

Green Thoughts

Conversations and ideas about growing at The Spring Gardens

We share the Spring Gardens with other species, lots of other species. Animals, plants, fungi, micro-organisms. Even pill bugs and thistles. Rumor has it that there are resident snakes. I think I saw one, once, out of the corner of my eye. We have all encountered the somewhat feral cats. And there is that most uninvited collection of species - mosquitoes. (I've asked serious biologists/ecologists what would happen, theoretically, if mosquitoes were selectively and totally eliminated, would that affect the rest of life on earth besides eliminating malaria and other nasty mosquito-borne diseases? They wouldn't say, but come to think of it, some bats eat mosquitoes so those bats would be unhappy). And about ourselves, let's face it, when it comes to the space between 18th and 19th streets and between Wallace and North, we too are just another species.

**Honey
Bees**

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Our very own honey bees

Circumlocutions aside, let's talk about honey bees, *Apis mellifera*, that most invited of species in the Spring Gardens. And for good reason - they pollinate our plants. It is said that 75% of flowering plant species need to be pollinated to produce fruit.

Green Thoughts decided to ask fellow Spring Gardener Karen Cherubini, who is hosting the bees, how things are going. The honey bee hive is located on a shady rise in the northeast corner of the Gardens. They have a sturdy new wooden home that contains seven vertical frames and a nice waterproof roof. The structure is insulated so the bees should have an easier time surviving the next winter.

The past few winters have not gone well for successive bee colonies.

In the most recent winter there was a month when the air temperature didn't get above freezing. There is also the worry that there are pesticides around, particularly nicotine-like substances that are toxic for bees. Here at the Spring Gardens there is a ban on such "neonicotinoids". It isn't clear why anyone would want to use pesticides or herbicides in their plots anyway. What gardener would want to have the possibility of ingesting these substances?

On the south side of the bee house is a long thin horizontal opening for the bees to go in and out. Guarding that opening are multiple worker bees admixed with foraging bees awaiting instructions indicating where the best flowers are. Successful bees returning to the hive are either covered with pollen or have ingested nectar.



The hive is that wooden box in the distance (looking from the west)



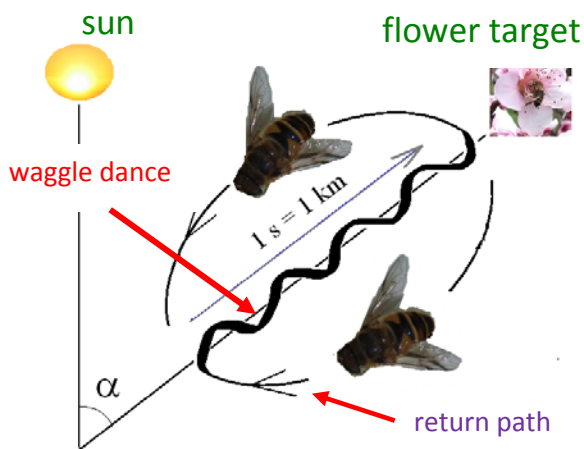
Close-up of hive seen from the south. Note thin horizontal slit. Bees on right.

Inside the hive are tens of thousands more bees each carrying out specific tasks which change from week to week as they get older. The youngest ones nurse the larval bees, then they feed the brood, next they clean the hive, then guard the hive and finally, they go foraging.

The worker bees, all females, generally live only about a month but in the fall some worker bees are able to survive through the winter. The Queen bee can survive three years. How do they survive below-freezing temperatures? They shiver, just the way we do. Antagonistic muscles are simultaneously contracted. There is little motion of the body but active muscles can generate heat. And bees are good at that. In winter the bee colony clusterrrs together inside the hive with the queen at the center and collectively they stay warm. The center of the colony can be kept at a toasty 81 degrees F. Worker bees take turns going to the periphery so they stay equally warm. Karen told me that to get through the winter a normal size bee colony needs about 60 pounds of honey, the energy source for the muscles. And conversely, the colony can get very large because they are so good at making honey. .

I asked how much hive maintenance is required. Not much. The bees are good at doing their own housekeeping. The main task for the human caretaker is to remove burr combs that block spaces inside. Burr combs are basically "weeds of wax".

Older worker bees from the hive go out to forage for flowers containing pollen (made of protein and other nutrients) and nectar (a good energy source). If they have successfully harvested they come back to the hive and recruit new foragers. One of the impressive skills that a foraging bee has is the ability to tell naïve recruits where to go. There are two pieces of information they need to communicate to the recruits: 1) which direction to fly; and 2) how far to go.



Waggle dance. In this case the dance is up and to the right of the “sun”. So flower target is 45° to the right of the present position of the sun’s azimuth.

Decades ago Karl von Frisch deciphered how the bees do it. They perform a “waggle dance” on a vertical surface. The bees are clever and so was von Frisch to figure it out.

First, direction. They use the sun as a guide post. In the early morning the sun is in the east and as the day progresses the sun’s horizontal position, or “azimuth”, shifts to the southeast then to the south then to the southwest then to the west. The bee’s dance can be performed in the hive or just outside. The dance consists of a waggly dance followed by a semi-circular return path back to where the dance started. If at the present time the flowers are in the direction of the sun’s azimuth, the bee’s waggle dance is in a directly upward direction. If the flowers are say, 45 degrees to the left of the current position of the sun, then the dance is upward at a 45 degree angle to the left. If the flowers are in the direction opposite from the direction of the sun then the bee dances straight *downward*. So any possible direction from the hive can be displayed and naïve recruits can make a bee-line to the food. For the figure shown on the left, the food source is 45 degrees to the right of the sun’s azimuth.

What about distance? The length of time the dancer spends on their waggle dance is a function of the distance the flower source is from the hive. The longer the distance, the longer the time on the dance. Bees can also figure out where the sun is even when it is cloudy but that is for another **Green Thoughts**.

There are about 20,000 species of bees in the world but only about seven species of honey bees, mostly in Asia. No honey bees



are native to the New World. Karen told us they were brought here from Europe. North America *does* have pollinating native bee species including bumble bees, carpenter bees, sweat bees, stingless bees and solitary bees. The latest research shows that there is more complete pollination of crops if multiple pollinating species are involved

Neonicotinoids As we mentioned above, there are a set of pesticides called neonicotinoids that are toxic to insect pests. They are widely used on commercial crops.. Almost all commercial corn seeds planted in the United States are treated with these insecticides to prevent seed loss from these pests. They are related to the molecule nicotine which is found in tobacco plants. In low doses nicotine has performance enhancing effects in humans for things like cognition, alertness, focus and motor

abilities. The principal way they work is through a brain neurotransmitter molecule called acetylcholine: When two neurons communicate with each other at a synapse the presynaptic neuron releases neurotransmitter molecules. The molecules quickly diffuse to the post-synaptic neuron (in about a millisecond) where there are receptor molecules that can detect that the neurotransmitter has arrived and communicate that information electrically to the rest of the neuron. One of the brain neurotransmitters is acetylcholine. Acetylcholine is also the neurotransmitter used to communicate motor signals from our motor neurons to our skeletal muscles so we can move our arms and legs (and all our other skeletal muscles). By coincidence, many acetylcholine receptors in the brain and in our skeletal muscles are also sensitive to nicotine and so those receptors are called nicotinic acetylcholine receptors. And that is where the plot thickens. Insects also have acetylcholine receptors and some of them are nicotinic. Scientists invented new kinds of nicotine-like molecules that bind to acetylcholine receptors but don't let go. That messes up the acetylcholine receptors so brain and muscle function is abnormal.. These neonicotinoids have a high affinity for insect nicotinic acetylcholine receptors and are quite toxic. Unfortunately they are also quite toxic for benign insect species such as honey bees. There has been quite a controversy concerning the use of these neonicotinoids. It is really big business for chemical companies. As of April 18, 2018 a majority of European Union states have banned neonicotinoids. However that has not yet happened in the United States.

But things are changing here too. And here is a report by fellow Spring Gardener Pat Schuyler.

Pat's report: Plants, Nicotinoids and Bees

Both The Home Depot and Lowe's have begun phasing out the sale of flowering plants containing pesticides called neonicotinoids, which have been linked to declining populations of honeybees, wild bees and other pollinators. The EU states have recently voted in favor of an almost complete ban on the use of neonicotinoid insecticides across the EU.

Neonicotinoids are nicotine-like chemicals; bees react to them like people do to cigarettes; they prefer plants treated with neonicotinoids to untreated plants. And like people who smoke cigarettes, bees are sickened by the treated plants.

According to Matthew Harrigan, Home Depot's corporate and public relations manager: "Right now, 80 percent of our flowering plants are neonic-free, and we plan to completely phase out the use of neonics on our live goods by the end of 2018. But in the meantime, we're one of the few retailers that have started requiring the suppliers to label neonic-treated plants, so that customers who believe that neonics are impacting the bee population won't unknowingly purchase those plants."

This is good news for gardeners, because it means you can safely buy plants from Lowe's and Home Depot, which are usually inexpensive.

You might still want to be careful about buying plants in 2018 at these big box stores. They could have older plants still tainted with neonicotinoids and are unlabelled....

Growing non-stunted carrots?

Six months ago we mentioned in [Green Thoughts](#) that there was an attempt to grow purple carrots here at TSG. Well, they didn't grow to long stature. We have spoken to other very experienced gardeners and they too had similar attenuated results with conventional carrot seeds. So, why?

If you have had success growing full length carrots please let us know what you did. What kind of seeds did you use? Did you prepare the soil in any way?

Pat Schuyler's Remedy for Powdery Mildew and her Aspirin Elixir

Pat Schuyler has other helpful advice to pass on. First, dealing with powdery mildew

Powdery Mildew

If you are seeing powdery-looking patches on the foliage of your plants, you most likely have a case of the very common [powdery mildew](#) fungal disease. While there are chemical remedies for powdery mildew, few home gardeners need to use them; these controls usually are reserved for commercial farming operations. A better solution for home gardeners is simply to follow good cultural practices and, if desired, to apply a simple homemade spray.

Powdery mildew can be caused by many different species of fungi, although the most common is *Podosphaera xanthii*. Powdery mildew is very easy to identify because its symptoms are white powdery spots on the leaves and stems of plants. Typically, you first see the powdery residue on the lower leaves and stems, but as the disease progresses, the powdery coating may blanket the entire plant.

Powdery mildew grows best in conditions where there is high humidity combined with moderate temperatures. It is not much of a problem in hot, dry climates, but in temperate regions of the Midwest, Northwest, and Northeast, it is so common during the humid midsummer months that it is regarded almost as an inevitable stage in the gardening season. In fact, many gardeners don't bother treating powdery mildew since it does not harm plants much unless the infestation becomes severe.

Homemade Spray for Powdery Mildew

You can apply a homemade spray to control the spread of the powdery mildew fungus.

It won't get rid of the fungus on leaves that already have it, but it will prevent it from spreading to the rest of the plant.

Ingredients:

- 1 gallon of water
- 1 tablespoon of [baking soda](#)
- 1 tablespoon of vegetable oil
- 1 tablespoon of [dishwashing liquid](#)

Mix the ingredients thoroughly in a gallon-size container, such as an empty milk jug, then pour some of the mixture into a spray bottle. You can also mix and spray directly from a pressure sprayer. Spray your plants weekly, preferably on overcast days to prevent it from burning the [foliage](#). Coat all sides of the leaves and stems, and let them dry.

Take 1.5 Aspirins and see Pat in the morning

Aspirin can be good medicine for plants, too. A solution of one and a half tablets in 2 gallons of water sprayed on your garden every 3 weeks can give you more and bigger veggies. The key ingredient, salicylic acid, can help plants grow and protect them from disease

A time to collapse and a time to rebuild

The vertical segment that collapsed on the wall on the north side of the church on 19th and Green (documented in previous issues of [Green Thoughts](#)) is being repaired. The gap has been filled by concrete block (see photo next page) and more recently, stucco has been applied. We asked how far below ground level the concrete block goes – 18 to 20 inches. Given the possibility that occasional water in an underground stream bed subverted the wall, we aren't sure that 20 inches is deep enough. But we are merely uncertified amateur hydrologists. The repair looks solid and should last for years.



Photo of church on the mend

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Please send your ideas, thoughts, suggestions and observations to:

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that address can also be used for getting on the mailing list for **Green Thoughts**, or getting off.

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