

## **Brenda Burke - Hanover Master Gardener**

- **Obtained a BS in Biology from Virginia Tech**
- **Worked 30 years at Altria as a Senior Research Scientist**
- **Served as a Botany, Zoology and Microbiology judge for the Metro Richmond Scientist Fair for 10 years**
- **Studied Landscape Design at the University of Richmond and at Lewis Ginter Botanical Garden**
- **Her landscaped yard was featured on Virginia Home Grown in 2018**
- **Became a Hanover Master Gardener in 2012**
- **Raised Honey Bees for 5 years**
- **Was a member of the East Richmond Bee Club**
- **Served as a presenter at the Science Museum of Virginia for the Honey Bee observation hive**

# Pollinators in North America



1. Native Bees
2. Honey Bees
3. Butterflies
4. Moths
5. Beetles & Flies
6. Bats
7. Hummingbirds

# Overview of Native Bees and Managing Honey Bees



USGS Bee Inventory and Monitoring Lab/flicker

# Bees of the Eastern US



- ✓ 4000 native bees in US
- ✓ Honey Bees came in 1622 with settlers to NA
- ✓ Bees descended from wasp
- ✓ Made switch from prey to pollen
- ✓ Only females sting
- ✓ Females are larger
- ✓ Build nest stocking pollen & nectar





# Bees of the Eastern US



- ✓ Bees are among the most important creatures to humans
- ✓ They pollinate over 80% of flowering plants
- ✓ They pollinate 70 of the top 100 food plants
- ✓ 1 in 3 bites of food is from plants pollinated by bees
- ✓ Almonds are totally dependent on bees





# Bees of the Eastern US

- ❖ Native bees and Honey bees can sting
- ❖ You will not be stung by a bee unless smash it or attack its hive
- ❖ Bees do not see people as a threat
- ❖ Wasp and yellow jackets sting people
- ❖ To understand why bees don't sting, it is important to understand the behavior of different types of bees





# Bees of the Eastern US

NOT A BEE!

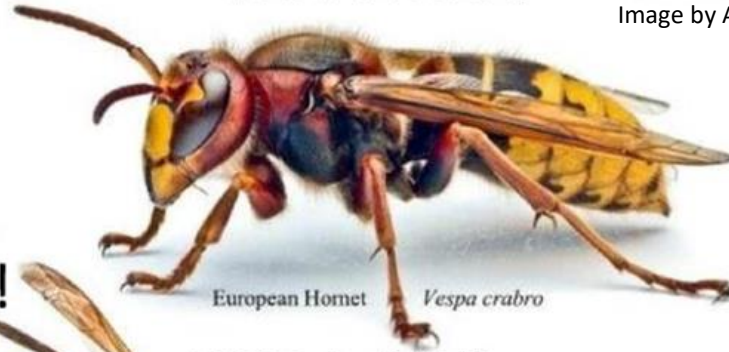


Bald-faced Hornet *Dolichovespula maculata*

NOT A BEE!

By Alex Surcica

Image by Alex Surcica



European Hornet *Vespa crabro*

NOT A BEE!



German Yellowjacket - *Vespula germanica*

NOT A BEE!



European Paper Wasp  
*Polistes dominula*

Bees, Wasps, and Other Beneficials  
[www.facebook.com/4wasps](http://www.facebook.com/4wasps)



Honey Bee  
*Apis mellifera*

BEE



Common Eastern Bumblebee *Bombus impatiens*

BEE

0.5 inch  
1.25 cm

# Bees of the Eastern US

- ✓ Mason Bees
- ✓ Leafcutter Bees
- ✓ Bumble Bees
- ✓ Carpenter Bees
- ✓ Blueberry Bees
- ✓ Squash Bees
- ✓ Sweat Bee
- ✓ Honey Bees
- ✓ Managing Honey Bees



by Alex Surcică



by Alex Surcică





# Mason Bees



- Solitary bee
- Same size as a Honey bee
- Metallic colors including blue, green and black
- Carry pollen in hairs on abdomen
- Work alone – nest in groups
- Use mud to close nest

# Mason Bees

## House – tubes



# Mason Bees

- ❖ 130 species in North America
- ❖ Appear early in spring
- ❖ Pollinate 2,000 flowers per day
- ❖ 1 Mason Bee = 100 Honey Bees
- ❖ One tree to another – cross pollinate
- ❖ Stays within 300' of home
- ❖ Provide habitat – Joe Pye Weed (reeds), or tube houses

# Mason Bees

## Females – 40% (fertilized egg)

- ❖ Eggs in the back of nest
- ❖ Lives 8 – 10 weeks
- ❖ Lays 15 – 20 eggs
- ❖ Does all jobs, all fertile

## Males – 60% (unfertilized egg)

- ❖ Eggs in the front of the nest
- ❖ Hatch in spring prior to females
- ❖ Lives 2 weeks
- ❖ Only job reproduction

# Mason Bees Pollination

**Pollinate Orchards** - apples, plums, peaches, pears  
**Almonds Trees**





# Leafcutter Bees



- Solitary Bee
- Similar to Mason bees
- Use leaves to close nest cavities
- Have large jaws
- Black with white hairs
- Carry pollen on abdomens
- Are fast flyers
- Pollinate alfalfa, summer gardens, flowers



Leaf Damage



# Bumble Bees



- Social bees
- Larger than Honey bees
- Males cannot sting
- Live in large nest in the ground
- Female workers are on plant blooms
- Have pollen baskets on legs

# Bumble Bees

- 50 species in North America
- Large, furry, mostly black
- Can have yellow, orange or white
- Pollinate peppers, cucumbers, tomatoes, blueberries & cranberries
- Buzz pollination – vibrate flower's anthers



# Bumble Bees Life cycle

- Queen builds wax cells filled with pollen & honey
- Early offspring are sterile females
- Female workers take over nest activities
- Then queens will stay and lays eggs
- Lays males at the end of summer
- Lays queens last
- Old queen dies
- New queens mate and overwinters in rotten logs



# Bumble Bees Ground Nest



# Common Virginia Bumble Bees



Common eastern



Two-spotted



Brown-belled



Half-black



Confusing



Lemon cuckoo



# Uncommon Virginia Bumble Bees



Rusty-patched



Yellow



Sanderson



Black and gold



# Rare Rusty-patch Bumble Bee

Rare



Rusty-patched

Common



Brown-bellied

# Carpenter Bees



- Solitary bees
- Males can not sting
- Can cause wood damage
- Chew small flowers
- Lays eggs in single file
- Lays females first then males in front

# Carpenter Bees

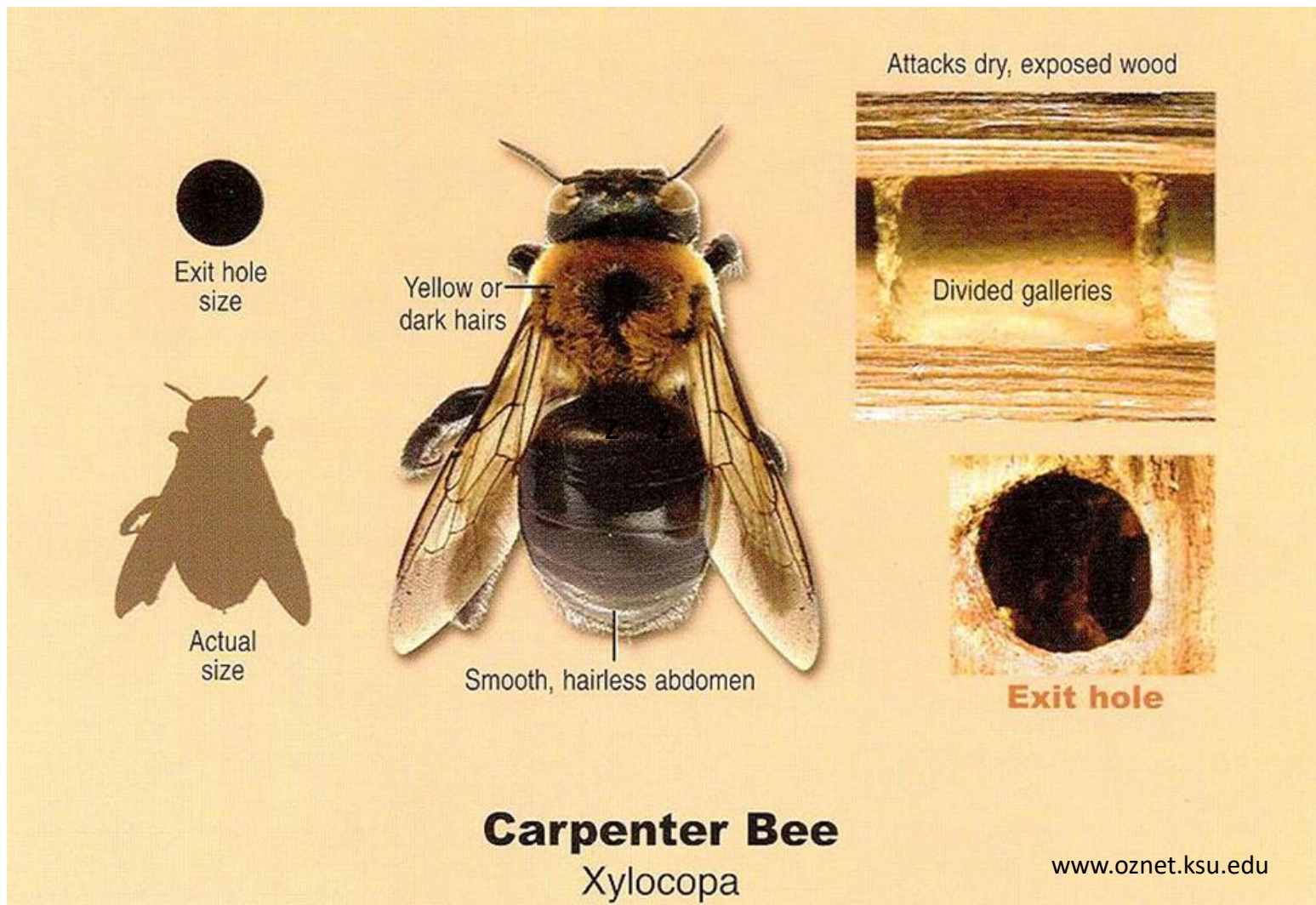


- Are good pollinators
- Pollinate eggplant & tomatoes
- Overwinter in wood
- Nest in wood – drill ½” holes for nest
- To control – paint wood, close holes with wood filler

# Carpenter Bee



# Carpenter Bee





# Blueberry Bees



Visits 50,000 blueberry flowers in her life



- Solitary bee
- Native bee that evolved with blueberry plants
- Nest in the ground near blueberry plant
- Looks like small Bumble bee
- Pollinates bell-shaped flowers



# Squash Bees

- Solitary Bee
- Resemble the Blueberry bee
- Color black & orange
- Pollinate squash & cucumbers
- Fly pre-dawn & dusk
- Nest in ground near food



# Sweat Bees

- Solitary Bee
- ¼ size of a Honey bee
- Fly fast
- Metallic blue and green with copper
- Attracted to human perspiration
- Excellent pollinators
- Active into November
- Attracted to small flowers
- Pollinate onions & carrots



Honey Bee



Sweat Bee

# Honey Bees



- Social Bees
- Golden brown with black
- Live in man-made hives
- Colonies contain 40,000 to 60,000 bees
- Fly 3 miles from hive
- Beehive can make 400 lbs. of honey per year

# Honey Bees



Workers   Drones   Queen

50,000

600

1



# Honey Bees

Drones cannot sting – produced in the Spring





# Honey Bees

## Blond Queen





# Honey Bees



Marked Queen

Color indicates year



# Honey Bees

Marking the Queen - Color indicates year

| Color  |  | Year ends in |
|--------|--|--------------|
| white  |  | 1 or 6       |
| yellow |  | 2 or 7       |
| red    |  | 3 or 8       |
| green  |  | 4 or 9       |
| blue   |  | 5 or 0       |

2016

2017

2018

2019

2020

# Honey Bees

## Mating

- Mating occurs 6-13 day of queens life
- She takes around 15 - 20 mating flights
- Mating occurs in a Drone Congregation Area
- She will not mate again in her lifetime
- Drones are produced in the Spring
- Drones die after mating

# Honey Bees

## Mating Flights

15 to 20 or more Drones (die after mating)



# Honey Bees



[freevintageillustrations.com](http://freevintageillustrations.com)





# Honey Bees

## Larval Life Cycle



## Adult Life Cycle





# Honey Bees

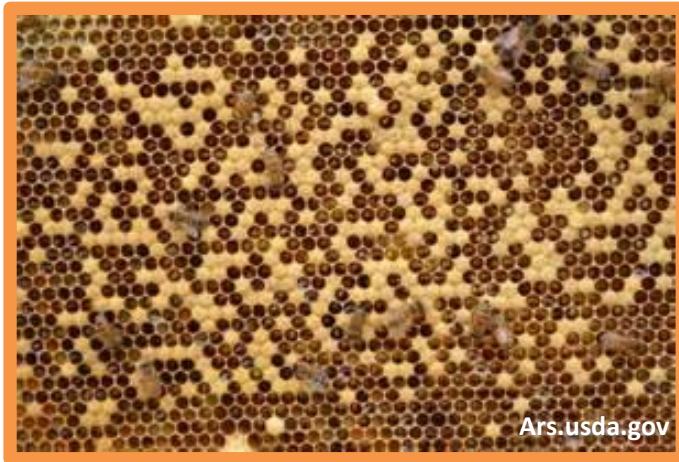


## Eggs, Larva, Capped brood



# Honey Bees

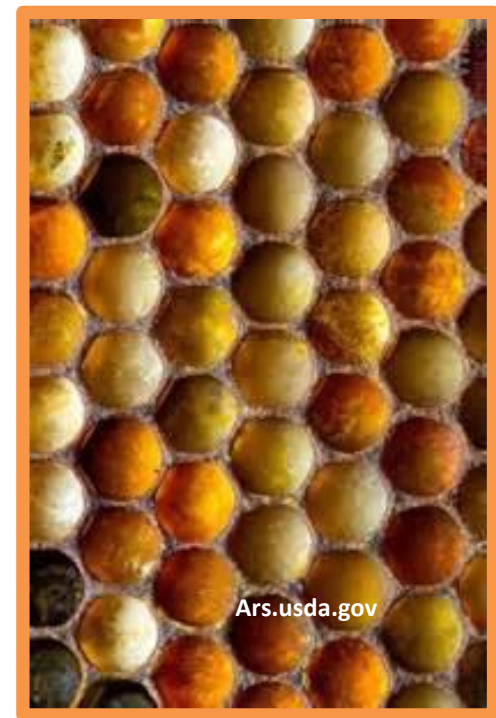
## Brood, Queen Cells, Drone Cells





# Honey Bees

**Pollen – *Protein source***



# Honey Bees



## Honey Frame and Cut Comb



Ars.usda.gov



Ars.usda.gov



# Honey – Health Benefits



- Maintains blood sugar levels
- Heals wounds
- Good for skin
- Removes free radicals
- Source of energy
- Aids in weight loss
- Substitute for sugar
- Regulates insulin
- Has nutrients, vitamins, minerals



# Honey

## Varietals of Honey

- Single Flower - monoflower, uniflower
- Many flowers - multifloral, wildflower





# Honey

## Single Flower Varietals

- The target plant is predominant, so bees have little choice of plants
- The beekeeper times the introduction of the hive and harvesting to coincide with the blooming period

# Honey

## Single Flower Honey – 300 Types

Alfalfa

Heather

Blackberry

Sourwood

Blueberry

Tupelo

Buckwheat

Manuka

Clover

Linden

# Honey

## Single Flower Honey



- ❖ Color ranges from nearly colorless to dark brown
- ❖ Flavor varies from mild to bold
- ❖ Light colors = mild
- ❖ Dark colors = strong

# Honey

## Most expensive honey

### Manuka honey \$1,000 / KG

- From Australia and New Zealand
- Nectar from Manuka bush
- Contains methylglyoxal, gives honey healing properties

### Elvish honey \$6,800 / KG

- From a cave in Turkey – 7 years old
- High content of minerals
- Chinese drug company bought for research

# Honey Bees

## Starting a Hive

- ✓ Learn about Honey Bees – books, internet
- ✓ Join a local Bee Club
- ✓ Find an experienced mentor
- ✓ Assist your mentor with hives
- ✓ Locate bees and supplies
- ✓ Understand the different bee breeds



# Honey Bees



freevintageillustrations.com

## Breeds and their Attributes

|                                      | Italian   | Carniolan | Buckfast | Russian   | German    | Caucasian |
|--------------------------------------|-----------|-----------|----------|-----------|-----------|-----------|
| <b>Gentleness</b>                    | Moderate  | High      | Low-Mod  | Low-Mod   | Low       | High      |
| <b>Spring Buildup</b>                | Good      | Very good | Low      | OK        | Low       | Very low  |
| <b>Over-wintering Ability</b>        | Good      | Good      | Good     | Very good | Very good | OK        |
| <b>Excess Swarming</b>               | OK        | High      | Low      | OK        | OK        | Low       |
| <b>Pollination</b>                   | Moderate  | High      | Moderate | Moderate  | Low       | High      |
| <b>Honey Production</b>              | Very good | Good      | Good     | OK        | OK        | Low       |
| <b>Wax &amp; Propolis Production</b> | Low       | Low       | Low      | OK        | OK        | High      |



# Honey Bees



## Four ways to start a Hive



Package



NUCS



Swarm



Complete Hive



# Honey Bees



Package = 10,000 workers & 1 queen



[carolinahoneybees.com](http://carolinahoneybees.com)

[BeverlyBees.com](http://BeverlyBees.com)

[freevintageillustrations.com](http://freevintageillustrations.com)

# Honey Bees



## Installing a Package





# Honey Bees

## Installed Package



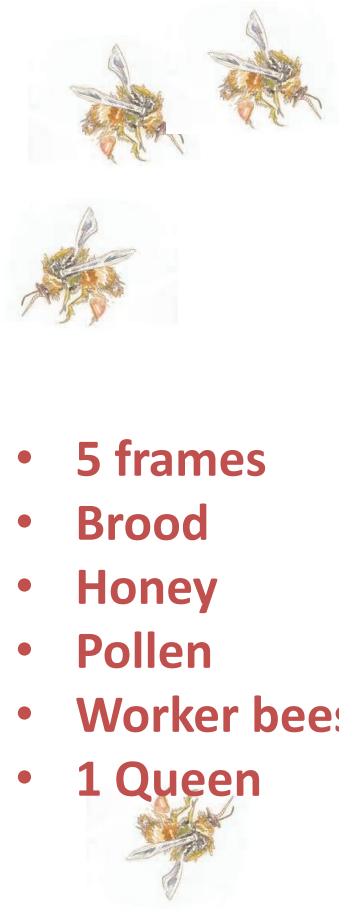
Old Church Garden

# Honey Bees

## NUC = Nucleolus Hive



- 5 frames
- Brood
- Honey
- Pollen
- Worker bees
- 1 Queen





# Honey Bees

## Swarm





# Honey Bees

## Swarm



BeverlyBees.com

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# Honey Bees

## Swarm



# Honey Bees

## Complete Hive





# Honey Bees



All new hives will need a food source



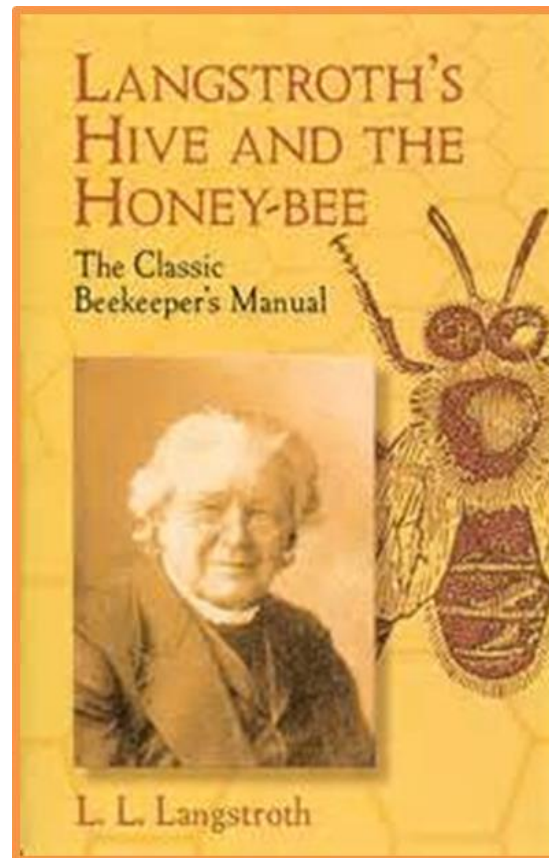
Entrance Feeder 50/50 water/sugar mixture

# Honey Bees



## Two Types of Hives

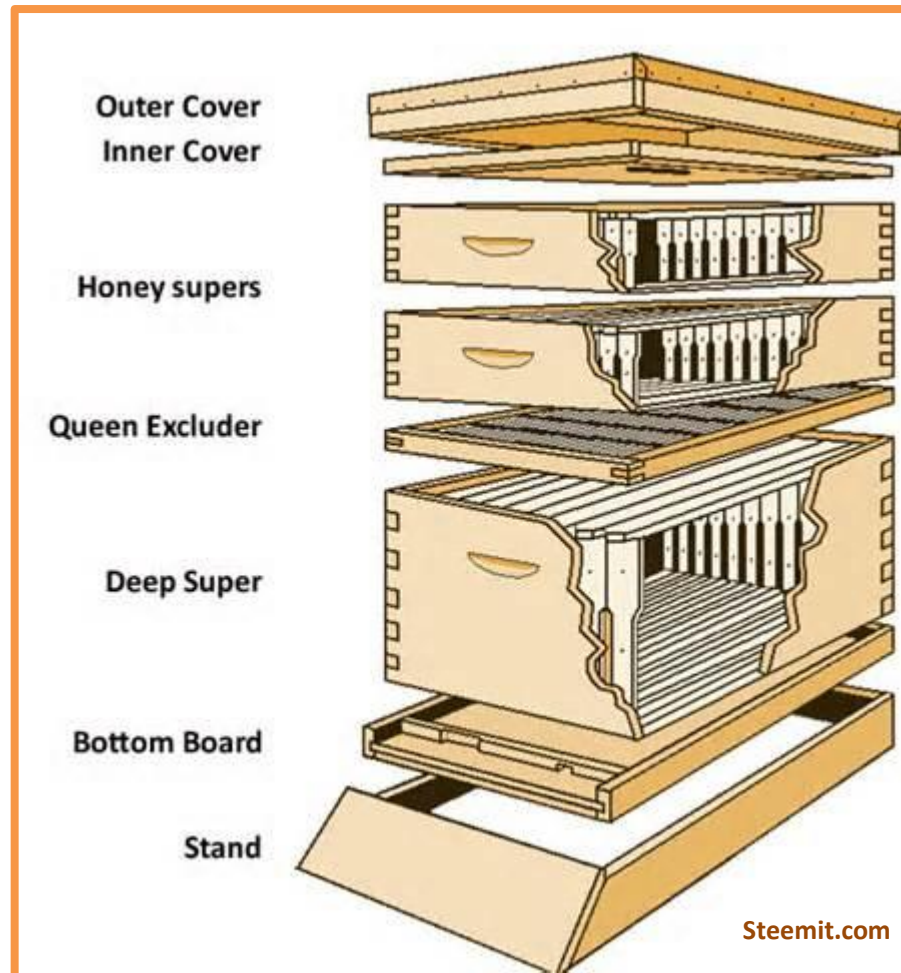
### #1 Langstroth's Hive



# Honey Bees



## #1 Langstroth's Hive





# Honey Bees



## Hive Tools

- Mouse guard
- Bee brush
- Hive tool
- Magnifying glass
- Frame grip
- Smoker
- Queen catcher & cage
- Queen marker
- Hive feeder



# Honey Bees



## English Garden Hive – Old Church Garden



# Honey Bees



## #2 Top Bar Hive - Vertical





# Honey Bees



## #2 Top Bar Hive - Vertical



# Honey Bees

Now you have established hives!

Add Supers as they grow





# Honey Bees



## Splitting Established Hives Prior to Swarming



BeverlyBees.com





# Honey Bees

## Split Hive – Prior to Swarming



- Find Queen
- Remove part of the brood
- Remove part of the honey
- Locate Queen Cells
- Knock some of the Worker Bees into the new hive
- Include extra space in both hives

# Honey Bees

## Splitting Hive – Prior to Swarming

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**Honey Frame**



**Swarm Queen Cells**



**Brood Frame**



**Pollen**

Photos: [Ars.usda.gov](http://ars.usda.gov)

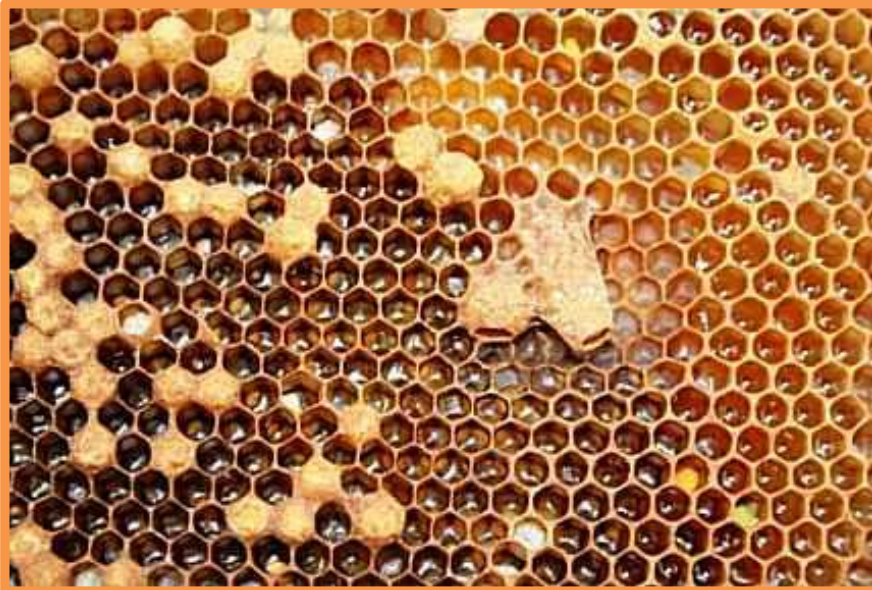


# Honey Bees

## Queen Cells



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**Supersedure Cells**

Replace aging, ill, missing queen



**Swarm Cells**

Old queen preparing to swarm

# Honey Bees

## Products of the Hive



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|                    |  |
|--------------------|--|
| <b>Honey</b>       | A sweet food substance produced by Honey Bees for their consumption. Consists of nectar, honeydew, bee regurgitation, enzymatic activity & evaporated water. |
| <b>Bee Pollen</b>  | Collected from flowers; is nutrient dense, anti-viral, antibacterial. Used by athletes.  |
| <b>Bees Wax</b>    | Secretion from bee wax glands used to build honeycomb for hives. Used for skin care, candles and furniture polish.   |
| <b>Mead</b>        | Honey wine – the first alcoholic drink brewed by man.  |
| <b>Bee Bread</b>   | Food for larvae and bees. Made from pollen, honey, wax and digestive enzymes.  |
| <b>Royal Jelly</b> | Food for the queen bee made by worker bees. Contains vitamins and amino acids. Promotes tissue growth and muscle and cell regeneration.                      |
| <b>Propolis</b>    | Sticky resins collected from trees used by worker bees to seal and protect the hive. Can heal wounds.  |
| <b>Bee Venom</b>   | Used to relieve pain from arthritis. Used in facial lotion's for anti-aging properties.  |

# Honey Bees



freevintageillustrations.com

## Landscaping with Decorated Hives



Top Bar Hive - Vertical



# Honey Bees



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## Landscaping with Hives



StockFreelimages

# Honey Bees



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## Landscaping with Hives





# Honey Bees



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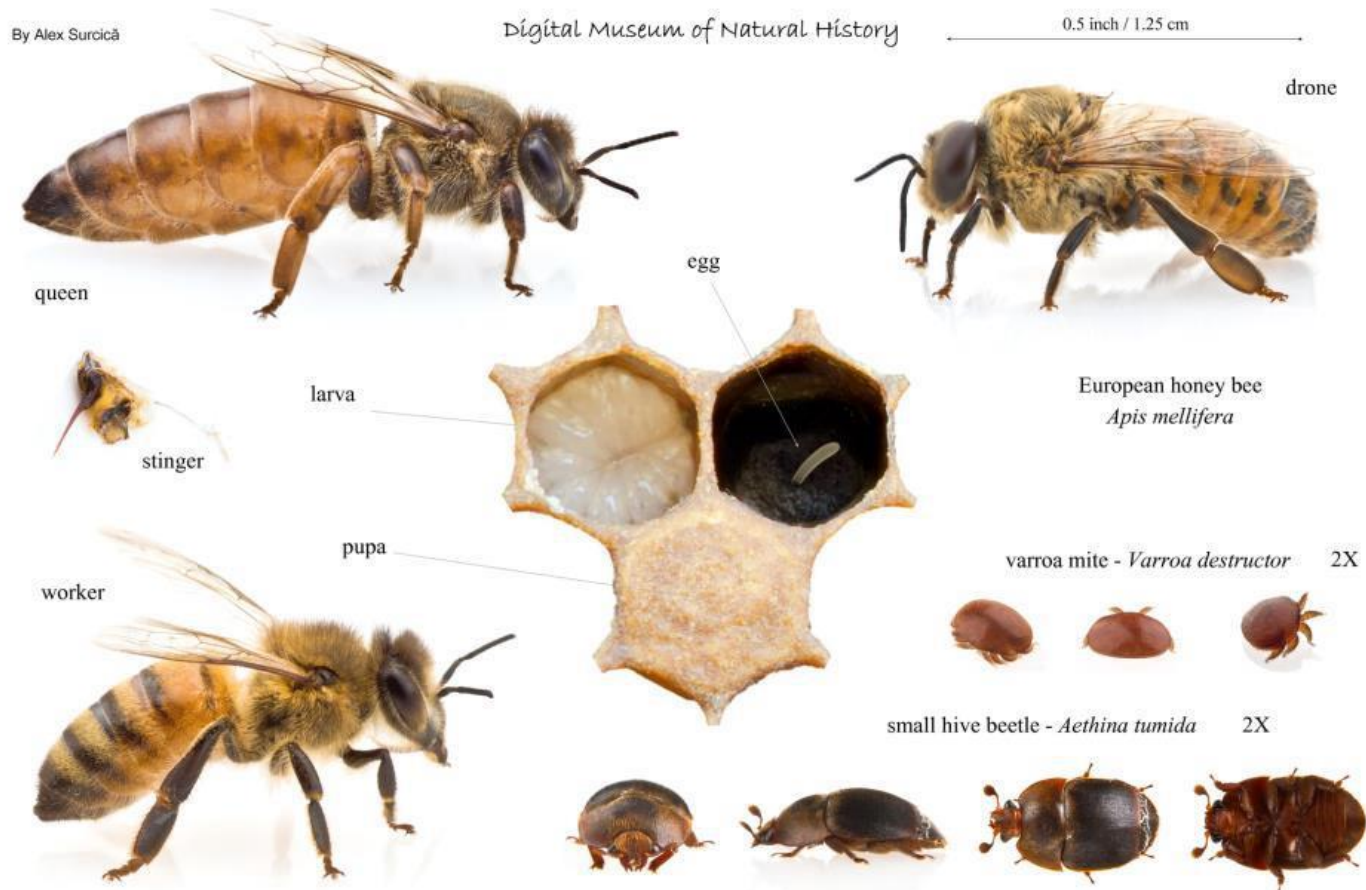
## Landscaping with Hives



# Honey Bees

## Diseases & Pest

### Brood and Adult Bees





# Honey Bees

## Diseases & Pest – Brood, Adults

- American foulbrood (most serious disease)
- European foulbrood
- Sacbrood virus
- Chalkbrood
- Nosema
- Varroa Mites
- Small Hive Beetle
- Wax Moth
- Tracheal Mite



# Honey Bees



## Diseases & Pest



Ants, dragon flies, spiders, ticks



Birds (*minimal problem*)



Frogs, toads, lizards, snakes



Mice, skunks, bears

# Africanizes Honey Bees

European honey bee X African honey bee



- Experiment in Brazil in 1952
- Increase honey production
- 26 hives escaped in 1957
- More defensive bees
- 10 x more stings
- Kill people and animals

# Africanizes Honey Bees

European honey bee X African honey bee

Currently found in the following States:

Florida

Arizona

California

Tennessee

Texas

Nevada

New Mexico

Oklahoma







# Bees Decline



✓ 1947 – 6 million honey bee hives

✓ 2017 – under 3 million honey bee hives



# How can we help bees



- ✓ Provide a variety of native flowering trees, shrubs and wildflowers



- ✓ Avoid pesticides or choose non-chemical solutions to insect problems

- ✓ Avoid seeds coated in pesticides



- ✓ Maintain bee friendly lawns

# Virginia Cooperative Extension Hanover County

## Virginia Tech References for Bees

- 3104-1541 Gardening for Bees
- 456-017 (ENTO-222P) Pest Management Guide
- ENTO-66NP Nosema and Honey Bee Colony Health

# Questions ?



Image: USGS Bee Inventory and Monitoring Lab/flicker