



### Hummingbirds

#### During Hummers & Sugar Flowers



Long life. The colorful birds of hummingbirds are tiny, and their wings beat so fast that they are blurred. Hummingbirds are the only birds that can fly backwards.

Hummingbirds are pollinators. As they fly from flower to flower, they transfer pollen from one flower to another. This helps the flowers produce fruit and seeds.



### Schools Go Solar!




Students across the country are installing solar energy systems on their schools. This helps them learn about renewable energy and how to save money on electricity.




### Butterfly Bounty

#### On Gossamer Wings




The ancients believed butterflies were departed spirits of the dead. We know, at the very least, that they help to transport pollen and enrich our lives.

Butterflies delicately probe for nectar with their long tongues (proboscis). Less efficient pollinators than bees, butterflies retain only minute amounts of pollen on their tall, thin legs or tongues. Tropical zebra wings (Heliconius) collect vibrant pollen on their tongues and steep it in nectar. This "butterfly smoothie" extracts amino acids from the pollen.



Butterflies prefer flowers with bright colors. Floral shape is even more important - their favorite blossoms are dense, sweetly scented clusters of small flowers with flared petals and narrow throats. The broad clusters provide both a "landing pad" and abundant resources.



If you garden for butterflies, select blooms like verbena, lantana, and milkweed, with bright colors and good landing platforms. Don't forget to include host plants for their hungry caterpillars.





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## Beetles, Flies, and Wasps


When flowering plants first appeared about 150 million years ago, beetles and flies were among the first pollinators. Magnolia blossoms are typical beetle flowers—they have succulent parts; heavy, sweet, sometimes fruity perfume; and abundant pollen.

Fly pollinators include the beneficial hover flies, bee flies, and midges. The smell of decay, rotting flesh, or dung is a beacon for many flies. Dutchman's pipe, pawpaw, and




some viburnums are among the fly-pollinated plants with foul-smelling flowers. But not all flies have disgusting tastes. Hover flies and bee flies love sweet-smelling flowers. Like humans, the tiny midges that pollinate cacao are "chocoholics."

Flower-visiting wasps provision their nests with pollen and nectar, just like bees. The champion wasp pollinators are the fig wasps of tropical forests.

 *Observe your garden – can you tell the bees from the wasps from the flies? They are all hard at work!*



## The Pollinator Partnership

 **Insects, birds, bats, and even monkeys, lemurs, and a lizard! About 75% of the world's flowering plants depend upon these animals for pollination.** Most other plants rely upon wind to carry their pollen grains from plant to plant.

**Pollination is the transfer of pollen** within or between flowers (or between cones). Pollination leads to fertilization and eventually to seeds and new life!

We can survive on wind-pollinated plants such as corn, wheat, and other cereals, but we thrive when our diet includes fruits, vegetables, nuts, chocolate, and other foods produced by pollinators.

**Habitat loss, pesticides, diseases, and invasive plants and animals can all harm pollinators.**

**You can help sustain pollinators:**

- Plant flowers, vegetables, and trees that supply vital pollen and nectar.
- Use pesticides sparingly, if at all. Apply at night when most pollinators are inactive.
- Become informed: visit online sites such as [www.fs.fed.us/wildflowers/](http://www.fs.fed.us/wildflowers/).

**Learn more and join the effort to protect pollinators with the Pollinator Partnership™ at [www.pollinator.org](http://www.pollinator.org).**



## The Solitary Bees


Single Moms with Families To Feed

Carpenter bees, mason bees, leafcutter bees, plasterer bees – all are solitary bees. Instead of living in hives, females excavate or reuse nests in soil or wood. They visit flowers for energy-rich nectar and high-protein pollen to feed their young (larvae).

Females lay single eggs on pollen mixed with nectar within nest cells. The eggs hatch and the grub-like larvae feast for several weeks and then pupate. The new adult generation may emerge soon or not until the next year.



Flowering plants and their environments provide essential resources needed by all bees. Solitary bees use materials such as water, leaves, mud, sand, stones, plant resins and downy plant fibers for their nests.

 You can help solitary bees with diverse plantings, by leaving dead branches for nesting sites (when safe to do so), or by drilling boards to make bee "condominiums."





**Solar: Bringing Jobs to a City Near You!**

As the sun rises over the city, a new day of opportunity begins. For many, the promise of a better life is found in the glow of solar panels. This technology not only provides clean energy but also creates jobs in a growing industry. From installation to maintenance, solar offers a path to economic stability and a brighter future for all.

**Affordable Solar for Homeowners**

Many homeowners are looking for ways to reduce their energy costs and make their homes more sustainable. Affordable solar programs are now available, making it easier than ever to harness the power of the sun. These programs often include financing options and incentives to help offset the initial investment, ensuring that everyone can benefit from the clean energy revolution.

**Beetles, Flies, and Wasps**

These insects play crucial roles in ecosystems, from decomposing organic matter to pollinating plants. Understanding their behaviors and interactions can help us better manage our gardens and farms. For example, certain beetles are known for their ability to break down tough plant matter, while flies and wasps are essential for the reproduction of many species.



**Symbiotic Partnership**

Some insects and plants have formed mutually beneficial relationships over time. For instance, certain bees pollinate specific flowers, which in turn provide the bees with nectar. This partnership is essential for the survival of many plant species and the health of the ecosystem. Understanding these relationships can help us create more sustainable agricultural practices.

**The Solitary Bee**

Unlike honeybees, solitary bees do not live in colonies. Each female solitary bee builds her own nest, often in hollowed-out wood or mud. These bees are important pollinators, especially for native plants. They are also more resilient to pesticides than honeybees, making them a valuable part of any garden. Encouraging solitary bees can help support local biodiversity.



LARRY SMITH FAMILY  
BEAR DAVE VANDERBILT  
BOB EMMETT

### Beetles, Flies, and Wasps

When flowering plants first appeared about 130 million years ago, bees and flies were among the first pollinators. Insects like bees are typical beetle flowers—they have succulent parts, heavy scented, sometimes fleshy perfume, and abundant pollen.

Flly pollinators include the beneficial house flies, bee flies, and midges. The arrival of insects robbing bees, or doing a disservice for many bees. Clutching's job, parasites, and



some vicissitudes among the fly-pollinated plants with food-seeking flowers. But not all flies have disgusting tastes. House flies and bee flies love sweet-smelling flowers. Like humans, the fly midges that pollinate cacti are "chocolate."

Flower-visiting wasps provision their nests with pollen and nectar, just like bees. The champion wasp pollinator is the fly wasp of tropical forests.

Observe your garden—can you tell the bees from the wasps from the flies? They are all hard at work!



### The Pollinator Partnership

Insects, birds, bats, and even monkeys, lemurs, and a lizard! About 75% of the world's flowering plants depend upon these animals for pollination. Most other plants rely upon wind to carry their pollen grains from plant to plant.

Pollination is the transfer of pollen either in between flowers (or between cones). Pollination leads to fertilization and eventually to seeds and new life!

We can survive on wind-pollinated plants such as corn, wheat, and other cereals, but we thrive when our diet includes fruits, vegetables, nuts, chocolate, and other foods produced by pollinators.

Habitat loss, pesticides, diseases, and invasive plants and animals can all harm pollinators.

You can help sustain pollinators:

- Plant flowers, vegetables, and trees that attract the pollen and nectar
- Use pesticide sparingly, if at all. Apply at night when most pollinators are inactive.
- Become certified. See online sites such as www.butterflymilk.com

Learn more and join the effort to protect pollinators with the Pollinator Partnership™ at [www.pollinator.org](http://www.pollinator.org)



### The Solitary Bees

Single Moms with Families To Feed

Provision for single eggs or pollen stored with female solitary bees. They dig holes and the pupa develops in the hole. The hole has a mud cap. The bee will provision the hole with pollen and nectar.

You can help solitary bees with these strategies:

- Plant flowers that bloom early in the season.
- Provide nesting sites like hollow stems or blocks of wood.
- Avoid pesticides.



### Solar: Bringing Jobs to a City Near You!

A cutting-edge solar industry will help lead the transition to a sustainable energy system. It brings job growth and economic development to local communities. Clean energy jobs are healthy, meaningful, training programs for solar installers and providing solar incentives for the local area.



### Solar Financing for Business & Government



### Building Integrated Solar Technologies

