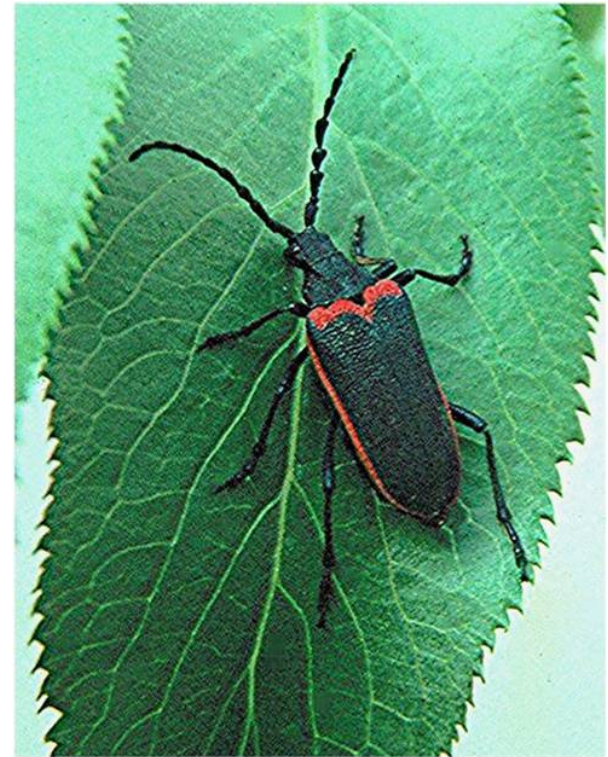



Photo © USFWS 2006



as they munch around the plant, thereby contributing to the conservation of their habitat. Elderberry shrubs are important for riparian ecosystems, and are also a nectar source for other pollinators!



# ‘Apapane

The ‘Apapane (*Himatione sanguinea*) is one of Hawai‘i’s endemic honeycreepers. But don’t confuse these birds, which are in the finch family (Fringillidae), with the honeycreepers native to central and South America, which are in the tanager family (Thraupidae).

Hawai‘ian honeycreepers offer a fascinating example of speciation and coevolution. Many of these species are specialists on a few flowering plants, and they sport the bill shapes to fit their foods of choice.

‘Apapane are sexually monomorphic, meaning that males and females look very similar. In this species, males are a few grams heavier than females. Both are bright red with black wings and legs, and white under their tails, as you can see in this photo. Their conical bills are blue-black and slightly decurved.



Photo © Caleb Slemmons 2009

One of the distinguishing characteristics of this species is its habit of holding its tail in the air, exposing its white underparts. Another way to recognize ‘Apapane is by the large flocks they form in search of their favorite food trees...

‘Apapane are the primary pollinators of another Hawai‘ian endemic, *Metrosideros polymorpha*, commonly called ‘ohi‘a. The bird in the photo is feeding from an ‘ohi‘a flower. ‘Ohi‘a is one of the most common native trees on the Hawai‘ian islands, so pollination by the ‘Apapane helps keep a large part of the islands’ ecosystems intact!

‘Apapane is not currently threatened, in spite of the fact that its feathers were once popular in traditional Hawai‘ian cultural garments. Many of Hawai‘i’s endemic birds are threatened due to habitat destruction, predation, and diseases due to invasive species. It’s nice to see that some of these amazing birds are still doing well!

# Lucifer Hummingbird

The Lucifer hummingbird, *Calothorax lucifer*, is a flying jewel of the Chihuahuan Desert in North America. This species has a distinct decurved bill and deeply forked tail. Males are identified also by their iridescent magenta gorget (throat patch- as seen in this photo).

Lucifer hummingbirds are uncommon in the US, but are most commonly seen in Big Bend National Park. The species is a resident of central Mexico, and prefers to breed in shrubby desert foothill habitats. Males are territorial and display and chase off intruding males. Females defend their nests while breeding, and choice flower patches during the rest of the year.

Some sources consider Lucifers to be migratory, because their breeding range can extend from central Mexico into southern Arizona and New Mexico. Partners in Flight has identified this species as one to watch for population declines, likely due to habitat destruction at important breeding sites.

Lucifer hummingbirds visit a variety of desert plants, including *Agaves* (century plants), desert honeysuckle, penstemon, and desert willow.

These hummers pollinate some species they visit, but have been known to take nectar from *Agaves* without serving as pollinators.



Photo © Maryann Eastman

# Purple Honeycreeper

The purple honeycreeper, *Cyanerpes caeruleus*, is one of 4 species of birds commonly known as 'honeycreepers' in the tanager family (Thraupidae). But don't get these confused with the Hawaiian honeycreepers, which are endemic to the Hawaiian islands, and in the finch family (Fringillidae).

The purple honeycreeper is native to tropical South America, from Colombia and Venezuela, south into Brazil, and the islands of Trinidad and Tobago.

These birds are a forest canopy species, found mostly below 3,300 ft. elevation. They have also been seen in cacao and citrus plantations, and could function as pest control for these crops.

Male purple honeycreepers, like the one in the photo above, are a striking blue-purple color with bright yellow legs. Females and immature birds are more camouflaged shades of green and streaked grey-yellow.

Like chickadees and titmice in temperate zones, you'll often find honeycreepers foraging (looking for food) in mixed flocks, and mobbing larger birds.

Purple honeycreepers have a varied diet of nectar, insects, and fruit. They are most noted for their pollination of bromeliads, and their decurved bills fit well into the curved flowers of this family (Bromeliaceae). But this species is an important pollinator of other plants as well.



Photo © Steve Garvie 2006



For example, purple honeycreepers pollinate the tree *Platonia insignis*, commonly called ‘bacuri,’ which is harvested for its fruit, latex, and timber. They are also important pollinators of the timber tree *Symphonia globulifera*, which has no common name.

Check out these articles to learn more:

- [honeycreeper pollination of \*Symphonia globulifera\*](#)
- [honeycreeper pollination of \*Platonia insignis\*](#)

# Ruby-throated Hummingbird

This tiny bird is the only hummer that breeds in the eastern U.S., where I live. The species is named for the iridescent red gorget, or throat patch, sported by the males like the little guy in the photo here. Both males and females are iridescent green-gold on their backs. Males are highly territorial and can be seen and heard chasing each other around flowers or feeders, chittering vigorously!

Here's a neat fact: these little dynamos migrate to Central America every fall, many crossing the Gulf of Mexico in one flight! How do you think you'd do swimming the Gulf without stopping? Many don't survive the trip, but the ones that do owe it in part to good feeding sites along their journey. So, you can help them out by providing them with their favorite nectar-rich native plants in your yard!

But what about them as pollinators, you're wondering? So glad you asked! Ruby-throats are important pollinators of many species of red- and orange- flowering plants native to the eastern U.S.! Just a few examples are scarlet sage, trumpet creeper, cardinal flower, and red buckeye. Planting these and other hummingbird favorites in your garden will create a hummingbird-friendly habitat and lots of wildlife-watching fun for you and your family!



Photo © hart\_curt 2006

# Rufous Hummingbird

Rufous hummingbirds, *Selasphorus rufus*, are one of my favorites. This species is small, typically around 3", but is so feisty that both males AND females chase off other hummers more than twice their size! I photographed this female in Portal, AZ, where she had staked out a feeder as hers and vigilantly defended it from others that came for a drink.

Rufous hummers are migratory, traveling up and down North America's western corridor during the year. They spend the winter in southern Mexico, and breed in Canada and Alaska. No other hummingbird in the world breeds as far North as this species! These tiny birds prefer open areas from sea level to around 6,000' for breeding, but winter in shrubby Mexican forests between 7,000' and 10,000'.

This species is an important pollinator of many plants with tubular flowers along their migration route. A few examples are columbine (*Aquilegia*), phlox (*Ipomopsis*), chuparosa (*Justicia*), and ocotillo (*Fouquieria*). Migratory pollinators, like the rufous hummingbird, are important for maintaining plant populations throughout their range. Maintenance of native flowering plants is especially important to this species and other migratory pollinators because their range is so large. Without ample, high-energy food sources along their migration corridors, hummers like the rufous can't sustain their metabolisms for the journey.

You can help rufous hummers and other migratory pollinators by planting species that are native to your region!



Photo © Athena Rayne Anderson 2009

# White-winged Dove

The white-winged dove is a bird of the subtropics, but its range extends into the southwestern US in Arizona. This dove, *Zenaida asiatica*, is actually expanding its range into other US states, thanks to the food supplied by bird feeders!

Like some other desert fliers ([lesser long-nosed bats](#) and [greater long-nosed bats](#)), white-winged doves are migratory. They spend the winter in Mexico and Central America, then fly North for the summers in northern Mexico and the southwestern US. In these hot climates, they rear their young and feed on the desert's abundance.

You might think that sounds nutty, "Abundant? The desert?" But the Sonoran is the most diverse desert in North America in terms of plant species!


White-winged doves eat a variety of goodies from these desert plants, including seeds, grains, fruits, and... nectar! You can see a pair of doves on top of a saguaro cactus in the photo above. One is feeding on the nectar from a flower. Like most pollinators, these birds fill this role accidentally. They stick their faces into the flower as they reach for nectar, and get covered with pollen in the process. The cactus benefits because the bird spreads this pollen to the next flower it visits.



Photo © SearchNetMedia 2009

Here's something you might not have known: white-winged doves are actually very important pollinators of saguaros in the northern reaches of the cactus' range! In the southern Sonoran Desert, saguaros are primarily pollinated by nocturnal bats. These bats are migratory, but don't fly as far North as the saguaro's range extends.

The saguaro has evolved to keep its flowers open during the night AND for part of the day, which attracts diurnal visitors like bees and white-winged doves. This has been adaptive for the cactus because individuals with flowers that remained



open into the day were pollinated more frequently, and were more successful at producing seeds, than those that closed at sunrise. Over thousands of years, the more successful cacti with day-open flowers increased in the population. Isn't that interesting?!

# ***Bactrocera* Fruit Flies**

Fruit flies in the genus *Bactrocera* are most commonly known as agricultural pests. In fact, it's hard to find information about them that doesn't relate to their pest status...

BUT... (I just love it when a story gets complicated), these flies are also key pollinators for some wild Australian orchids!

*Bactrocera* flies are in the family Tephritidae, along with about 500 other genera. The other family of flies known as "fruit flies" is Drosophilidae, which contains the genus *Drosophila*, well-known for its use in genetic studies.

*Bactrocera* flies have a life cycle typical of insects with complete metamorphosis: they grow through several life stages, starting with an egg, then a larva (maggot), then pupa, and finally an adult. Adults of this genus are generally less than 1/2 cm in length, and are commonly found feeding on rotting fruit.

Adult females deposit their eggs within the tissue of developing fruit (including agricultural crops). Once these eggs hatch, the larvae eat their fill, then fall to the ground and pupate in the soil. The reason this is so damaging to fruit crops is because larval feeding activity destroys the fruit, making it unmarketable.

The really neat thing about these flies is their mating behavior and interactions with the plants they pollinate. Male *Bactrocera* advertise their availability to mate using chemical signals called pheromones. They have specialized glands in their bodies that store and release these pheromones, which are attractive to females of the same species. But males can't produce these pheromones without eating particular chemicals, which they obtain from plants.

*Bactrocera* flies are especially important to the pollination of some orchids in the genus *Bulbophyllum*. Many orchids in this genus (such as *B. beccarii*) smell like rotting meat and are pollinated by carrion flies, which don't get anything in



Photo © James Niland 2011

return for their services. But about 60-70 species are thought to be pollinated by *Bactrocera flies*, which are attracted to them for their chemical rewards.

A couple of examples of *Bulbophyllum* orchids that are thought to be primarily pollinated by *Bactrocera* are *B. baileyi* and *B. patens*. It's the male flies that do the pollinating for these flowers, which is not especially common in nature. These males find the flowers by their scent, lick up the scent-producing chemicals, get stuck with the orchid's [pollinia](#), and then fly off. The pollinia are then deposited on orchids visited later, while the fly is busy lapping at their chemical rewards.

Cool, huh?! Read more details (oh yes, there's more!) about *Bactrocera* and *Bulbophyllum* interactions in this published article:

[Tan, KH. 2006. Fruit fly pests as pollinators of wild orchids. Proceedings of the 7th International Symposium on Fruit Flies of Economic Importance 195-206.](#)



# Bee-flies

These interesting little pollinators are really flies, in the insect order Diptera, and the family Bombyliidae. They've earned the common name "bee-fly" because some of them, like the one at left, look and act like bees. The one in this photo is what I think of when I hear the name "bee-fly." (Many thanks to [Thomasbentley.com](http://Thomasbentley.com) for allowing me to feature this photo!) Others, like the one in the photo below, look more like wasps (Thanks go to Nick Richter for permission to use this photo!). This family of flies is actually very diverse, with species that have stripes, spots, or no pattern at all!

Bee flies are also everywhere! But that's a good thing, because they're great pollinators! You can find these flies on every continent but Antarctica, and they are especially important for pollinating plants in desert and alpine habitats.



Photo © Thomasbentley.com 2011

Perhaps another reason these flies are nicknamed bee-flies is because of their feeding habits. Adults males feed on nectar, and females eat only pollen! So the fact that adult female bee-flies feed only on pollen means that they're constantly in contact with it and, over the course of evolution, have become effective pollinators of the plants they visit! Neat, huh?

Bee- flies are important pollinators for many plants all over the world. For instance, they are the primary pollinators of the rare scrub mint (*Dicerandra frutescens*) in Florida, USA (1). They also make reproduction possible for a tiny, tube-flowered penstemon (*Penstemon ambiguus*) in Mexico (2). And they have been studied as pollinators of a South African aster, *Gorteria diffusa*, which attracts them with spots on its petals that look like potential mates (3)!



# Delhi Sands Flower-loving Fly

## Endangered!

The Delhi Sands flower-loving fly (*Rhaphiomidas terminatus abdominalis*) is a big one- adults are about 1" long, and they hover like hummingbirds and hawk moths while feeding. They're only active for a few weeks of the year, in August and September, during which time they feed from and pollinate flowers.

The Delhi Sands flower-loving fly was listed as endangered under the Endangered Species Act in 1993; it was the first fly species to be listed, and is still the only fly receiving protection under the Act.

The Delhi Sands formation once covered about 40 square miles, but has been converted or destroyed by commercial development, agriculture, off-road vehicle use, and other activities. This is a unique dune habitat in southern California, USA, found nowhere else in the world, and only a few hundred acres remain. The Delhi Sands flower-loving fly is endemic to its namesake habitat, and both are on the brink of extinction.

Pressure is high to remove this fly's protected status, as the demands for land are also high in California. The fly's status protects habitat for wildlife like native birds and mammals. There are also an estimated 5-10 other species of insects endemic to the formation. This fly is a great example of a flagship species: its conservation also means the conservation of an entire habitat and the other species living there.



Photo © USFWS

# Long-tongued Flies

I could not believe my eyes when I first saw photos of long-tongued flies. These flies are rare in North America, and long-tongued fly pollination is uncommon in general. But to some flowers in southern Africa, they're crucial for reproduction!

Take a look at this photo here- doesn't it look like someone stuck a moth mouth on a fly's body? Anyway, despite their odd appearance to folks (like me) who don't see them every day, these critters are great at what they do. In fact, there are plants that are entirely dependent upon them for pollination!

Long-tongued fly species are found in two families. The Tabanidae, or horseflies, mostly drink nectar as adults... and the females cause a painful bite when they try to drink your blood, the nutrients from which they use in egg development.

The fly in the photos here is in the Nemestrinidae, the family of "tangle-veined" flies. (Apparently the veins in their wings look messy.) These photos are courtesy of Dr. Dennis Hansen who tells me that this species is so new to science that it hasn't been officially described yet! For the time being, the fly taxonomy folks are calling it *Prosoeca* sp. nov., which means "Fly In The Genus *Prosoeca* That We Haven't Named Yet."

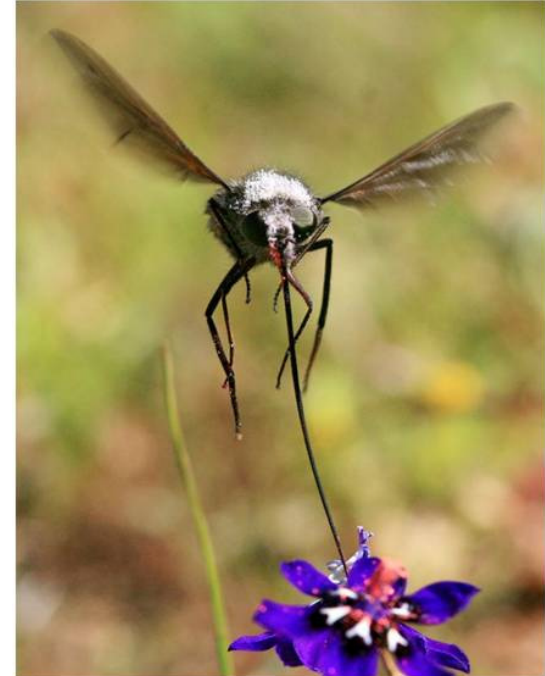


Photo © Dennis Hansen

Isn't that cool? This species has a tongue, or *proboscis*, that is 0.7 - 2.0 inches long! If you think that's impressive, the meganosed fly, *Moegistorhynchus longirostris*, in the same family, has the longest proboscis of ANY fly in the world. Care to guess how long?

Up to 4 inches!

Can you imagine seeing one of those flying around with its tongue dangling between its legs? They can't roll it up like a butterfly can! An [article in Natural History Magazine](#) gives the analogy of you walking down the road with a 27-foot straw hanging out of your mouth!

So what do they DO with that crazy tongue? It gives them access to rich nectar resources stored deep in the [corolla](#) of certain types of flowers. This is adaptive for the fly because few animals can reach the nectar, so competition is reduced. It's adaptive for the plant because specialized pollinators are good at picking up pollen and moving it to other flowers of the same species. This is a great example of coevolution!

Both photos show *Prosoeca sp. nov.* drinking from *Lapeirousia oreogena*, one of several plants in the Iris family in southern Africa that depends on these flies for pollination.

# Ailanthus Webworm Moths

This moth used to be known to science as *Atteva punctella*, but its name has been changed to *Atteva aurea*. What's that mean to you? I guess that depends on what you do for a living! For most folks, it doesn't change much, because it still looks like the same critter in your garden!

These moths are in the family Yponomeutidae, also called ermine moths, which are characteristically fuzzy-looking up-close. The larvae (caterpillars) live in little groups inside a protective home they construct by spinning silk that sticks a few leaves of their host plant together. Hence the "webworm" part of their common name.

This brightly-colored species is native to the far southern United States and down into Central and South America. Its larvae have historically fed on leaves of Paradise Trees, in the genus *Simarouba*, which are native to the same areas.

The moth's common name is interesting. *Ailanthus* is the genus of Tree of Heaven, which is an ornamental tree that was introduced into the U.S. from Asia in 1784. The species is now considered a noxious weed all over the country. The moth didn't start to show up all over the U.S. until the tree had spread into the southern states and the two met. It looks like the moth larvae started feeding on Tree of Heaven leaves, which allowed the the moth to expand its range north as far as Canada!

The moth, even though not native to most of the U.S., isn't a pest except in certain greenhouse conditions. In fact, these little garden gems can serve as pollinators of many native plants! So, next time you see a bright orange moth in your summer garden, it might be this one, and you can wow your friends and family with your knowledge of its natural history!



Photo © Athena Rayne Anderson 2007

# Bay Checkerspot Butterfly

The Bay Checkerspot (*Euphydryas editha bayensis*) lives in the San Francisco Bay area, hence its common name. They are in the Family Nymphalidae, along with other brush-footed butterflies like fritillaries and the Monarch. Checkerspot larvae (caterpillars) depend on a handful of plants for food; dwarf plantain (*Plantago erecta*) is most important, but the larvae can feed on a few other species when it is unavailable.

Adult checkerspot females mate once, then lay their eggs at the base of dwarf plantains in early spring. The larvae hatch less than 2 weeks later, then feed and grow for about another 2 weeks. If they survive to a certain size, the larvae then hide in soil or under rocks and become inactive (this is called **diapause**) until the plantains sprout again the next year. The larvae then pupate (make a **cocoon**), then emerge as adults, mate, and die.

If you're lucky enough to see a checkerspot adult, you'll know that it's more than a year old! That's really old for an insect!


The dwarf plantain that checkerspot larvae need only grows in areas with a certain type of soil. In other words, the checkerspot's survival depends on there being enough of this habitat to feed their caterpillars. If the habitat disappears, the butterfly will disappear.

Unfortunately, this has been happening for decades. The unique habitat on which the checkerspot depends has been increasingly broken into smaller pieces (this is called **habitat fragmentation**) to make way for industry and residential areas. Invasive European grasses have also outcompeted the dwarf plantain and other plants on which checkerspot larvae can feed. In 1987, the Bay Checkerspot was listed as Threatened and added to the Endangered Species List.

The Bay Checkerspot is an important pollinator for wildflowers, especially dwarf plantains, in the unique habitat it calls home. What can you do to help conserve these pollinators? If you live in the Bay area, contact USGS or your local



Photo © Eric Baetscher 2007



extension office to find out about habitat restoration efforts. You could also volunteer your time in one of the yearly population surveys (I did this when I lived in Vallejo, and it was fun!). If you don't live near checkerspot habitat, you could still make a difference for them and pollinators everywhere, by encouraging lawmakers to preserve unique habitats and create pollinator habitats where possible!



# Senita Moths

## They can't be without each other!

Obligate mutualism is when two species depend on each other for something. This is actually a rare occurrence among living things, but the examples of it are really neat! The relationship between senita cacti and their pollinating moths is one example...

The senita moth, *Upiga virescens*, is in the family Crambidae, along with other “grass moths.” These moths tend to be small and inconspicuous, with a variety of camouflaged wing patterns. Did I mention that this was a small moth? Adults are only 0.3” at their largest!

Females, like the one in this photo, visit flowers of the senita cactus (*Pachycereus schottii*) primarily to lay their eggs. Here's the neat stuff: the female has modified scales under her [abdomen](#) that she brushes around on the [anthers](#) to pick up pollen. Then she flies to another plant- individual senitas can't be pollinated with their own pollen.



Photo © G. Dimijian

Once on the flower of a different plant, the moth rubs the underside of her abdomen on the stigma, intentionally pollinating the flower! This behavior is adaptive for her because she's going to lay an egg on the flower, and her offspring will feed on some of the seeds. If she pollinates the flower, she makes it more likely that her larvae will have enough food to mature. Like with [yucca moths](#), senita moth larvae only eat some of the cactus' seeds; the rest are able to mature and produce new senitas.

Impressed yet? But wait, there's more...

Female moths can tell when a flower has already been visited by another female moth! A female moth avoids already-visited flowers; an adaptive behavior that makes it more likely that her offspring won't have to compete as much for food!

Senita moths visit other flowers for nectar, but cannot reproduce without the senita cactus. Interestingly, senita cactus flowers are also visited by other insects, but none do much for pollination! Senita cacti are one of the large “columnar” cacti (along with Saguaros), and are endemic to the Sonoran Desert. In fact, the northern-most tip of their range barely extends into the US- in Organ Pipe Cactus National Monument, in Arizona.



# Sphinx Moths

Moths tend to be overlooked as important pollinators. Maybe that's not surprising, considering that most people are sleeping when the moths are about. The majority of moth species are nocturnal (come out at night), but the species I'm talking about in this post is part of a group that can be seen day and night. The photo here is of a White-lined Sphinx moth, *Hyles lineata*, a member of the large moth family Sphingidae.

These moths have many common names, including sphinx moths, hawk moths, hummingbird moths, and hornworms (I prefer sphinx because it sounds neat). The tobacco hornworm, a notorious tobacco pest, is the caterpillar of a sphinx moth. These moths get the common name "hummingbird moth" from their flight behavior- they look very much like a hummingbird! They're the same size as some hummingbirds, and they hover while sipping nectar. If one flies past you, you'll hear a "vrooom," like you would from the wings of a hummer.



Photo © Athena Rayne Anderson 2011

Some of the largest moths in the world are in this family, and species' wingspans range from one to nearly 7 inches! Read the post about [moths as pollinators](#) for the story about the moth with the longest proboscis (tongue) in the world!

There are sphinx moths all over the world, and the White-lined Sphinx can be found in most of North and Central America, Africa, and some parts of Asia! I found this beauty in Franklin Mountains State Park, near El Paso, Texas. In the southwestern U.S., sphinx moths are important pollinators of night-blooming plants like the Sacred Datura (*Datura* sp.), and cereus cacti (*Peniocereus* sp.).

# Yucca Moths

I think one of the neatest examples of a plant-pollinator mutualism is that between yucca moths and their plants (in the genus *Yucca*). In this photo, you can see three adult female moths inside one yucca blossom. See them? They have black legs and white wings, so they look sort of like little rice grains with legs...

A mutualism happens when two species rely on each other for something. In this case, the yucca moths (commonly the genus *Tegeticula*) depend entirely on the yucca flowers for feeding their offspring. The yucca plants, in turn, can't be pollinated without these moths. This is a special kind of mutualism called an obligate mutualism- the two species are obligated to interact with each other in order to survive or reproduce.




Photo © Lisa Brown 2007

Here's the cool stuff... female yucca moths take pollen from [anthers](#) and stick it onto the [stigmas](#) to make sure the flowers are pollinated! By doing this, the mothers ensure that their larvae will have developing seeds to feed on as they grow.

Well, what about the advantage for the plant? This relationship isn't one-sided; the plant benefits by having a devoted pollinator. Moth larvae only eat some of the yucca seeds- they're not large enough, and there aren't enough of them in each flower, to eat all the seeds. The rest of the yucca seeds are free to develop to maturity.

The only problem is... if the yucca or the moth disappears, the other member of the partnership won't survive! Hmm...



So, in terms of evolution by natural selection, how could this have happened? One possibility is that female yucca moths that laid eggs inside flowers that they pollinated produced more offspring that survived and also reproduced. In this way, the genes involved in this pollinating behavior increased in the population.

For the yuccas, having a specialist pollinator is a huge advantage. Yucca flowers have evolved so that they never fully open, so they're not visited by other potential pollinators. But as long as the yucca moths are around, the plants are guaranteed to get pollinated. In other words, the yuccas that only allowed yucca moths into their flowers might have been protected from flower-eaters AND were pollinated completely, so the genes for these traits increased in the population.

# Greater Long-nosed Bat

## Tequila, anyone?

The greater long-nosed bat, also known as the Mexican long-nosed bat, and *Leptonycteris nivalis*, is one of North America's beautiful migratory bat pollinators.

What's that have to do with tequila? Stay with me here!

The range of these bats covers much of Mexico and into Guatemala, usually between 4,900 and 7,500 feet. Those of us in the US only see these bats from June through August, as they fly north to follow the cactus bloom.

Greater long-nosed bats feed primarily on the nectar, pollen, and fruit of cacti such as saguaro and organ pipe, and succulents like the 'century plants' in the genus *Agave*. These bats hover, like hummingbirds, in front of flowers, then stick their faces in. They can stick their tongue out of their heads about 3" to reach nectar at the base of flowers. In the process of drinking nectar, the bats get a pollen dusting on their fur, which they spread to other flowers as they feed.


This is amusing- at between 2.75" and 3.75" long, these bats are considered large for North America! Isn't that adorable?! Like a lot of nectar-feeding bats in the New World, the greater long-nosed bat has a long muzzle and a bit of skin that sticks up on the end, called a 'nose leaf.'

So...have you figured out the tequila connection yet?

Greater long-nosed bats are the most important pollinator of the blue agave, *Agave tequilana*, the juices from which are fermented to make tequila! (Check out that creative species name.) No bats means no tequila!



Photo © SearchNetMedia 2011



Sadly, the public's fear of bats has led to intentional destruction of the caves in which they sleep and raise their young. Cave demolition for road construction has added to the problem, and the bat's populations have suffered severe declines.

The greater long-nosed bat was listed as **endangered** in 1996 by the International Union for Conservation of Nature (IUCN) Red List of Threatened Species.

Whether you drink tequila or not, how sad would it be if these bats went extinct? Right now, kids in the US and Mexico can talk to each other about the fascinating little flying mammal their two countries share. And we can work together to conserve them too! Check out [Bat Conservation International](#) to learn how you can help save these and other bat pollinators!

# Kinkajou

The kinkajou, *Potos flavus*, is in the family Procyonidae, along with raccoons, coatis, and ringtails. In fact, it is one of the most primitive species in the family (meaning it evolved earliest), and is the only member of its genus.

Kinkajous are native only to the tropical Americas, from southern Mexico into Brazil. They're rarely seen, though, because they're nocturnal and live high in the tree canopy. These furry golden climbers are sometimes mistaken for monkeys, partly because of their prehensile tails that can be as long as the rest of their body!

These critters range in size from about 15-24 inches, and weigh between 3-10 lbs. Kinkajous breed year-long, and usually give birth to one infant after gestating for around 4 months. Although they aren't classified as endangered, kinkajous are hunted for meat and the pet trade. Like all rainforest species, deforestation is a threat to their survival.

Kinkajous are the only species in the order Carnivora (carnivores) that are considered important pollinators! Although they have an omnivorous diet, the majority of their food comes from fruits and flower parts. They pollinate many species of night-blooming trees, and are the primary pollinators for *Ochroma pyramidale*. You've heard of this one before- it's the tree from which balsa wood is harvested!

So, think of the beautiful kinkajou the next time you come across balsa wood. You can help kinkajous and other rainforest species by purchasing balsa and other rainforest tree products from sustainably-managed sources.



Photo © Yannik Turbe 2008



# Lesser Long-nosed Bat

The lesser long-nosed bat (*Leptonycteris curasoae*) is an amazing little mammal!

These bats are migratory! Well, the females are. In winter, you'll find both sexes in southern Mexico or northern Venezuela. In early spring, pregnant females start to fly North to maternity roosts in northern Mexico and southern Arizona.

Why just females? The idea is that a female needs a LOT of nutrition for herself and her developing fetus. Migrating gets females to the Sonoran Desert, which is more rich in food plants than their winter habitats. The fact that males stay behind reduces competition between the sexes for food resources- this has been adaptive for them because their offspring are more likely to survive when their mothers get plenty of food. Neat, huh?

I mentioned food *plants*. Lesser long-nosed bats feed mostly on nectar and fruit from cacti and agaves. They're very important pollinators of saguaro and cardón cacti and many species of agave (a.k.a. century plants) in Mexico and Arizona.

You might be wondering about the photo. Lesser long-nosed bats have been using hummingbird feeders to supplement their diets! Dr. Ted Fleming and a network of citizen scientists are monitoring the bats' usage of feeders to learn more about their feeding behavior and migration. Isn't that amazing?!

Hear Dr. Fleming talk with me about these fascinating bats in December's podcast, [Episode 5: Interview with Dr. Ted Fleming!](#)



Photo © Meg Benhase

# Lesser Short-nosed Fruit Bat

The lesser short-nosed fruit bat, *Cynopterus brachyotis*, (sometimes called the lesser dog-faced fruit bat) is a small Asian bat in the family Pteropodidae. This bat is found in a variety of habitats, from beaches to mangroves, to lowland and montane rainforest. The fox-like face and large eyes of this and other fruit bats are adaptations for finding its food primarily by sight, rather than echolocation.

Lesser short-nosed fruit bats have a long life span for such small mammals (one would fit in your hand); they're estimated to live 20-30 years! Females appear to give birth year-round, and one male mates with several females. Females reach sexual maturity at around 6-8 months, while males aren't mature until they're about a year old.

Like other bats with "fruit" in their common name, *Cynopterus brachyotis* feeds on an abundance of ripe fruit. They also eat leaves! Also like most fruit bat species, the lesser short-nosed feeds on nectar and pollen, providing pollination services for many rainforest tree species. For instance, this bat is suspected to pollinate several legumes, including *Cassia (Senna) spectabilis* and *C. fistulata*, *Peltophorum pterocarpum*, and *Bauhinia purpurea* in Malaysia (see reference below).

Fortunately, this little bat is not endangered as I write this. However, it is considered a crop pest because its fruit-eating damages crops of mangoes, figs, and other cultivated fruits. These bats are also vulnerable to habitat loss, and there are some reports of them being hunted for medicinal purposes.



Photo © wildsingapore 2003

Reference: [Food habits of \*Cynopterus brachyotis\* \(Muller\) \(Chiroptera: Pteropodidae\) in Peninsular Malaysia](#)

Interested in conserving this and other fabulous bats? Consider joining [Bat Conservation International](#)! Their work educates and helps to protect bats of all kinds, all over the world!

# Mariana Fruit Bat

## Endangered!

The Mariana fruit bat, *Pteropus mariannus mariannus*, lives only in the northern Mariana Islands, Guam, and the Caroline Islands. It is also known as the Mariana flying fox, and the fanihi by local peoples. This bat is listed by the International Union for Conservation of Nature (IUCN) as Endangered, which means that it is at high risk for going extinct in the wild.

Mariana fruit bats mothers give birth to a single pup each year. Much of this bat's life history is unknown, but other bats in the same family typically don't reach sexual maturity until they're 2 years old. These combined characteristics make this bat a slow reproducer, and animals like this tend to be more susceptible to environmental and man-made threats.

Poaching and habitat destruction are the likely culprits for the Mariana fruit bat's endangered status. Meat from this large bat (adults are about 0.5 to 1 lbs) is considered a delicacy by the native people of Guam. The islands on which the bat lives have also been intensively logged for agriculture and livestock grazing.

Fruit bats, like this one, are important as seed dispersers and pollinators in their home ecosystems. The Mariana fruit bat prefers to roost in and feed from native trees, but provides some pollination for introduced coconut plantations. This bat pollinates the flowers of at least seven plant species, including kapok (*Ceiba pentandra*) and Indian coral tree (*Erythrina variegata*). Kapok has traditionally been an important fiber source, much like cotton, and is cultivated commercially in some areas.



Photo © Ann Hudgins 2005

# Spiny Mice

## Mice with spines!

That's right! Spiny mice are equipped with stiffened guard hairs that resemble the spines of a hedgehog... although not quite as dense. You can see them pretty well on this one's back if you enlarge the photo here (this is the Cairo spiny mouse, *Acomys cahirinus*).

Spiny mice are all in the genus *Acomys*, and are native to Africa and Asia. They evolved in the desert regions, and are also found in hot, dry, rocky and scrubby habitats. They're social, living in groups and cooperating in birthing and rearing offspring.

Like most mice, *Acomys* species are omnivorous, but they are important pollinators of a variety of low-growing plants. One example is the relationship between the Cape spiny mouse (*Acomys subspinosus*) and the parasitic plant, *Protea humiflora*.

*Protea* species are parasitic- they produce no chlorophyll, and basically suck nutrients out of the plant on which they grow. They're sometimes called "sugarbushes," and they provide protein (pollen) and sugar (nectar) at a time when other food sources are scarce. Cape spiny mice take full advantage of this, and are actually one of *Protea humiflora*'s primary pollinators. *Protea* are one of several genera around the world that are thought to have evolved to be pollinated by small, ground-dwelling mammals. A number of other little rodents include pollen and nectar from *Protea* in their diets, demonstrating the complex interactions within arid ecosystems!

Now, say this ten times fast: spiny mice, spiny mice, spiny mice! 😊



Photo © Olaf Leillinger 2005



# Tube-lipped Nectar Bat

This little bat has the longest tongue relative to its body size of any mammal! At a little over 3 inches (8.5cm), that might not sound very long, but it's 150% the length of its body! Guess where it puts that tongue when it's not using it... in its chest! Very few animals do this; armadillos are another group that do. Could you imagine a 6ft guy stuffing a 9ft tongue into his ribcage so he doesn't trip on it?!

Now that you're curious (you're curious, right?), read on...

The tube-lipped nectar bat, *Anoura fistulata*, was discovered in the Andes of Ecuador and [described by Dr. Nathan Muchhala and colleagues in 2005](#). It lives only in cloud forests, which are a unique high-elevation tropical forest type that is almost always shrouded in mist. Sounds mysterious, right? Unfortunately, these fascinating forests are threatened by agriculture and deforestation, like most tropical forests around the world.



Photo © Nathan Muchhala

But the story gets even more interesting! In Latin, 'fistulata' means "tube," which is an apt species name for this bat because its lower lip is curled and forms a tube through which it sticks its tongue when it drinks nectar. You can see the bat's lower lip sticks out farther than its upper lip in this photo at right.

So, why the long tongue? Dr. Muchhala is still looking into that one. But he has found that this bat drinks nectar from several types of flowers, some that have very long [corollae](#) and others that don't. A flower with a long corolla is impossible to drink from unless you have a tongue long enough to reach the nectar. *Anoura fistulata* has a tongue longer than any other bat, so it can visit flowers with both long and short corollae. One reason this long tongue might be advantageous is that it allows the bat to access flowers that other bats cannot, so this reduces competition for nectar between it and other nectar-feeders in the community.



On the other hand, the flowers with the long corollae are in a tough situation, because they require a long-tongued pollinator. In fact, Dr. Muchhala has found that one plant, *Centropogon nigricans*, can ONLY be pollinated by the tube-lipped nectar bat! Have a look at this photo here, which shows the [stigma](#) way above the flower, at the yellow arrow. When the bat sticks its head into the flower, the stigma brushes the fur on the back of its neck, picking up pollen the bat collected from a different flower.

Specialist flowers like *Centropogon nigricans* play a risky evolutionary game. The potential cost is that the one pollinator it relies on could go extinct, possibly leading to the plant's extinction. But the benefit is that the plant gets a reliable pollinator that is most likely to deliver its pollen to the stigma of another flower of its same species. This is a neat theme across pollination ecology, and something that I also talk about in a [post on long-tongued flies](#).

Many thanks to Dr. Muchhala for allowing me to show you his photos here! 😊

## Blue-tailed Day Gecko

The bright little blue-tailed day gecko, *Phelsuma cepediana*, lives on the island of Mauritius, which is located about 560 miles East of Madagascar, in the Indian Ocean. The gecko visits flowers for nectar and ends up with pollen stuck to its head in the process (see the photo below). Researcher Dr. Dennis Hansen has discovered that the gecko is a better pollinator of the threatened plant *Trochetia blackburniana* (at right) than any other animal!

This plant was once mostly pollinated by a bird called the olive white-eye, which is now almost extinct. Pollination by the gecko could now be the plant's last best chance for survival.

While reptile pollination is practically unheard- of in temperate climates, many fascinating examples of such interactions are being discovered in the tropics! Dr. Hansen and others are finding that small reptiles play an increasingly important role as pollinators on oceanic islands as formerly common bird species disappear.



Photo © Dennis Hansen

# Madeiran Wall Lizard

The Madeiran wall lizard, *Lacerta dugesii*, is native to the Madeira Islands of Portugal, but has also been accidentally introduced to the Azores. This species appears in habitats as diverse as rocky shorelines, home gardens, and temperate forests. This lizard is numerous and considered of least concern by the IUCN Red List.

Information about the Madeiran wall lizard's life history is difficult to locate. I was able to find that individuals are typically around 2.3- 3.1 inches (60- 80 mm) long. They appear to be omnivorous, but there are several published records of *Lacerta dugesii* pollinating native plants.

For instance, Olesen and colleagues (see below) published what they think is the first record of lizard pollination in the Azores, involving *Lacerta dugesii*. They observed this species visiting the Azores bellflower (*Azorina vidalii*) in large numbers, eating nectar and pollen and becoming dusted with pollen in the process. They also reported this lizard climbing among, and feeding from, *Musschia aurea*, the Madeira giant bellflower.

*Musschia aurea* is endemic to Madeira and a few nearby islands, so further research should reveal whether the Madeiran wall lizard is important for maintaining its population health. Either way, here's another fascinating example of lizards pollinating island flowers!

Reference: [Pollination, biogeography, and phylogeny of oceanic island bellflowers \(Campanulacea\)](#). Just click on the title to download the free .pdf!



Photo © enbodenum 2009

# Round Island Skink

## Vulnerable!

The Round Island skink, also known as Telfair's skink, and *Leiolopisma telfairii*, was once endemic to Mauritius and its islets. It is now found only on the 373-acre (151ha) Round Island, off of Mauritius' North coast.

Round Island skinks are the largest lizard species on the island, reaching about 12-15" (30-40cm) from nose to tail. Adults use their strong legs to dig burrows in which they hide or nest, usually in vegetated habitats. These skinks tend to spend most of their time on the ground, and are active primarily during the day.

Round Island is one of the last strongholds of a palm savanna habitat that was once also present in the lowlands of northern and western Mauritius. According to David Bullock (see citation below), this habitat contains some of the world's rarest palms and reptiles. The Round Island skink is now rarely found outside this unique habitat.

The Round Island skink is omnivorous, but is an important pollinator for palms and other plants native to the island. The individual in the photo above is resting on a palm, and you can see yellow pollen dusted on the top of its head.

Invasive rats, rabbits, and goats are largely to blame for the destruction of the palm savanna habitat on Mauritius. Like many other endangered species, habitat destruction has been one of the greatest threats to the Round Island skink. The International Union for Conservation of Nature (IUCN) has listed this skink as Vulnerable since 1986.

Round Island has been better preserved than other islets, mostly due to its greater distance from the mainland. I call it a conservation success story that invasive rats, rabbits, and goats have been eradicated from the island. According to Angelo Pernetta and colleagues (citation below), the Round Island skink might soon be reintroduced to islands on which it was extirpated.



Photo © Dennis Hansen

The history and conservation of the Round Island skink are examples of the connections between plants and their pollinators. Read more pollinator stories in the [Pollinator Profiles](#) category!

Reptiles are not common as pollinators around the world, but their stories are fascinating! Read more in the [Reptiles](#) category.

**Bullock, David.** 1986. [The ecology and conservation of reptiles on Round Island and Gunner's Quoin, Mauritius.](#) Biological Conservation 37:135-156.

**Pernetta, Angelo P., Diana J. Bell, and Carl G. Jones.** 2005. [Macro- and microhabitat use of Telfair's skink \(\*Leiolopisma telfairii\*\) on Round Island, Mauritius: implications for their translocation.](#) Acta Oecologica 28:313-323.

# Pollen Wasps

Pollen wasps, you say? Indeed! While the vast majority of wasps are carnivorous, pollen wasps behave more like bees in that they feed on pollen and nectar as adults. The females even supply their eggs with pollen and nectar to feed on once they hatch! Have a look at this photo of a pollen wasp in the genus *Pseudomasaris*, a member of the Family Vespidae.

*Pseudomasaris* wasps are primary pollinators of several plant families in the southwestern United States, especially those containing penstemon (*Penstemon*), scorpionweed (*Phacelia*), waterleaf (*Hydrophyllum*), and wildflowers known as Yerba Santa (*Eriodictyon*). In the photo at left, a female clings to the anthers of a scorpionweed flower (*Phacelia*).

Unfortunately, some species of these wasps haven't been collected or seen in decades, and some species are known to live only in very small areas. This is a topic of concern because of the important role these and other pollen wasps play in keeping wild ecosystems healthy and reproductive. One primary goal of pollinator research is to start regular monitoring projects of these and other pollinators worldwide.



Photo © David Reed



# Tarantula Hawk Wasp

## It's not a tarantula or a hawk!

Tarantula hawk wasps (in the genus *Pepsis*) don't 'hunt' tarantulas in the traditional sense of the word- for food- but females do indeed seek them out and attack them!

The wasp usually wins the ensuing battle by stinging the spider, which is then paralyzed. Next, the wasp drags the spider to a hole in the ground, lays an egg on it, and closes the entrance. Later, the wasp larva will eat the still-living tarantula to fuel its own development.

But, what does this have to do with pollination? Well, first of all, these wasps are quite a spectacle. The first time I saw one, I did a double-take and stared. They can be 2" long, and have blue-black iridescent bodies with bright orange wings! They also have a reputation as having the one of the most painful stings of any insect in the world!

So, most people are surprised to learn that these formidable critters eat only nectar! Most wasps, by definition, are predatory. But there are exceptions to every rule (of course), and tarantula hawks are one of them. I photographed the one above in Big Bend National Park (Texas, USA) feeding from an acacia blossom. These wasps are also fond of milkweed and other summer-blooming plants. Males and females are both important pollinators in the desert southwest, keeping these ecosystems productive.



Photo © Athena Rayne Anderson 2003

## THANKS AGAIN!

Thanks again for supporting **pollinators.info** I hope you enjoyed learning about these amazing pollinators, and that you'll continue to visit the site to see what's in store for Year 2!

If you'd like to learn more about pollinators, their importance, and their fascinating lives, stop by **www.pollinators.info**! I also welcome you to sign up for the free weekly e-newsletter to get site updates, free goodies, and product discounts!

I love hearing from visitors like you, so feel free to leave comments on the site, ask me pollinator-related questions, and share your pollinator stories with me and the other site visitors!

All the Best,

*Athena Rayne Anderson*

