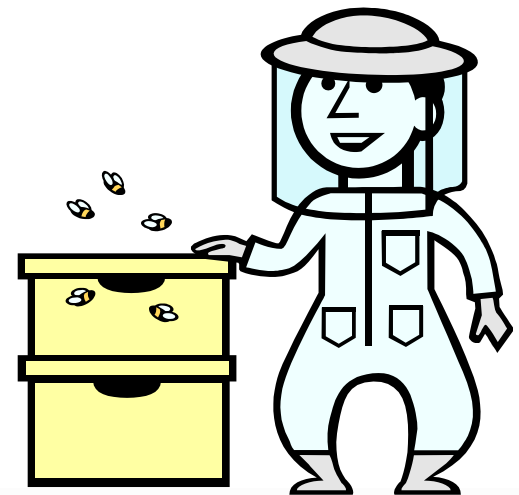




Honey Bees Identification, Biology, and Lifecycle

Speaker: Donald Joslin



- Hive consists of three types of bees
 - Queen, Drone and Worker





Color:	For Year Ending In:
White	1 or 6
Yellow	2 or 7
Red	3 or 8
Green	4 or 9
Blue	5 or 0

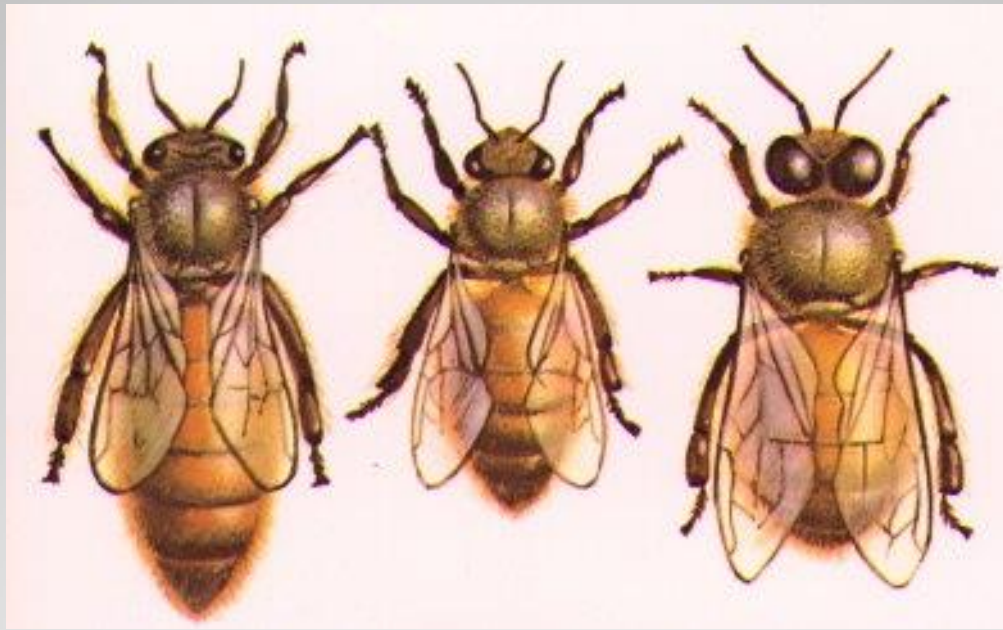
Queen Marking Colors

Queen

- Only Fertile female in the Hive
- Can lay 2000 eggs each day
- She can live 5 years, 3-years average
- One per colony usually
- Mates in flight with 7-150 drones

Queen

- Her thorax is slightly larger
- No pollen baskets or wax glands
- Stinger is smoother and curved (and reusable)



The Honey Bee Colony



Queen

- Pheromones
 - The “social glue” of the hive
 - Gives the colony its identity and temperament
 - Sends signals to the workers
- Mates once, in flight, with 7 to 150 drones
- Lays both fertilized and unfertilized eggs
 - Fertilized eggs become workers or Queens
 - Unfertilized eggs become drones

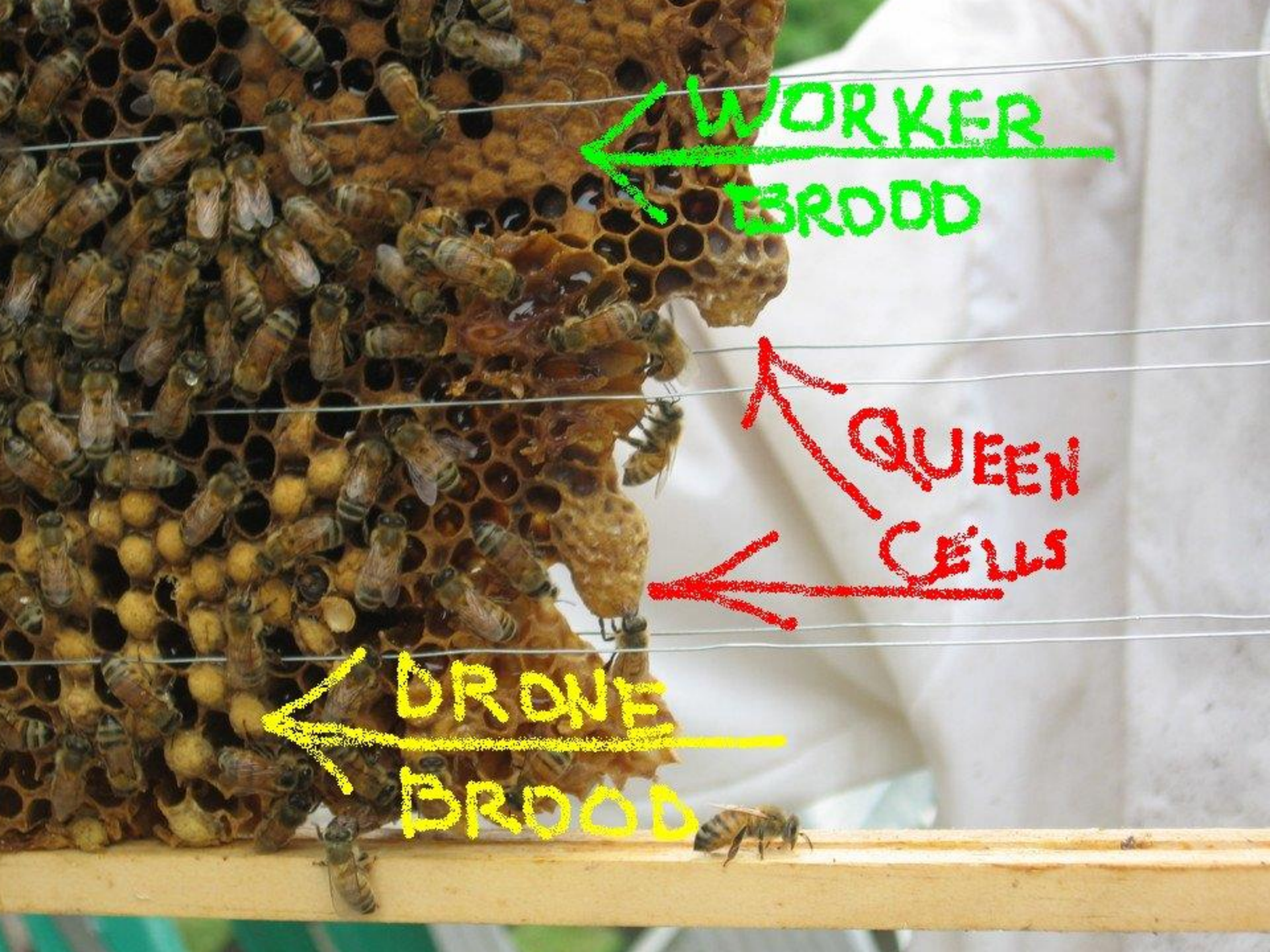
- How does an egg become a queen instead of a worker?
 - Royal Jelly is fed to the larvae for a much longer period of time
 - Royal Jelly is secreted from the hypopharynx of worker bees

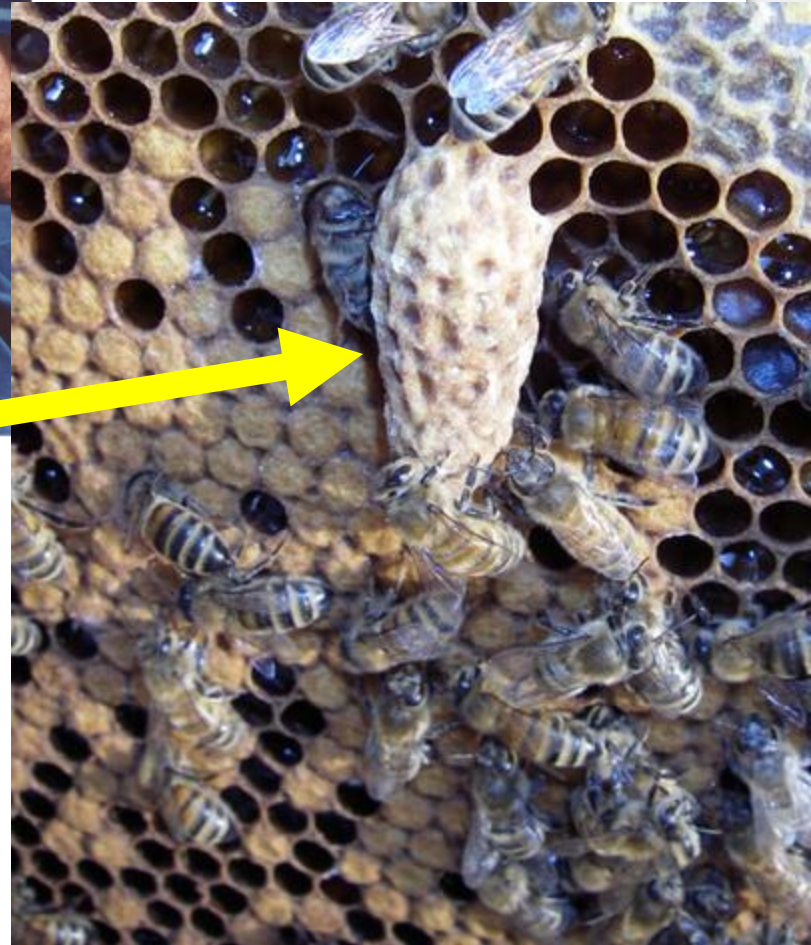
Royal Jelly

← WORKER
← BROOD

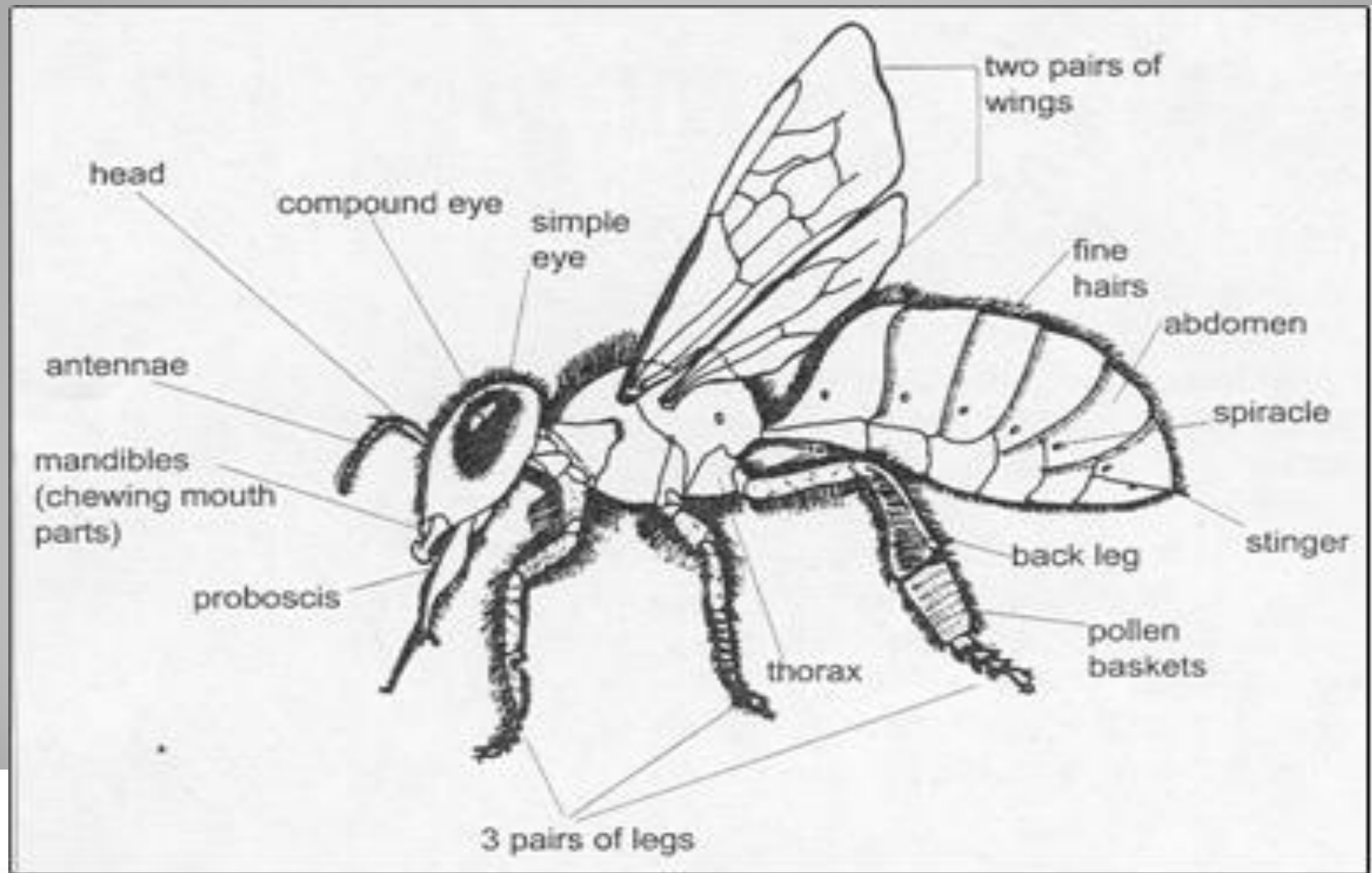
↑ QUEEN
← CELLS

← DRONE
← BROOD





Supercedure Cell
(Never cut these unless you have a replacement queen ready)



Worker

- Sterile female
- Does the work of the hive
- Have specialized body structures
 - Brood food glands – royal jelly
 - Scent glands (pheromones)
 - Wax glands
 - Pollen baskets
 - Barbed stingers – Ouch!

The Honey Bee Colony

- Worker Bees Perform Roles
 - Nurse
 - Guard
 - Forager



Castes

- Worker bees progress through very defined growth stages
 - When first hatched they become **Nurse Bees**
 - Clean cells, keeps brood warm, feed larvae
 - Receive nectar from field bees
 - Cleans the hive
 - Builds wax comb
 - Begin to take orientation flights

Nurse Bee

Guard Bees

- Keep unwanted visitors out of the hive
- Fan to cool the hive
- Fan to release locator pheromone (Nasonov)
- Fan to dehydrate honey

Undertaker Bees

- Remove the dead

Forager

- Last stage of life
- Gathers nectar and pollen
- Fills nature's critical pollinator role
- Low survival rate
 - Predators
 - Insecticides
 - And if she survives this she...
- Works herself to death!

Castes

Laying Worker

- Sterile female
- When a colony becomes permanently queenless, the ovaries of several workers begin to develop and workers begin to lay unfertilized eggs
- This is normally suppressed by presence of brood, the queen and her pheromones
- The colony is doomed

Drone

- Fertile male
- No stinger, pollen baskets, or wax glands
- Exists solely to mate with queens (then dies)
- Put out for the winter



Development Times

BEE	EGG	LARVA	PUPAE	TOTAL	LIFE SPAN
Queen	3	5-1/2	7-1/2	16	2-5 years
WORKER	3	6	12	21	6 weeks • Inside duties • Forager
DRONE	3	6-1/2	14-1/2	24	8 weeks

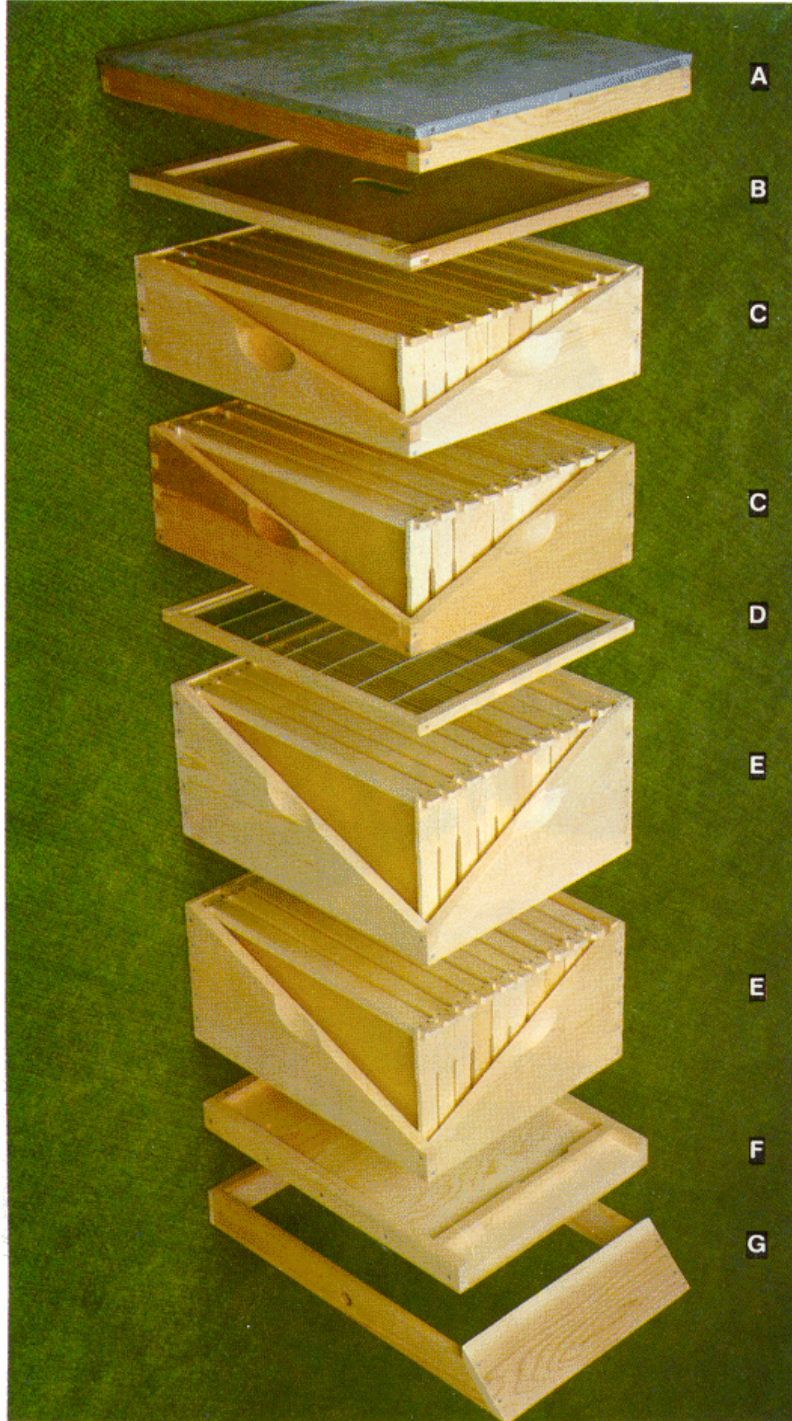
- If you see capped swarm cells the old queen and her forager bees are gone!
 - Or will be shortly
- If your hive is nasty
 - There may not be a queen
 - Or, you need to Requeen (genetics)

Using Your Knowledge

- Probably the single most distinguishing characteristic of the honey bee
 - They are social
 - They communicate via pheromones and dancing
 - The forager bee dances to tell the other foragers where the source of nectar or pollen is

Communication

Beekeeping Equipment



The modern bee hive is like a highly efficient multistoried factory with each “story” having a specific function. These “stories” work together to provide a home for bees and a honey factory for the beekeeper.

- A) **Hive Cover** — telescoping cover “telescopes” over the sides of the top super to protect the hive. Galvanized covering.
- B) **Inner Cover** — Creates a dead air space for insulation from heat and cold.
- C) **Shallow Supers** — For “surplus” honey storage. Bees store their extra honey in these for the beekeeper to take. 6 $\frac{1}{8}$ ”, 5 $\frac{1}{8}$ ” supers, or even hive bodies may be used.
- D) **Queen Excluder** — Keeps the queen bee in the brood chambers as she is too large to pass through the excluder.
- E) **Hive Bodies** — “Brood Chambers” are the bee’s living quarters. Queen lays eggs in these chambers and brood is raised. Honey is also stored for the bees’ food.
- F) **Bottom Board** — Forms the floor of the hive. Shown with wooden entrance reducer in place to keep mice and some cold out during winter.
- G) **Hive Stand** — Supports the hive off the ground to keep hive bottom dry and insulate hive.

Successful beekeeping means easy manipulation of the frames of brood and honey to provide a “surplus” of honey beyond that needed by the bees to live on and rear their replacements. It is this “surplus” that the beekeeper removes and markets.

Components of the Hive

Honey Bee Diseases and Pests

- There are two categories of diseases that concern us
 - Brood diseases
 - Adult diseases

- Pests include
 - Mites, Mice, Hive beetle, Wax Moth, Skunks and Bears!

- American Foulbrood (devastating)
 - European Foulbrood (least likely)
 - Chalkbrood
-
- These are the most likely occurring brood diseases we will encounter

Brood Diseases

- Caused by spore forming bacterium
- The most destructive
- Attacks brood, does not affect adult bees
- Larvae eats spores and dies after capping
- Cells are discolored, sunken and have punctured cappings
- Colonies must be burned or irradiated
- Larvae Die after Capping

American Foulbrood

- The spores are very difficult to eradicate
- Don't buy used equipment
- Even honey may contain AFB spores
- Burning is required by law!
- Irradiation is becoming accepted
(Worcester Beekeepers Irradiation Program)

American Foulbrood

- Often considered a "stress" disease
- Most prevalent in the Spring
- A healthy colony can usually survive
- Hygienic Bees quickly recover
- Larvae die before capping

European Foulbrood

- Fungal brood disease caused by spore-forming fungus
- Affects all brood types
- Dead larvae are chalky white and fluffy
- Prevalent in late spring
- Increasing ventilation helps recovery
- Strong bee populations can deal with it and not be destroyed by the infection

Chalkbrood

- Nosema
- Nosema Ceranae

- Deformed Wing Virus
- Acute Paralysis Virus
- Kashmir Bee Virus

Adult Diseases

- Single Cell Protozoan
- Two Stages
 - Long Lived Spore
 - Vegetative Form - the growing stage
- Diagnosis
 - Spotting on hive
 - Field gut test
 - Slow/sluggish hive

Nosema

- Dysentery
 - From too much indigestible matter
 - Occurs during colder months
 - Lack of Cleansing Flights
- Chilled Brood
 - Brood dying from sudden cold snaps
 - Only inspect on warm days 65+

- Bears
- Skunks
- Mice
- Small Hive Beetle
- Wax Moth
- Tracheal Mite
- Varroa Mite

Honey Bee Pests

- From South Africa
- First discovered in Charlestown S.C. 1996
- By 1999 found in California, Maine, Iowa, Minnesota, Massachusetts, Texas, and others
- Larvae hatch eating honey and pollen
- Leave hive and Pupate in the ground
- Larvae are not Light Sensitive

Small Hive Beetle

- Not a big problem - so far
- Cold winters kill most
- Oil Traps in Hive
- Checkmite Plus Coumafous
- Gardstar – Soil Drench
- Diatomaceous earth – acts as desiccant in soil

Treatment for SHB

- Lays eggs in brood comb
- Larvae eat castings left by pupae
- Spin Strong Silken web consuming the comb
- Strong hives easily control moths
- Freezing temperatures kill eggs
- Para-moth used for storing comb

Wax Moth

- Nearly wiped out British Honey Bees
- Acarapis Woodi invaded U.S. 1984
- Mites reproduce in trachea feeding on blood
- Weaken and shorten life of bees
- Highest infestation in winter
- Some bees more susceptible than others

Tracheal Mite

- Menthol Crystals
- Grease Patties
- Formic Acid – Mite Away Pads
- Thymol – Apiguard

- Buy Resistant Bees - Buckfast

Tracheal Mite Treatments

- 1987 Discovered in U.S.
- Reproduce in cell feeding on larvae
- Transmits Deformed Wing Virus and Acute Paralysis Virus
- Prefer Drone brood
- High mite population in summer causes hive to crash when mites switch to worker brood in the fall

Varroa Destructor



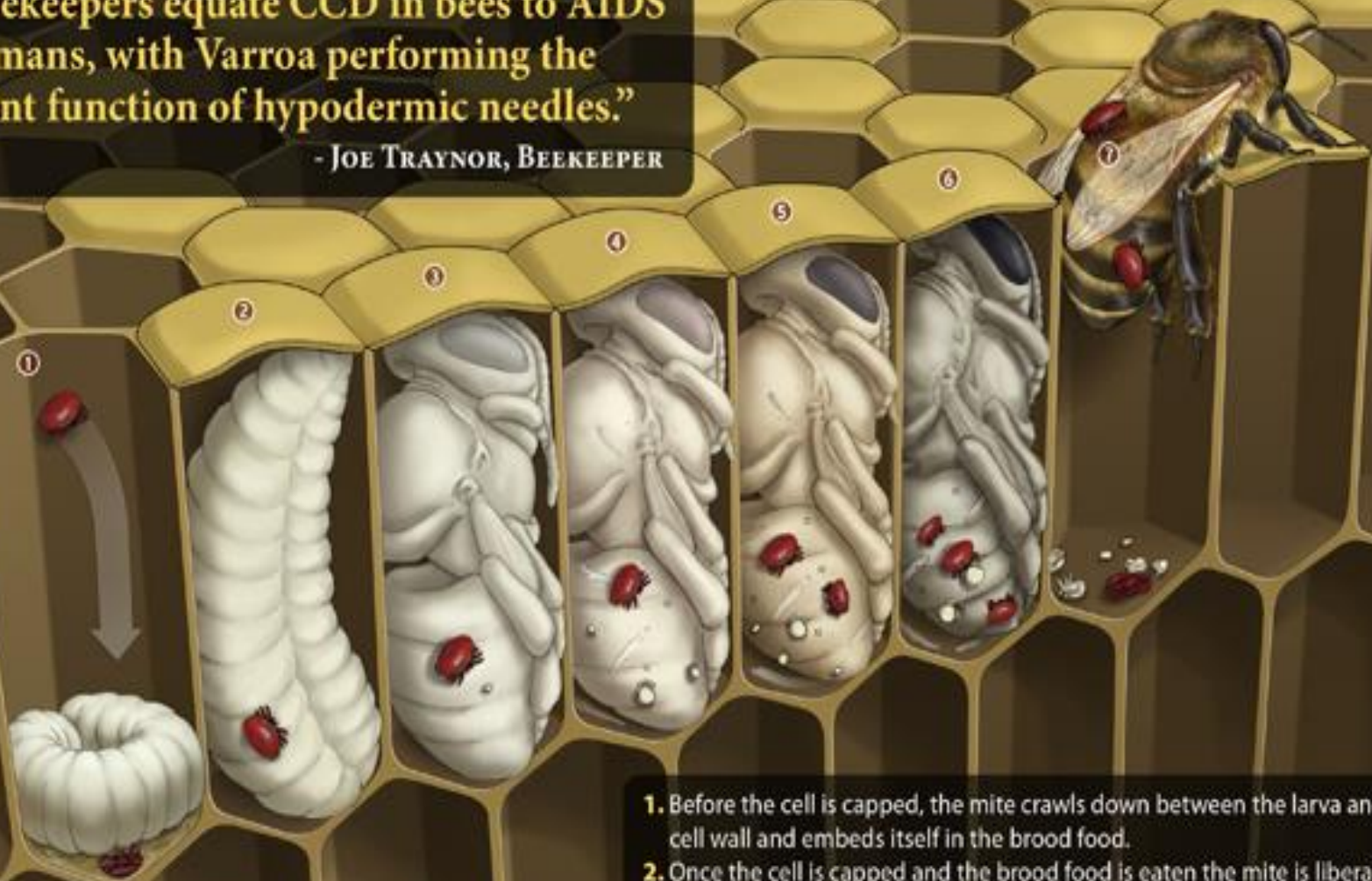
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and

- Female enters cell before capping and starts feeding on pupae
- Lays a male egg 60 hours later
- Lays a female egg 30 hour intervals
- Brother and sisters Mate
- Emerge with bee and seek new host

Varroa Life Cycle

“Some beekeepers equate CCD in bees to AIDS in humans, with Varroa performing the equivalent function of hypodermic needles.”

- JOE TRAYNOR, BEEKEEPER



1. Before the cell is capped, the mite crawls down between the larva and cell wall and embeds itself in the brood food.
2. Once the cell is capped and the brood food is eaten the mite is liberated and begins to suck the blood of the prepupa.
3. The mite lays its first egg (a male) 60-hours after capping and lays subsequent eggs (all females) at 30-hour intervals.
4. Mite feces begin to build-up within the cell.
5. Mites continue to develop and feed upon the bee, transferring viruses.
6. Mating begins within cell.
7. Adult female mites leave with emerging honeybee while male and immature mites stay in the cell and die.

- Apistan – Fluvalinate – Mites are resistant
- Checkmite – Coumaphous
- Apiguard – Thymol
- Api Life - VAR- Menthol, Eucalyptus, and Thymol
- Mite Away Quick Strip (MAQS) – Formic Acid

Varroa Treatments