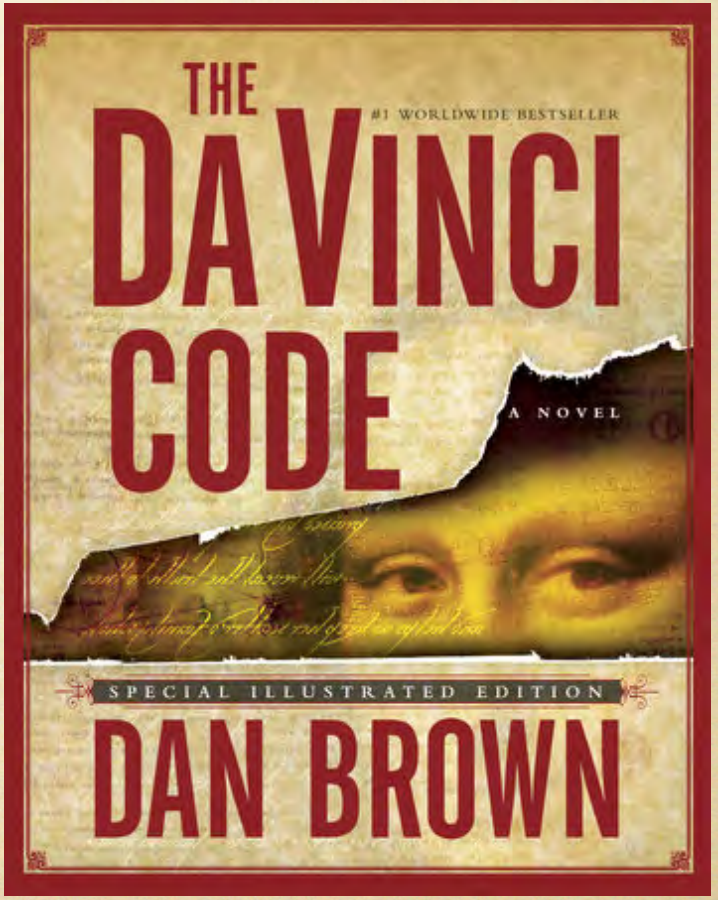
TO BEE OR NOT TO BEE?

- UNBEELIEVABLE REVELATIONS ABOUT THE MIRACULOUS HONEY BEE

WHAT DOES A HIVE OF BEES HAVE IN COMMON WITH THE BOOK…

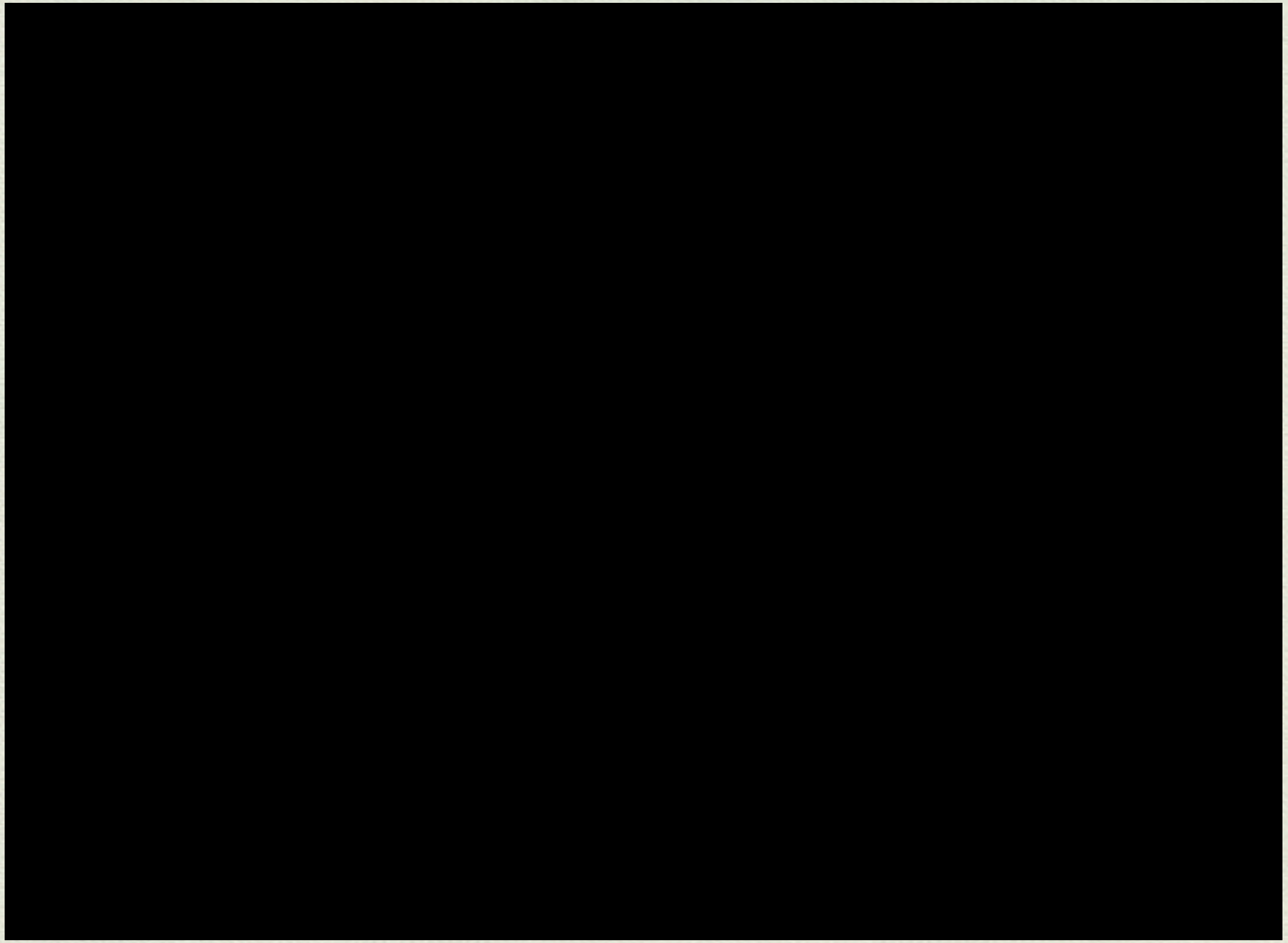
The DaVinci Code, by Dan Brown?



Golden Ratio ≅ 1.618

Female/Male Bee Ratio ≅ 5.666

Amazing Thing 1- Their Love Life



Types of Honey Bees and Their Love Life

Worker Bee(Female)

Does not mate. Can lay an unfertilized egg. Does all the work, collects the nectar, makes honeycombs etc.

Queen Bee

Usually has **only one 20 min mating flight**, mating with≅10 drones. Uses that sperm to fertilize eggs all her life. **Never mates again**.

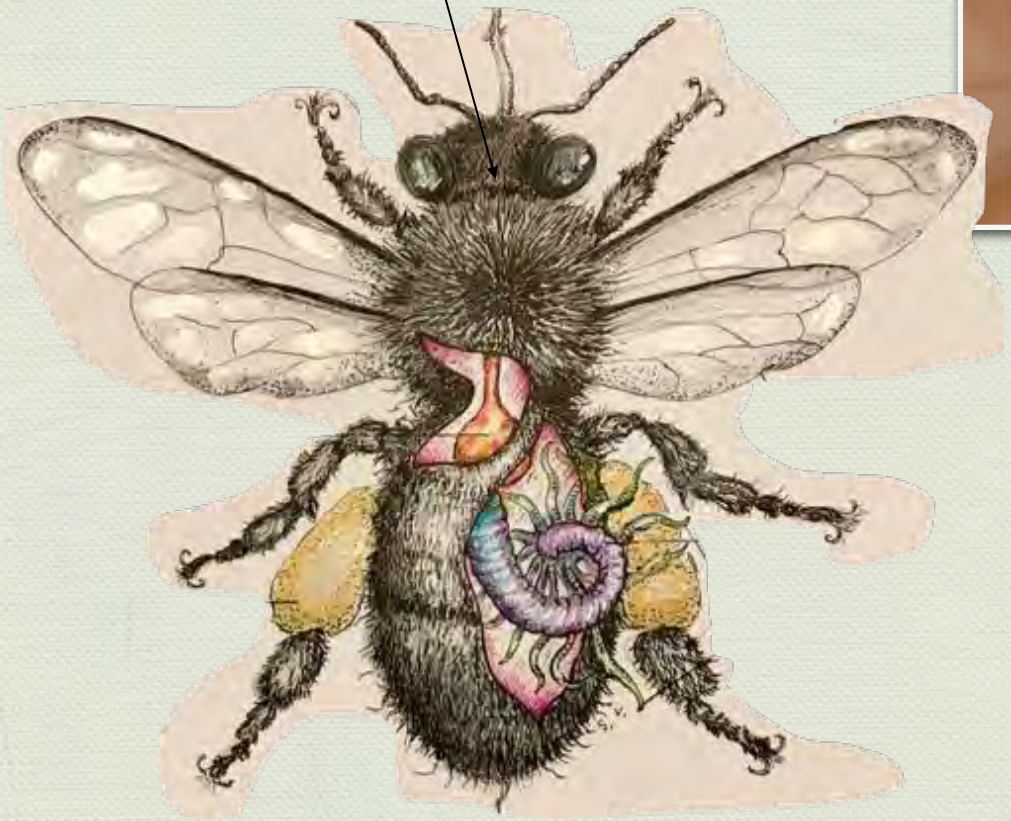
Drone (Male Bee)

Hangs around with friends, **mates once**, in the air, **then dies**

Amazing Thing 2-Their (Worker Honey Bees) Limitations, And Accomplishments in Spite of Them

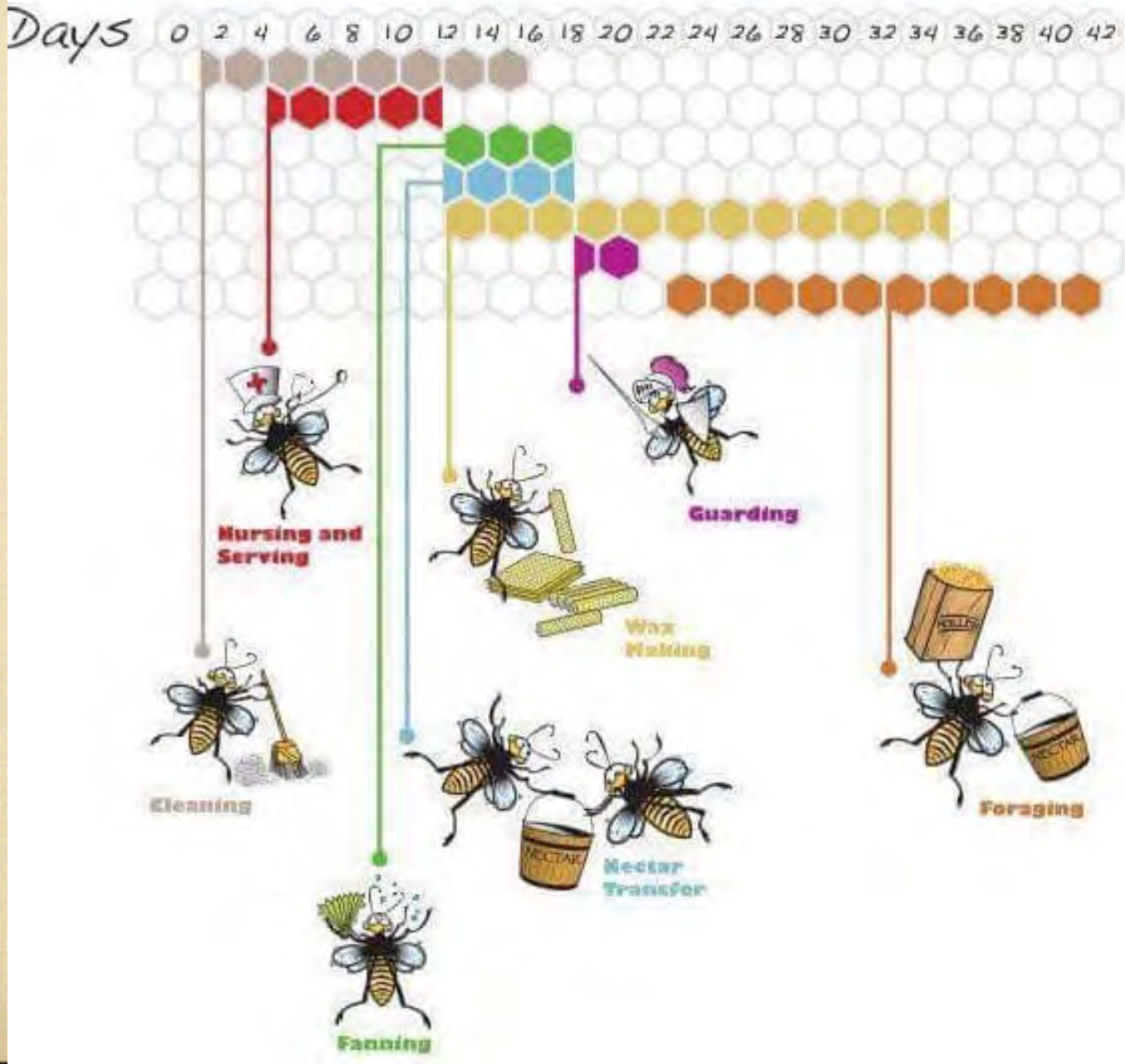
How Long are they?	1/2 inch long
What do they weigh?	1/10 of a gram
How big is their brain?	Size of a mustard seed
How long do they live?	About 42 days

HOW BIG IS A WORKER HONEY BEE'S BRAIN?



- The Honey Bee brain is about the size of a mustard seed (1 cubic millimeter)
- It has almost 1 million neurons. 10 times more dense than any mammal

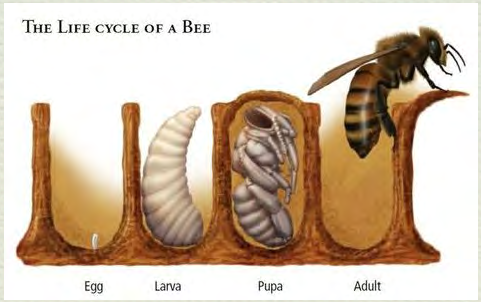
A Worker Bee's Life



THE WORKER HONEY BEE'S MAIN TASK- TO MAKE HONEY

Worker Bees build a honeycomb

Queen bee, fertilized by a drone, lays eggs in the honeycomb to start the egg-larvae-pupa process



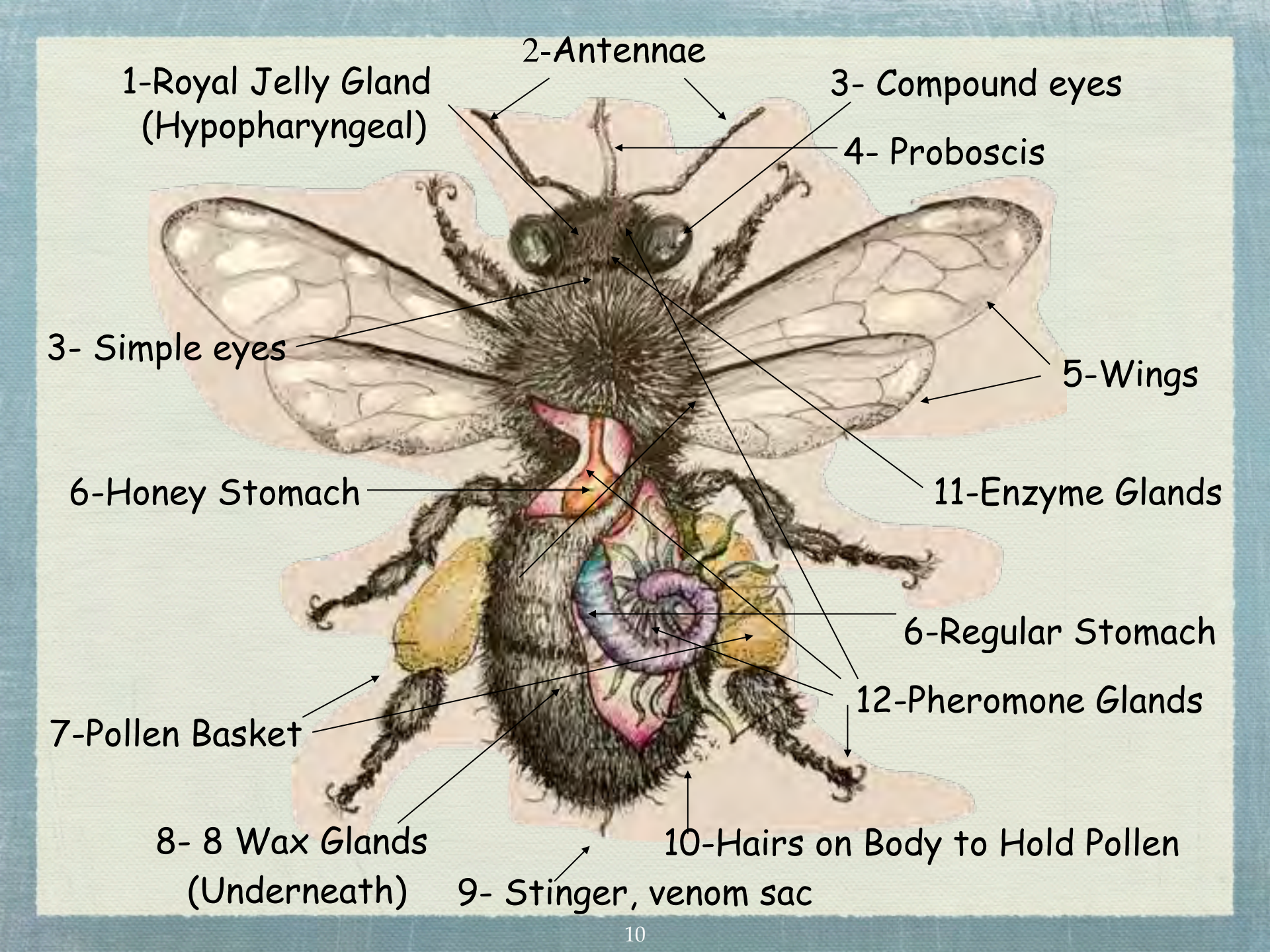
Worker bees, born from the egg-larvae-pupa process, collect nectar, pollen, and propolis

Worker bees inject enzymes in the nectar and dry it until it is finally honey

Honey is stored in honeycomb cells within the hive. Bee larvae, bees, and people eat it.

Amazing Thing 3- How Well They Are Equipped To Do What They Do

And the $64,000 Question: How did she come to be equipped in this strangely appropriate way?


2-Antennae
1-Royal Jelly Gland
(Hypopharyngeal)
3- Compound eyes
4- Proboscis
3- Simple eyes
5-Wings
6-Honey Stomach
11-Enzyme Glands
6-Regular Stomach
12-Pheromone Glands
7-Pollen Basket
8- 8 Wax Glands
(Underneath)
9- Stinger, venom sac
10-Hairs on Body to Hold Pollen

1. To feed larvae so they will grow into a Queen Bee, she has a Royal Jelly Gland (1).

2. To smell, hear, taste, feel, navigate to get nectar, and care for her hive, she has two wonderfully versatile antennae (2).

3. To see flowers, navigate via the sun, and use ultraviolet light, she has 5 special eyes, two of them with 6000 little photosensitive lenses, and hairs on them to help her navigate in windy conditions (3).

4. To suck nectar from flowers, taste, and transfer food, she has a very versatile tongue (Proboscis)(4).

5. To fly quite a ways to get nectar and fly back with a heavy load, she has four special wings (5).

6. To carry nectar she's collected back to the hive, she has a special honey stomach that holds half her weight in nectar (6).

7. To carry pollen she's collected back to the hive, she has pollen baskets on the back of her hind legs (7).

8.To supply wax to make honeycombs, she has 8 wax glands (8).

9. To protect the hive from intruders, she has a stinger and venom sac (9).

10. To collect pollen from flowers, she has three million hairs on her body (10).

11. To help her make honey from nectar, she has some enzyme glands (11).

12. To help her emit odors (pheromones) to communicate, she has 15 additional pheromone glands (12)

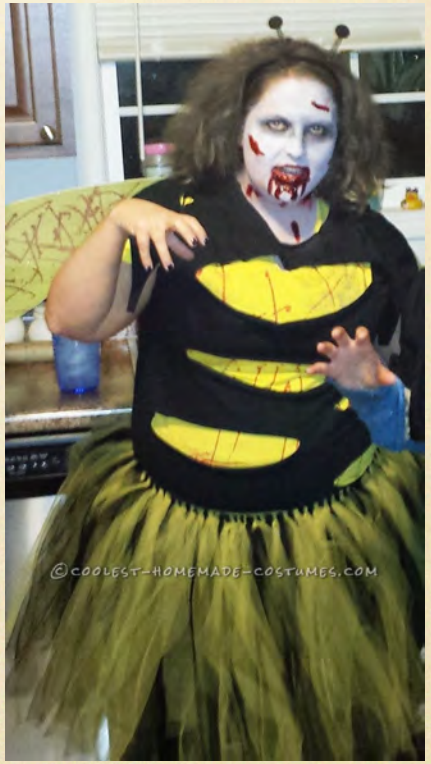
AERODYNAMICALLY
THE BEE SHOULDN'T BE ABLE TO FLY
BUT SOMEONE FORGOT TO TELL THE BEE

we think there might be a lesson in there for all of us!

thesmilecollective.com.au

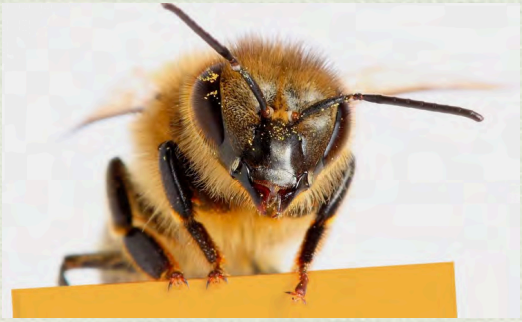
A FRISBEE

What do you call a bee who lives in a graveyard?



A ZOMBEE

Amazing Thing 4- How Smart They Are

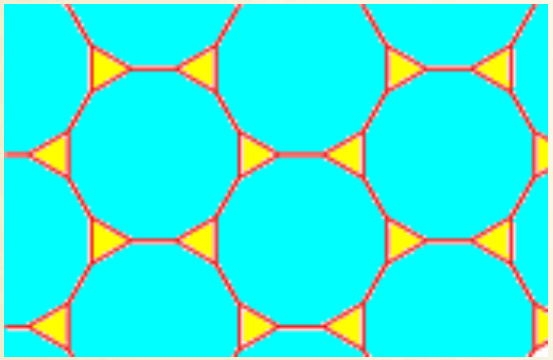


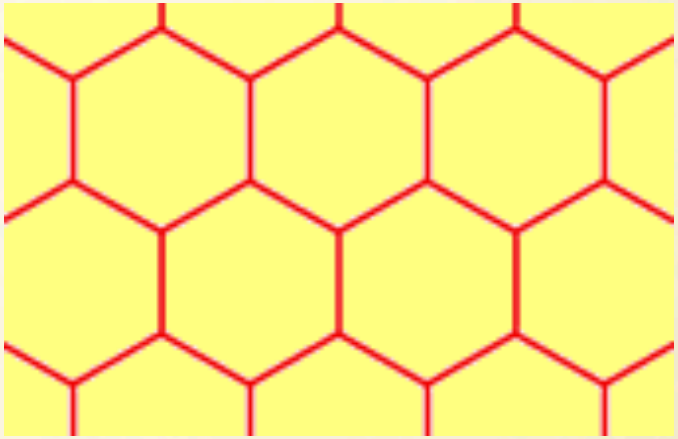
Eleven centuries ago, Byzantine emperor Constantine VII said "The bee is the wisest and cleverest of all animals and the closest to man in intelligence."

- Highly Intelligent, More than Instinct
- Can count, understand "addition" and "subtraction" and "zero"
- Can remember route details up to six miles over several days
- Have a symbolic language; Can communicate in detail with each other
- Can identify colors, landmarks, right and left; Can teach things to other bees; Can observe and mimic behaviors, Understand time.

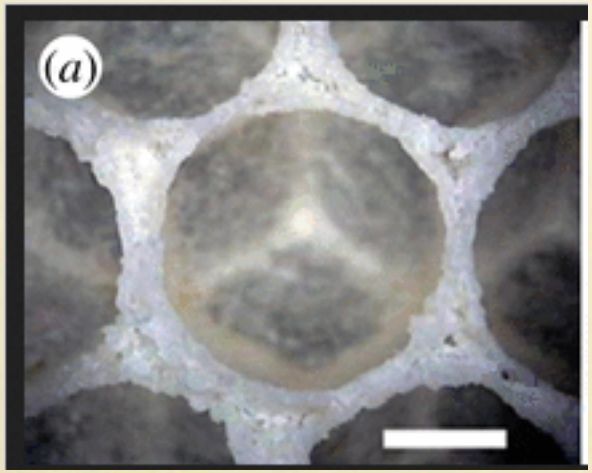
Amazing Thing 5- How They Build Honeycombs

Analyzing a Honeycomb

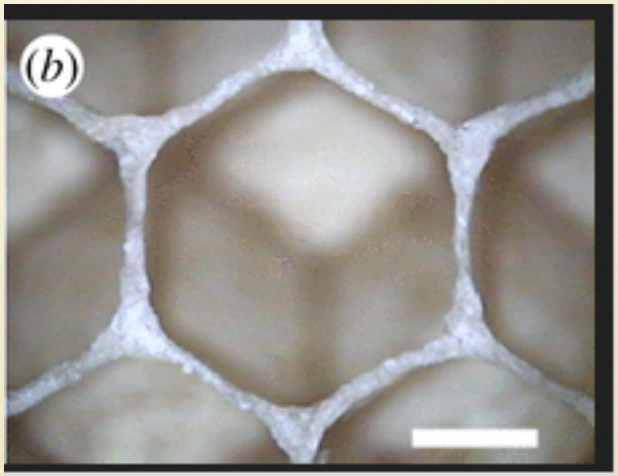




At the Start



Two Days Old




So, Where are we exactly?

Amazing Thing 6- How Bees Make Honey Honey

1. The bees collect nectar, 80% water, from flowers, into their honey stomachs

2. On the way back to the hive, the bees insert an enzyme, *invertase*, from their salivary glands, into the nectar. It helps change sucrose into equal parts of glucose and fructose.

Amazing Thing 6- How Bees Make Honey Honey (Cont.)

3. The nectar is transferred to house bees, who pass the nectar between their honey stomachs to add other enzymes- *amylase* and *glucose oxidase*- which change nectar to honey. And *catalase*, which changes *hydrogen peroxide* to water and oxygen.

4. The house bees deposit the honey into the honeycomb, fan it with their wings until it is 17-18% water, move it to storage, and seal it with a wax cap.

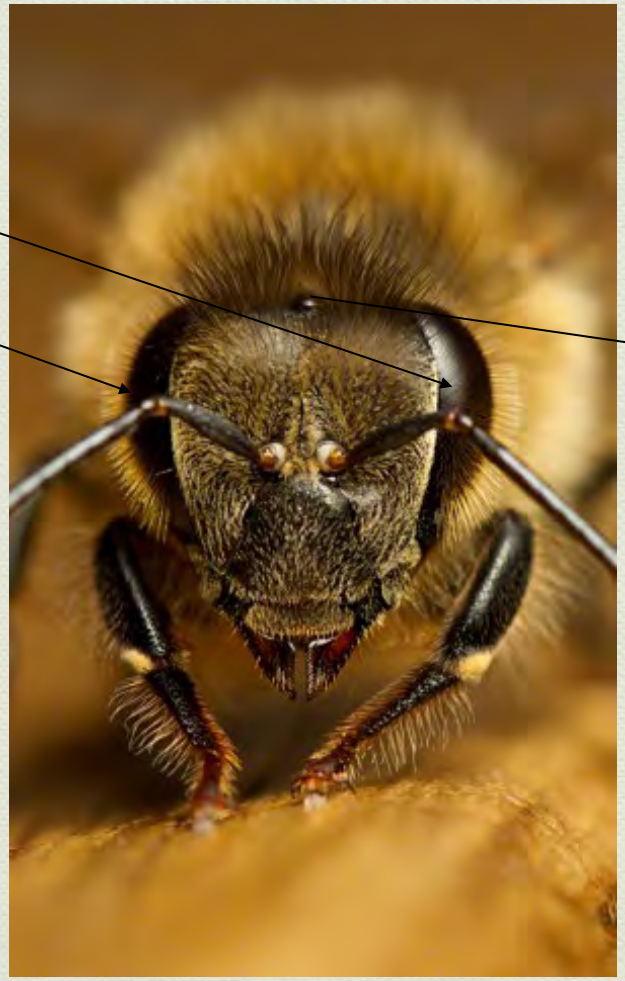
"A Bee is an exquisite chemist"

- Royal Beekeeper to Charles II.

Amazing Thing 7- Their Eyes and How They Use Them

The 5 Eyes of a Honeybee

Two Compound Eyes (Large)



Three Small Simple Eyes

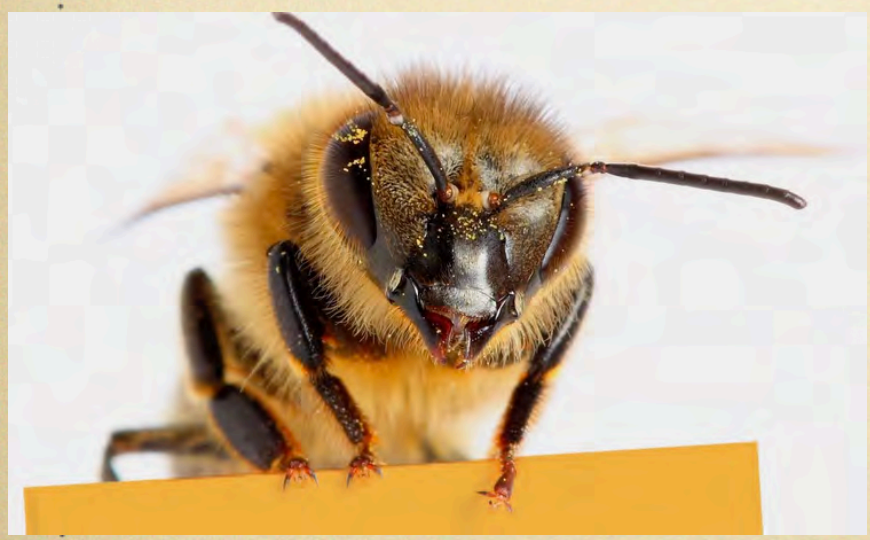
HONEY BEE'S COMPOUND EYE-

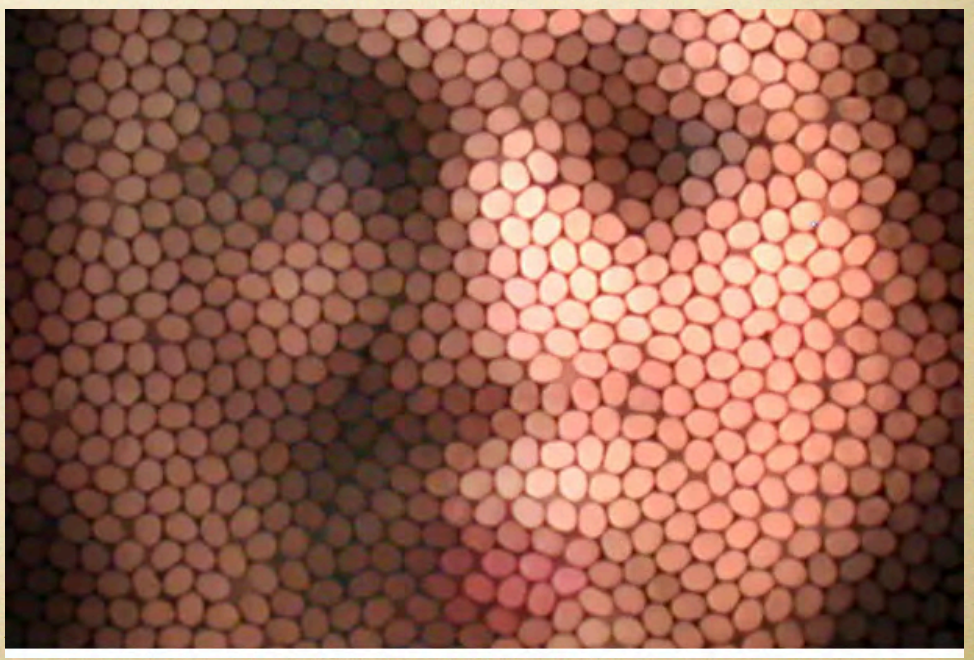
HONEY BEE'S 3 LITTLE EYES

Exchanging Glances!

What We See!

What a Honeybee Sees!



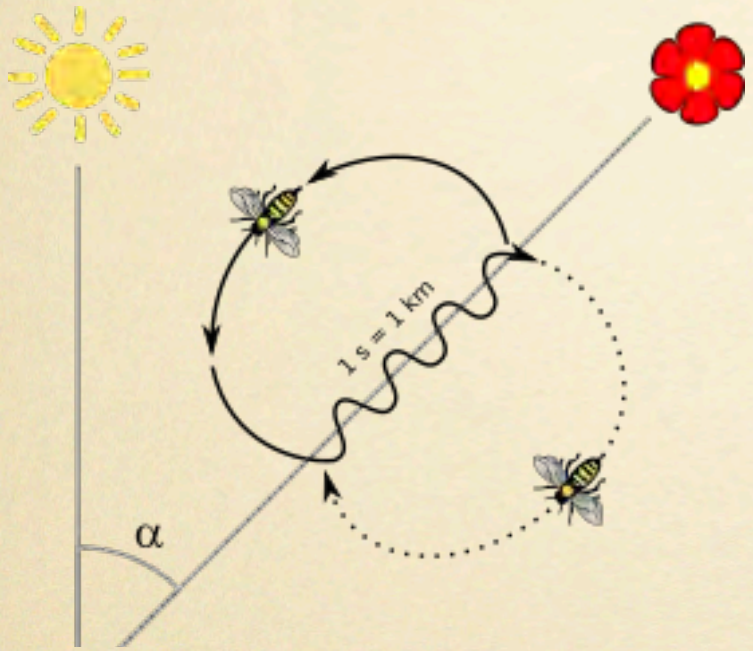


Amazing Thing 8 - How Bees Communicate

A. WITH A WAGGLE DANCE

B. WITH PHEROMONES(ODORS)

The Famous Waggle Dance Video



Time of the Waggle (squiggly line) : Distance to Flower

Direction of dance : Angle of Flowers to Sun

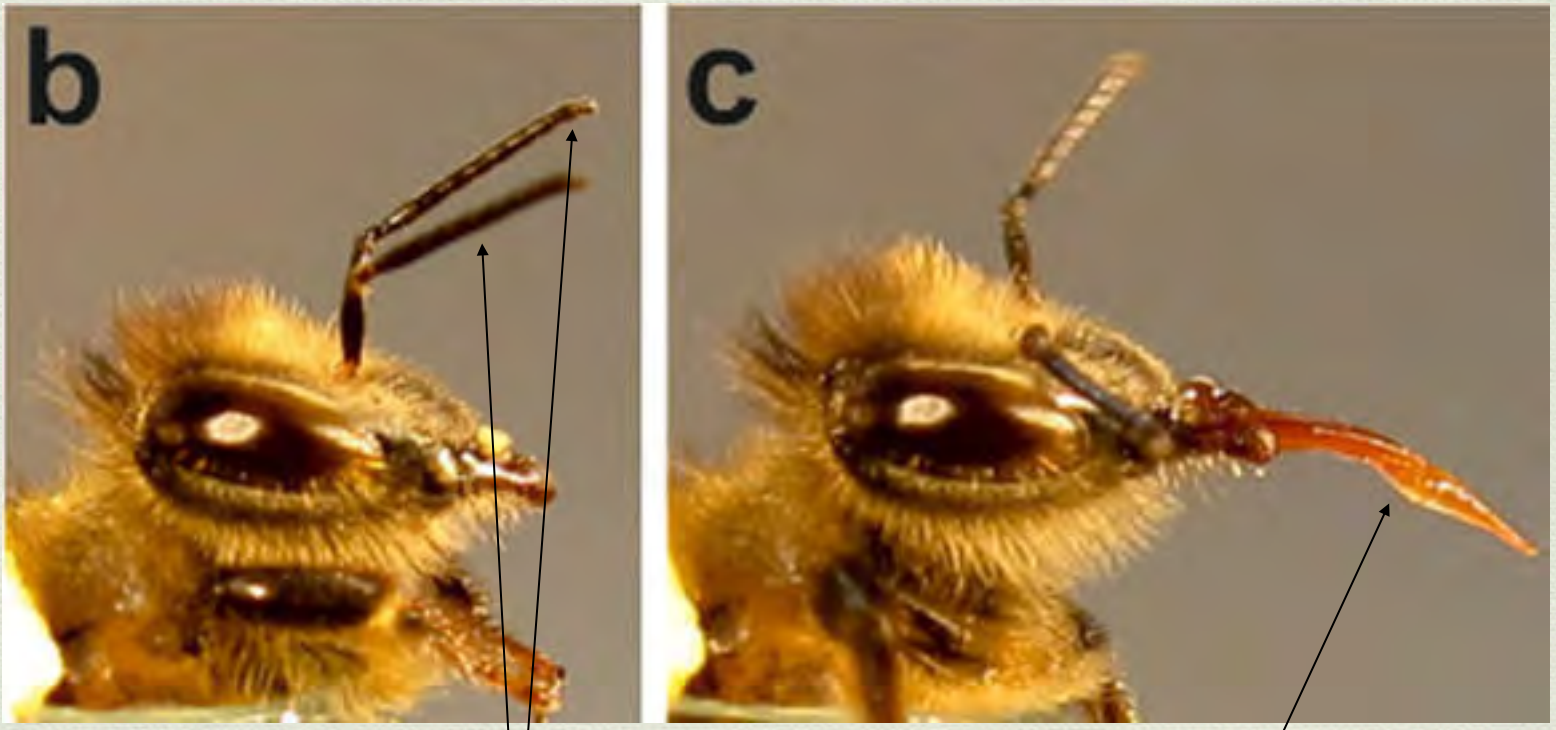
SOME OF THE PHEROMONES THAT BEES USE

Queen Mandibular	Queen Retinue	Brood Recognition	Drone
Queen Well Being	Directs Workers	Controls Worker Ovaries	Drone Get-Together
Egg Marking	Nasonov	Alarm A	Alarm B
Identifies Queen Eggs	Helps Foragers Return	Signals a Sting	Paralyzes Intruders

Forager	Signals Foragers Are Here

Amazing Thing 9- The Scientific Value of Their Sense of Smell

AS BOMB DETECTORS



ANTENNAE

PROBOSCIS

PROBOSCIS **E**XTENION **R**EFLEX= **PER**

BEES "PER-ING"

IN COMPUTER SCIENCE AND MEDICINE

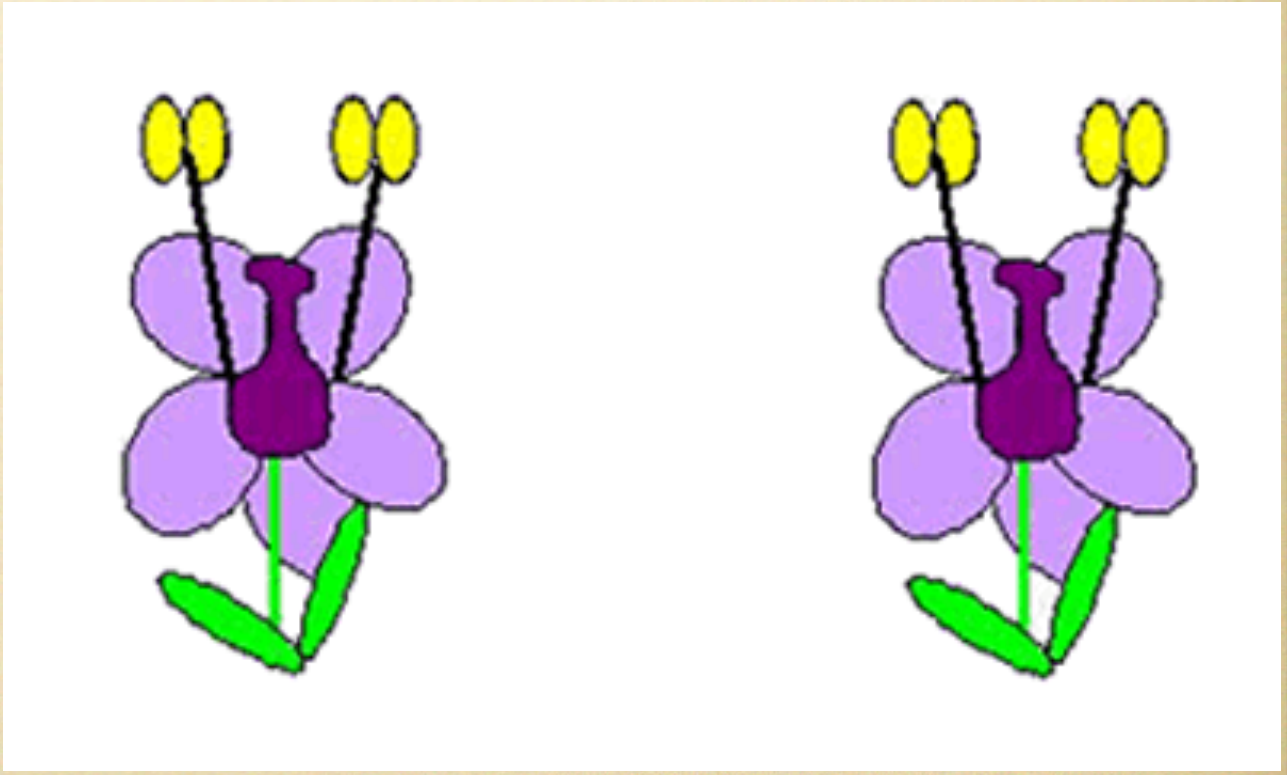
Bees can be trained within 10 minutes to detect the odor of early stage cancer

Amazing Thing 10- How Valuable Bees are to Humans

WHAT DO HONEY BEES DO FOR US?

ONE OUT OF 3 MOUTHFULS OF FOOD IN OUR DIET IS A PRODUCT OF HONEY BEE POLLINATION!

HONEY BEES YEARLY CONTRIBUTE $20 BILLION TO THE VALUE OF U.S.CROP PRODUCTION



WHAT'S THE BOTTOM LINE ON THE BEE'S, AND OUR, FUTURE?

One can no more approach people without love than one can approach bees without care. Such is the quality of bees
Leo Tolstoy

Without bees, the availability and diversity of fresh produce would decline substantially, and human nutrition would likely suffer.

The loss of bees would dramatically alter human food systems but would not likely lead to famine. The majority of human calories still come from cereal grains, which are wind-pollinated and are therefore unaffected by bee populations.

SLIDE ADDENDUM

1. WHAT'S THE SCOOP ON HONEY BEES DYING OFF?(37)
2. WHAT IS CAUSING HONEY BEES TO DIE?(38)
3. WHAT ARE WE DOING ABOUT IT?(39)
4. FROM THIS TALK ABOUT BEES YOU MAY HAVE LEARNED THAT HONEY BEES ARE…(40)
5. WHAT ARE THE MANY TALENTS OF HONEY BEES?(41)
6. WHY BEES USE HEXAGONS FOR THEIR HONEYCOMBS(42)
7. THE AMAZING QUEEN HONEY BEE(43)
8. SOME AMAZING REVELATIONS ABOUT WORKER BEES(44)
9. ABOUT HONEYBEES(45)

WHAT'S THE SCOOP ON HONEY BEES DYING OFF?

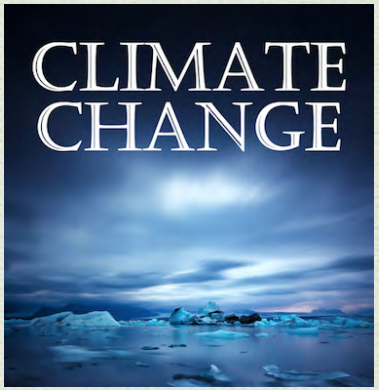
37.7% of U.S. Honey Bee Colonies Died This Past Winter. 9% More Than The Average Winter Loss.

From 2010 through 2018, an average of 30% of U.S. Honey Bee Colonies Died in the Winters. An Average of 10% Over Expected Winter Loss.

WHAT IS CAUSING HONEY BEES TO DIE?

Pesticides

Neonicotinoids



Impairs Pollination

Cell Phones Disorients

Varoa Mites

Kills

Greatly reduces available food

Virus

Kills

WHAT ARE WE DOING ABOUT IT?

Government Action

Natural Pesticides

Seeding and Planting Robots

Treatments for Mites and Viruses

Tracking Bee Problems

Setting Aside Land for Bees

FROM THIS TALK ABOUT BEES YOU MAY HAVE LEARNED THAT HONEY BEES ARE…

Smarter Than You Thought

More Physically Capable Than You Thought

Harder Workers Than You Thought

More Organized Than You Thought

More Valuable Than You Thought

More Safe Than You Thought

More Amazing Than You Thought

OR MAYBE NOT!

THE MANY TALENTS OF HONEY BEES

Building Maintenance Experts

Mathematicians

Chemists

Engineers

Navigators

Communications Experts

Bomb Detectors

Medical Diagnosticians

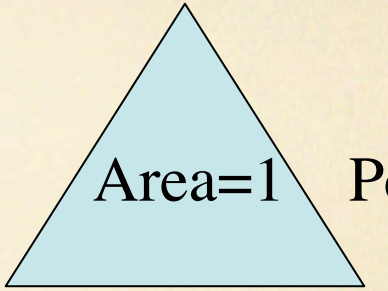
Nurses

Honey Makers

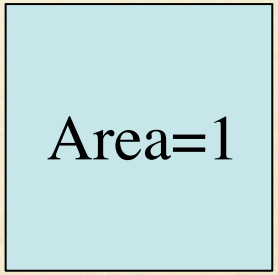
Pollinators

????????

WHY BEES USE HEXAGONS FOR THEIR HONEYCOMBS



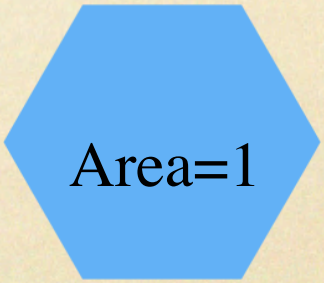
Perimeter= **4.56**



Perimeter= **4.00**

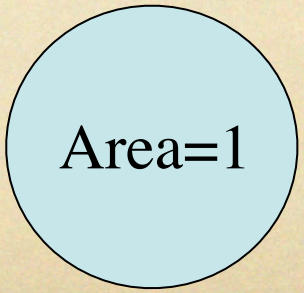
-All the figures on right have area 1.

-All but the circle can be placed together without leaving spaces.



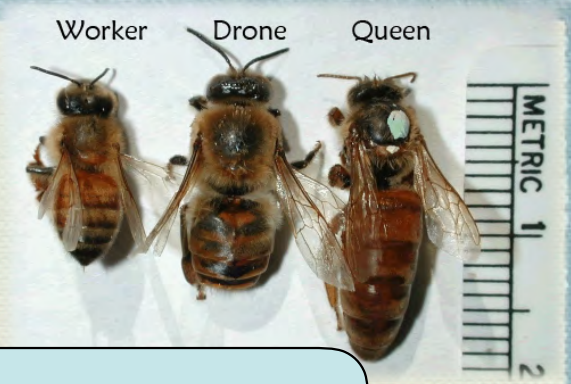
Perimeter= **3.72**

-Hexagons(smallest perimeter) use less wax to contain the same amount in a honeycomb, and work best for the bees.



Perimeter= **3.55**

The Amazing Queen Honeybee ….



Born from an egg as a larva, pupa

Eats Royal Jelly to become Queen

Becomes Twice the Size of a worker bee

Goes on a short mating trip. Mates with ≅10 drones

Uses that sperm all her life to fertilize eggs

Lays 2000 eggs a day for 4 years

Emits pheromones (odors) to communicate and direct hive activities

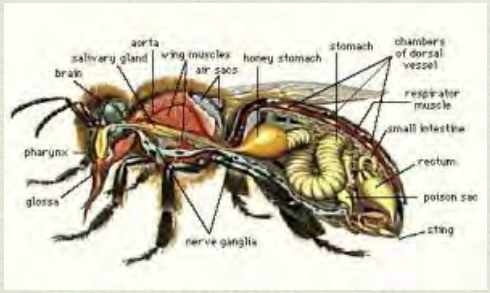
Only stings rival queens

Come Hear

SOME UNBEELIEVABLE REVELATIONS ABOUT THE MIRACULOUS HONEY BEE

A Talk by Phares O'Daffer

Aug 20, 2019, 2:30 pm in Luther Oaks IL Dining Room



Some Bee Facts

What They Do

How Are They Equipped to Do It?

Some of Their "Unbelievable Abilities"

Their Value and Their Problems

About Honey Bees

Brain the size of a sesame seed
1 million neurons

Can Fly
15 mph

Use a Waggle Dance to Communicate

Wings Flap 15,000 Times a Minute

Worker Bees have 2 stomachs

Queen Bee
2 cm long

Honey bees die after stinging

And, believe it or not, honey bees can see you. (More on this later)

Bees carry pollen in baskets on hind legs