



# Introduction to Beekeeping

Tom & Sue Roper – January 23<sup>th</sup>, 2020

# Discussion Topics



# The Honey Bee

**Apis Mellifera** - The western honey bee or European honey bee (*Apis mellifera*) is the most common of the bee species. The name **Apis** is Latin for "bee", and **mellifera** is the Latin for "**honey-bearing**", referring to the species' production of honey. Like all honey bee species, the western honey bee is **eusocial**, creating colonies with a single fertile female (or "queen"), many normally non-reproductive females or "workers", and a small proportion of fertile males or "drones". Individual colonies can house tens of thousands of bees. Colony activities are organized by communicating between individuals, through both pheromones and the dance language.



# Common Varieties



## The Italian Bee

Italian honey bees, of the subspecies *Apis mellifera ligustica*, were brought to the United States in 1859. **They quickly became the favored bee stock in this country and remain so to this day.** Known for their extended periods of brood rearing, Italian bees can build colony populations in the spring and maintain them for the entire summer. **They are less defensive and less prone to disease.**

## The Carniolan Bee

The subspecies *A. m. carnica*, from middle Europe, also has been a favored bee stock in the United States for several reasons. First, their **explosive spring buildup** enables this race to grow rapidly in population and take advantage of blooms that occur much earlier in the spring, compared to other stocks. Second, **they are extremely docile and can be worked with little smoke and protective clothing.** Third, they are much less prone to robbing other colonies of honey, lowering disease transmission among colonies. Finally, they are very good builders of wax combs, which can be used for products ranging from candles, to soaps, to cosmetics.

Because of their rapid buildup, however, **carniolan bees tend to have a high propensity to swarm** (their effort to relieve overcrowding) and, therefore, may leave the beekeeper with a very poor honey crop. This stock requires continued vigilance to prevent the loss of swarms.



# Common Varieties



## The Caucasian Bee

*A. m. caucasica* is a race of honey bees native to the foothills of the Ural mountains near the Caspian Sea in eastern Europe. This stock was once popular in the United States, but it has declined in regard over the last few decades. **Its most notable characteristic is its very long tongue**, which enables the bees to forage for nectar from flowers that other bee stocks may not have access to. They tend to be a moderately colored bee and, like the Carniolans, are extremely docile. However, their slow spring buildup keeps them from generating very large honey crops, and **they tend to use an excessive amount of propolis—the sticky resin substance sometimes called “bee glue” that is used to seal cracks and joints of bee structures—making their hives difficult to manage.**

## The Russian Bee

One of the newer bee stocks in the United States was imported from far-eastern Russia by the US Department of Agriculture.. The researchers’ logic was that these bees from the Primorski region on the Sea of Japan, have coexisted for the last 150 years with the devastating ectoparasite *Varroa destructor*, a mite that is responsible for severe colony losses around the globe, and they might thrive in the United States. Numerous studies have shown that bees **of this strain have fewer than half the number of mites** that are found in standard commercial stocks.

**Russian bees tend to rear brood only during times of nectar and pollen flows, so brood rearing and colony populations tend to fluctuate with the environment.** They also exhibit good housecleaning behavior, resulting in resistance not only to varroa but also to the tracheal mite.



# The Killer Bee

## What Are Africanized Bees?

The Africanized bee is a hybrid species of the Western honey bee. These so-called “killer” bees were established when bees from southern Africa and local Brazilian honey bees mated. The Africanized bee was first identified in Brazil in the 1950s, but it quickly spread through Central and South America after a handful of swarms escaped quarantine. The first Africanized bees in the United States were discovered in 1985 at an oil field in California. Then, in 1990, the first permanent Africanized bee colonies arrived in Texas from Mexico. **Today, Africanized honey bees are found in southern California, southern Nevada, Arizona, Texas, New Mexico, Oklahoma, western Louisiana, southern Arkansas, and central and southern Florida.**

Africanized honey bees are **dangerous stinging insects that have been known to chase people for more than a quarter of a mile** once they get excited and aggressive. This is why they earned the nickname “killer bee.”



# SWARMING – Common but Not Dangerous

Swarming is a natural process in the life of a honey bee colony. **Swarming occurs when a large group of honey bees leaves an established colony and flies off to establish a new colony, essentially creating two from one.** Swarming is a natural method of colony expansion that occurs in response to crowding within the colony. Swarming usually occurs in late spring and early summer and begins in the warmer hours of the day.

Honey bee swarms may contain several hundred to several thousand worker bees, a few drones and one queen. **Swarming bees fly around briefly and then cluster on a tree limb, shrub or other object.** Clusters usually remain stationary for an hour to a few days, depending on weather and the time needed to find a new nest site by scouting bees. When a suitable location for the new colony, such as a hollow tree, is found the cluster breaks up and flies to it.

Honey bee swarms are **not highly dangerous under most circumstances.** In most situations when a honey bee swarm is found on a tree, shrub or house you do not need to do anything. Swarms are temporary and the bees will move on if you patiently ignore them. You may be able to give a honey bee swarm to a beekeeper who will gather the swarm and relocate it for you.



**There are 3 types, or castes of Honey bees.**



Queen




Drone



Worker





A close-up photograph of a dense colony of bees on a honeycomb. The bees are of various colors, including brown, black, and yellow, and are actively moving across the hexagonal cells of the comb. The lighting is warm, highlighting the texture of the bees and the honeycomb.

Each member of the colony has a definite task to perform, but it takes the combined efforts of the entire colony to survive and reproduce.



# Bee Anatomy

## Other Notable Body Parts

- Proboscis – Gathering nectar
- Nasonoff Gland – GPS communication
- Wax Gland – Produce comb
- Hypopharyngeal Gland – produces Royal Jelly
- Queen's Egg Sack
- Mandibular – Queen substance or QMP



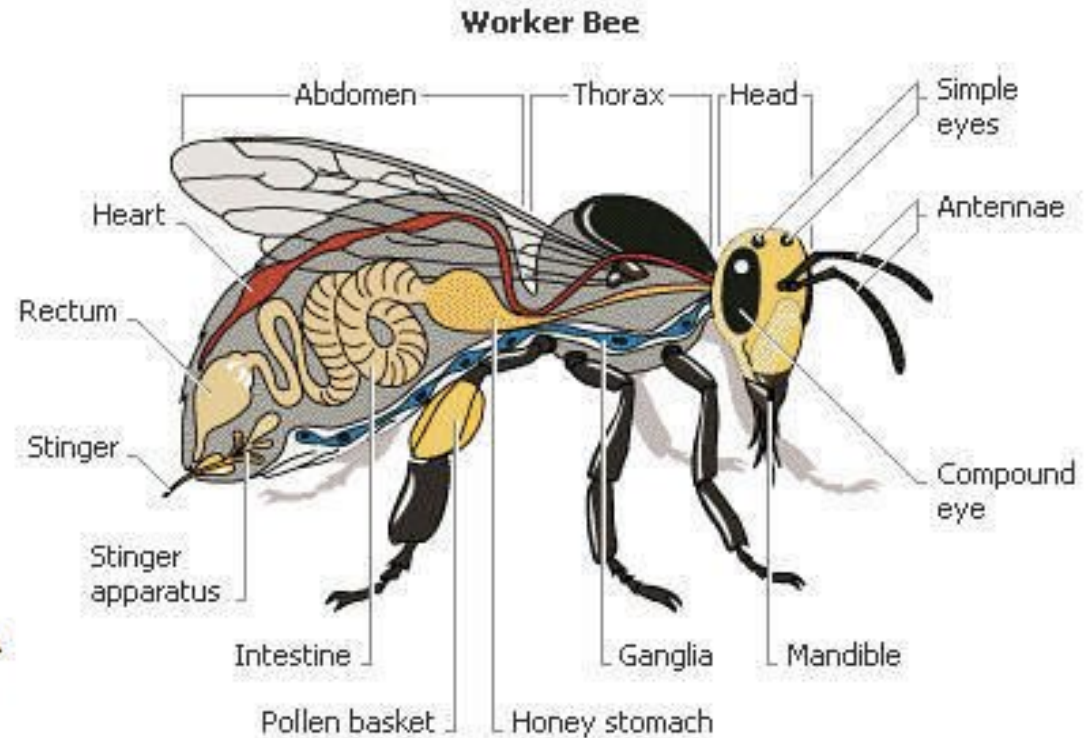
Drone



Worker



Queen



# Interesting Facts

- One queen per hive (female)
- Drone population is determined by the queen (males)
- Workers have numerous roles (females):
  - Nurse
  - Hive attendant – general hive cleanliness, queen attendant, food prep and storage, foragers
- Hive population around 40,000 bees
- The honey bee dies after releasing her stinger – 1 and done



# Honey Bee Development

- All honey bees come from eggs
- All honey bees develop into larva
- All honey bees go through metamorphosis
- The development times for honey bees differ by caste
- Queen – 16 days
- Worker – 21 days
- Drone – 24 days



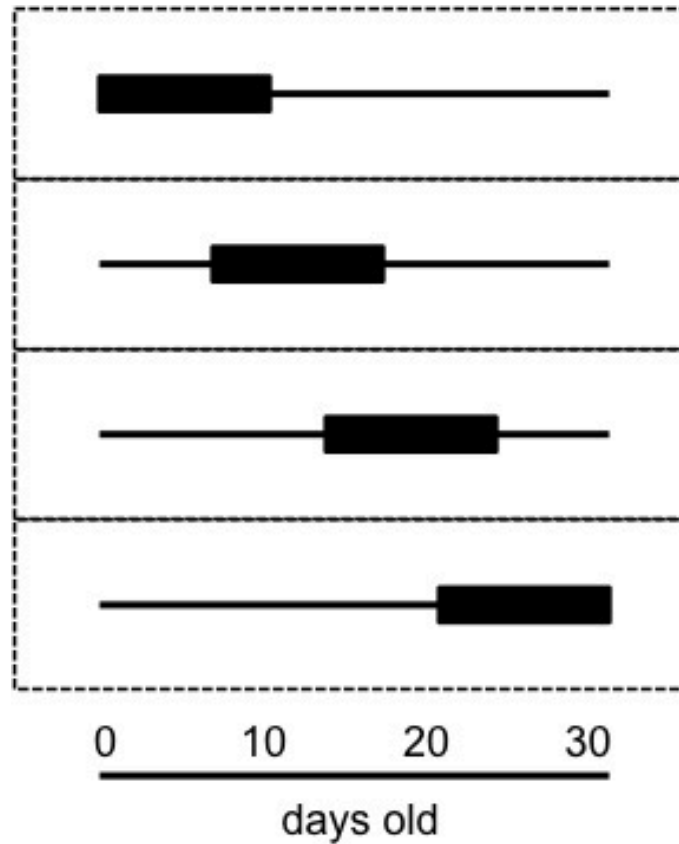
# From egg to bee



	Open Cell		Sealed Cell		AVG Emergence Days	Life Span
	Egg	Larva	Pre-Pupa	Pupa		
Queen	3	5	3	10	21	2-3 years
Worker	3	5	2	6	16	6 weeks
Drone	3	7	4	10	24	1-2 months



# Busy as a ? – Worker Bee Duties



## Hive Center

(Cleaning Cells, Feeding Brood, Capping Brood, Attending Queen)

## Throughout Hive

(Grooming Nestmates, Feeding Nestmates, Ventilating, Shaping Comb)

## Hive Periphery

(Receiving Nectar, Packing Pollen, Storing Nectar)

## Outside Hive

(Guarding, Removing Dead, Foraging)



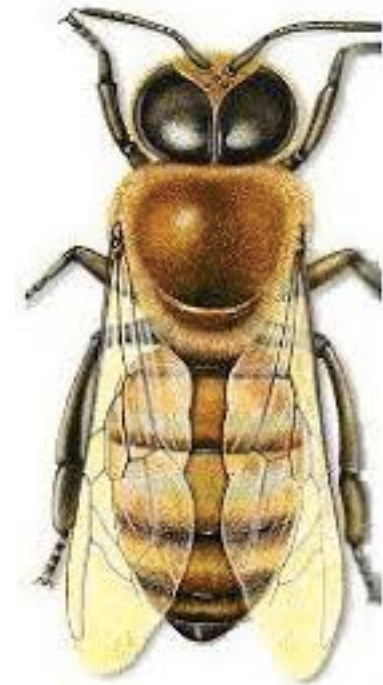
# Her Majesty the Queen

- Only one queen per colony
- Largest bee in the hive
- Can live three to five years
- Lays 1,500 eggs a day
- Only actively reproducing female
- Motivates productivity and brood-rearing by releasing pheromones – QMP - including regulating social behavior, swarming, mating, and suppressing laying workers
- Attended by nurse bees
- Can begin new colonies by swarming



# The Guys – aka - Drones

- Product of unfertilized egg
- No stinger
- Do not participate in work of colony
- One job only: to fertilize new emerging queens through mating flights
- Large compound eyes
- Less than 1000 at peak of honey season
- Kicked out in the fall!!!



**DRONE**





# The Worker

- Female but **typically** not able to reproduce
- 20,000 - 60,000 in a colony
- Live for 4-6 weeks in summer, 4-5 months in winter
- Develop from fertilized eggs
- Defend the hive; have a stinger, but can sting only once
- Have pollen baskets on rear legs to gather and collect pollen while they are foraging for nectar outside the hive
- Perform a variety of functions depending on age and the needs of the hive.
- Each larvae will require 2-3 thousand visits from nurse bees prior to capping the cell



# Foraging Facts

- Forages for pollen, nectar, water
- Transfers nectar and pollen in hive where it is stored
- Travels up to five miles from hive
- Visits 50-100 flowers per collection flight
- Covers a ~50 sq mile distance around hive.
- Most foraging within ½ mile



# Pollination – the facts

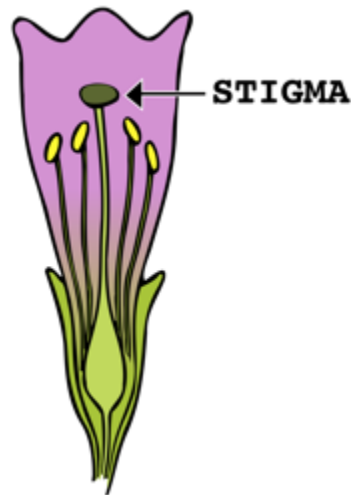
Bees play a major role in the pollination of plants and crops, and are extremely important commercially for farming practices worldwide. It is an essential service—**without pollination, life on the planet would be very different and probably much less diverse.**

It is estimated that about one-third of global food production requires pollination and that **80–90%** of this role is carried out by honeybees.



# Pollination

When a bee collects nectar and pollen from the flower of a plant, some pollen from the stamens—the male reproductive organ of the flower—sticks to the hairs of her body. When she visits the next flower, some of this pollen is rubbed off onto the stigma, or tip of the pistil—the female reproductive organ of the flower. When this happens, fertilization occurs.





# Pollination

- Pollen is the **protein** for the colony and is essential for colony survival !
- Pollen is a key trigger for colony **expansion or contraction** throughout the year.
- Bees return precisely back to the same hive they originate regardless of the distance they travel



## Interested Pollination Facts

- Some crops, including blueberries and cherries, are 90-percent dependent on honey bee pollination. One crop, almonds, depends entirely on the honey bee for pollination at bloom time.
- It's estimated that there are about 2.7 million bee colonies in the U.S. today, two-thirds of which travel the country each year pollinating crops and producing honey and beeswax.
- The California almond industry requires approximately 67% of all US colonies of honey bees in order to adequately pollinate nearly one million acres of almond orchards.



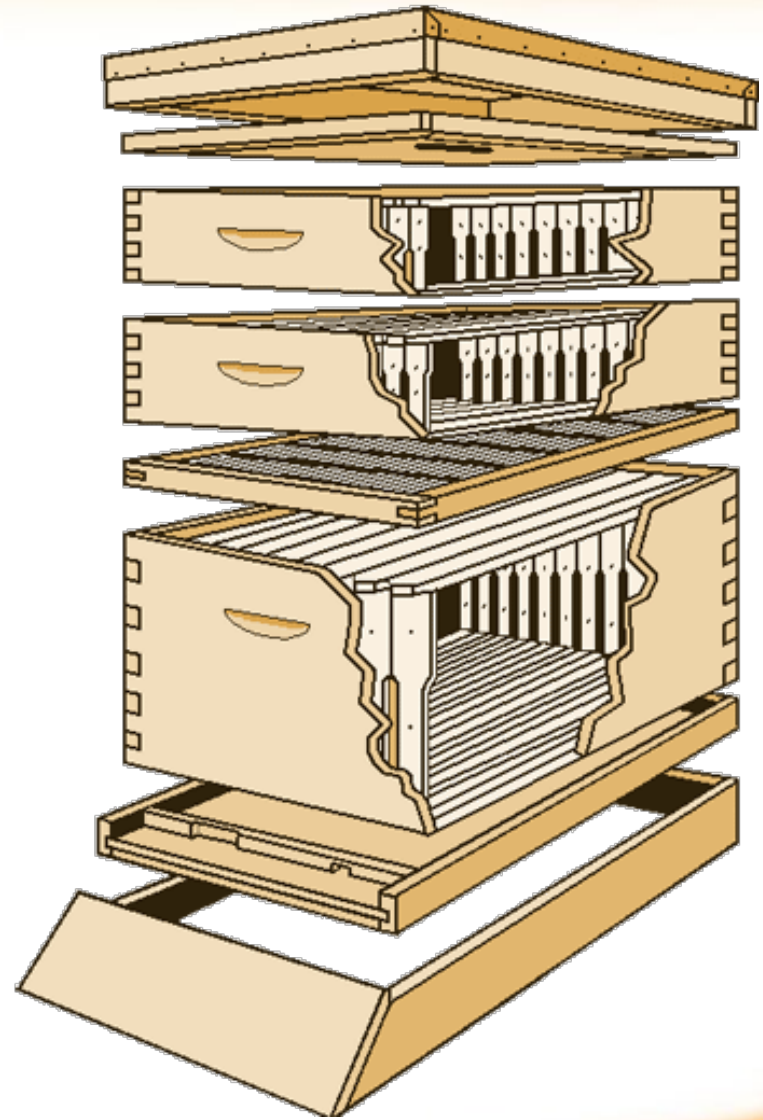
# Equipment





# Equipment – Langstroth Hive Design

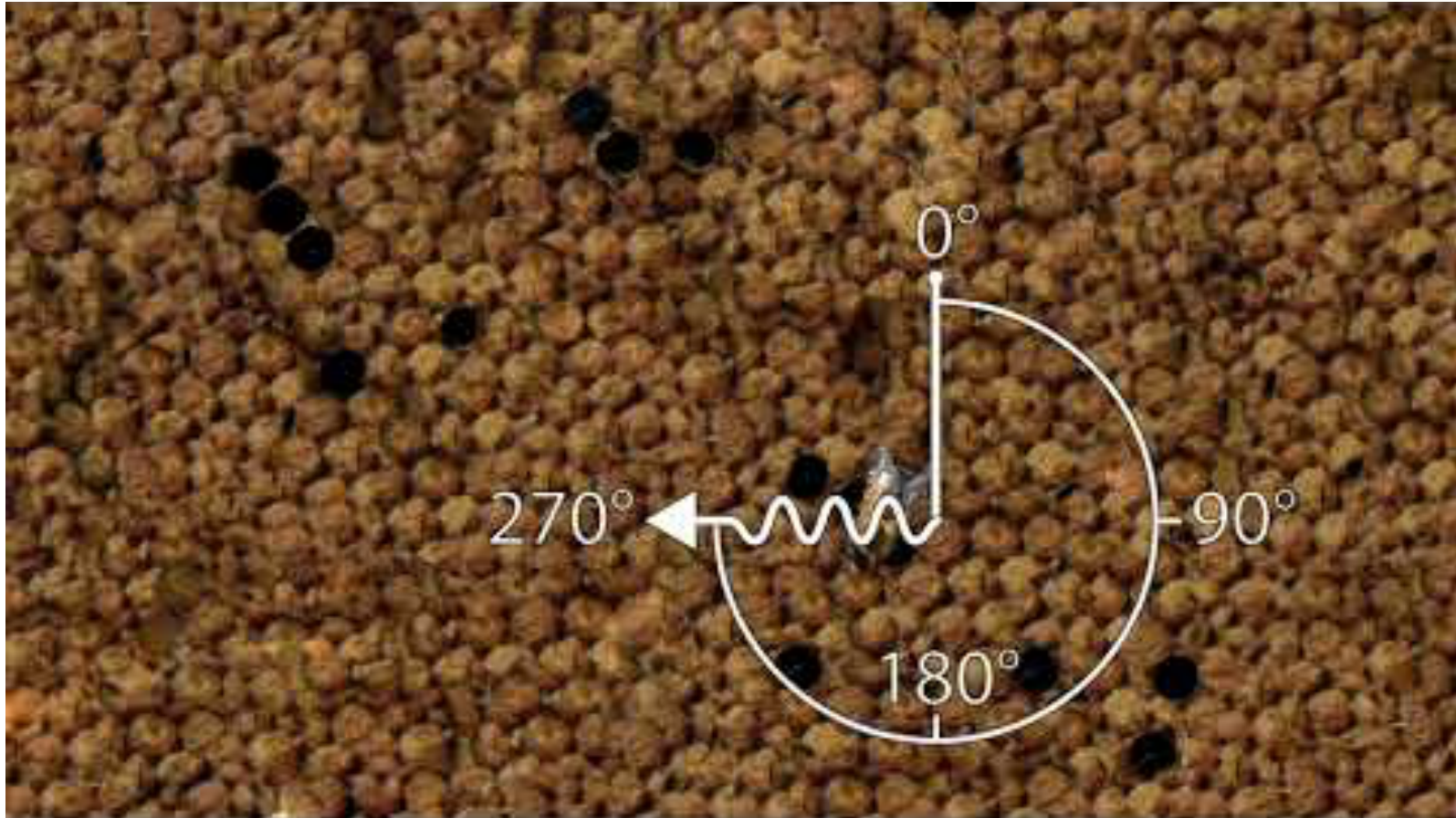
- Telescoping cover and inner cover
- Honey supers
- Queen excluder
- Hive body – Brood box
- Bottom board (screened or solid)
- Hive stand



# Typical 'FRAME' of Bees in a Hive



# Another amazing fact – Care to Dance?



# Equipment



# Challenges

## Diseases



Varroa Destructor Mite \*\*

Foul Brood

Deformed Wing Virus

Small Hive Beetle

Wax Moths

## Pesticides



Encountered During  
Pollination

Brought Back to the Hive

Kills Entire Colonies

Pest Spraying/Mosquitos

## Destruction of Habitat



Short Spring

Extended Draught/Dearth

Extremely Long Winter

Loss of Greenspace/Bee

Habitat



# Colony Collapse Disorder

Honey bees and other pollinators have been declining in abundance and species diversity around the world. The term Colony Collapse Disorder (CCD) was coined in 2006 to describe the mysterious, large-scale sudden disappearances of honey bees in North America and Europe. **There is no single cause for these declines**, but rather a combination of numerous interacting conditions that include parasites, pathogens, poor nutrition, and exposure to environmental pollution and pesticides. Each of these factors can stress individual bees, and their combination results in weakened colonies that may ultimately fail.



# Products From The Hive



# Where Does Honey Come From

- Nectar from flowers
- Enzymes from the bee's stomach
- Changes nectar into simple sugars
- Stored and dried in wax cells
- Capped and stored
- Then we take it!





# How Do We Harvest It?



#1

Remove  
wax  
cappings



#2

Insert  
frames in  
extractor



#3

Filter  
debris/wax  
particles



# Honey – Beyond the Toast

- Raw honey is incredible for your skin thanks to its antibacterial properties and hefty serving of skin-saving antioxidants
- Honey has natural antiseptic and anti-inflammatory properties
- No definitive scientific evidence that raw honey unpasteurized honey helps with allergies



- **Moisturizing Face Mask** - With its moisturizing and soothing effects, raw honey can hydrate the skin, leaving it soft and radiant. The sugars in honey act as natural humectants (retains moisture) and emollients that increase the water content and reduce dryness in the skin even after they have been washed off.
- **Gentle Exfoliant** - Since raw honey crystallizes over time, the tiny granules act as a gentle exfoliant. They start to break down when they come into contact with water and the heat of your skin making for a gentle scrub. And since it's antibacterial, you can use it for your daily face wash.



- **Scar Healing Properties** - The antioxidant properties in honey (particularly buckwheat honey) nourish damaged skin.
- **Bath Soak** - Take a honey-infused soak. Honey's hydrating qualities will leave skin silky soft. Make it at home by mixing two big tablespoons of raw honey into one cup of hot water until the honey is dissolved. Pour it into a tub of warm water to soak.
- **AND MORE!**





## WAX FACTS


- It is used to construct the combs in which the bees raise their brood and they store pollen and surplus honey for the winter.
- Worker bees develop special wax-producing glands in their abdomens and are most efficient at wax production during the 10th through the 16th days of their lives.
- Bees consume honey 6-8 pounds of honey to produce a pound of wax.



# Lip Balm



# Candles

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- Of all the materials used to make candles, natural beeswax is considered to be the most prestigious, the most elegant and in many cases the most expensive.
  - Candles made with beeswax burn very slowly and cleanly with the sweet aroma of honey, creating a relaxing atmosphere.
  - Beeswax can be used at 100% or can be blended effectively with paraffin or soy waxes to improve the overall quality. It can also be very beneficial in increasing burn times when blended with paraffin and soy.





# Questions

