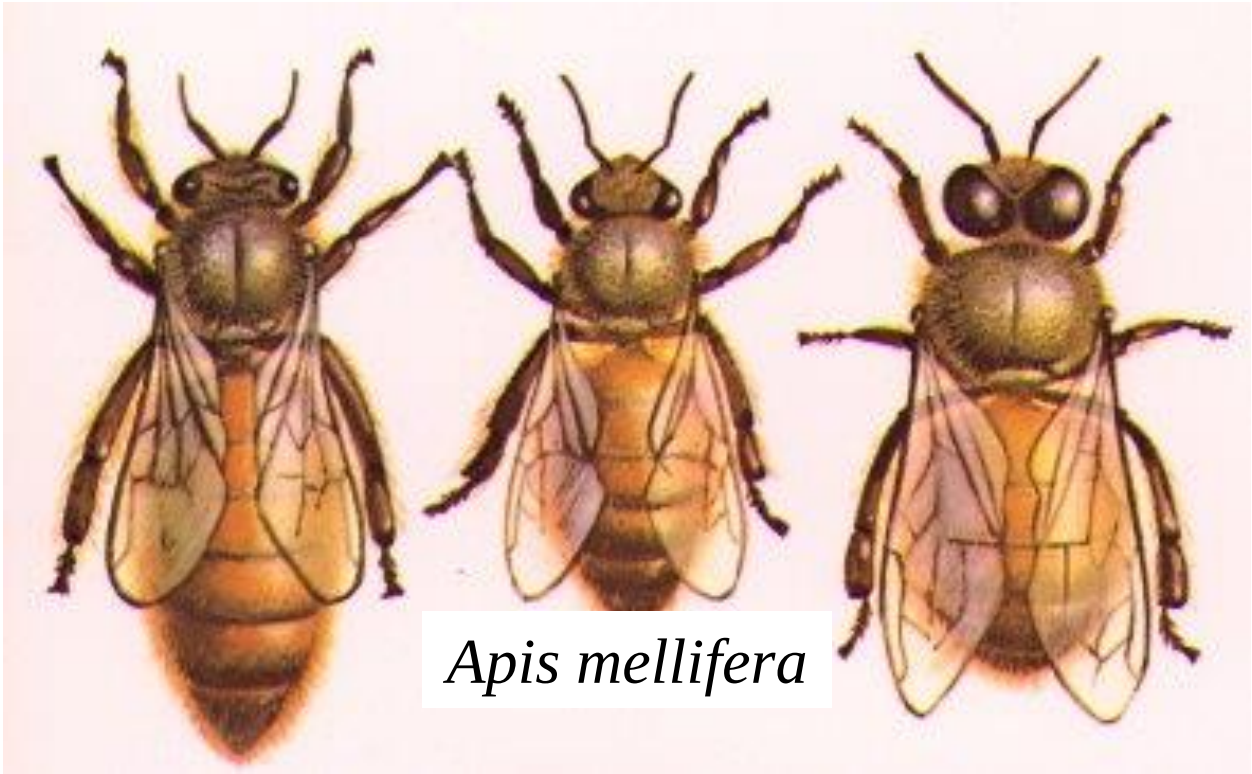
WASHINGTON MASTER BEEKEEPERS
"THE BEE BOOK
APPRENTICESHIP CURRICULUM"

THE HONEY BEE



Honey Bee Scientific classification

- Kingdom: Animal
- Sub-kingdom Phylum: Arthropod
- Class : Hexapoda or Insect
- Order: Hymenoptera
- Family: Apidae
- Genus: Apis
- Species: up to 26 and counting!
  - millifera – Western Honey Bee
- Subspecies (Races)

  ligustica, carnica, caucasica, rusian, etc.

No Native Honeybees Found in the New World!

TABLE I

HONEY BEE TAXONOMY

KINGDOM **Animalia**	animals
PHYLUM **Arthropoda**	Exoskeletons Jointed legs
CLASS **Insecta**	Exoskeletons Jointed legs Compound eyes Antennae 3-part bodies
ORDER **Hymenoptera**	"Membranous wing: Undergo metamorphosis Bent antennae
FAMILY **Apidae**	2-pair of wings
GENUS **Apis**	Latin "Bee" Honey production and storage, wax construction i hives
SPECIES **Mellifera**	*Latin "Honey bearing"*

SUB-SPECIES* popular with beekeepers
Apis mellifera ligustica
Apis mellifera carnica
Apis mellifera caucasia

G 1. Apis mellifera: Scientific name of the native European honey bee

A Colony of Honey Bees
Three Types of Bees in a Hive

Bees are one of three main castes. Queen, Worker & Drone.

Queen **Female – Fertile - one per hive**

Worker **Female – Not Fertile – 15,000-60,000**

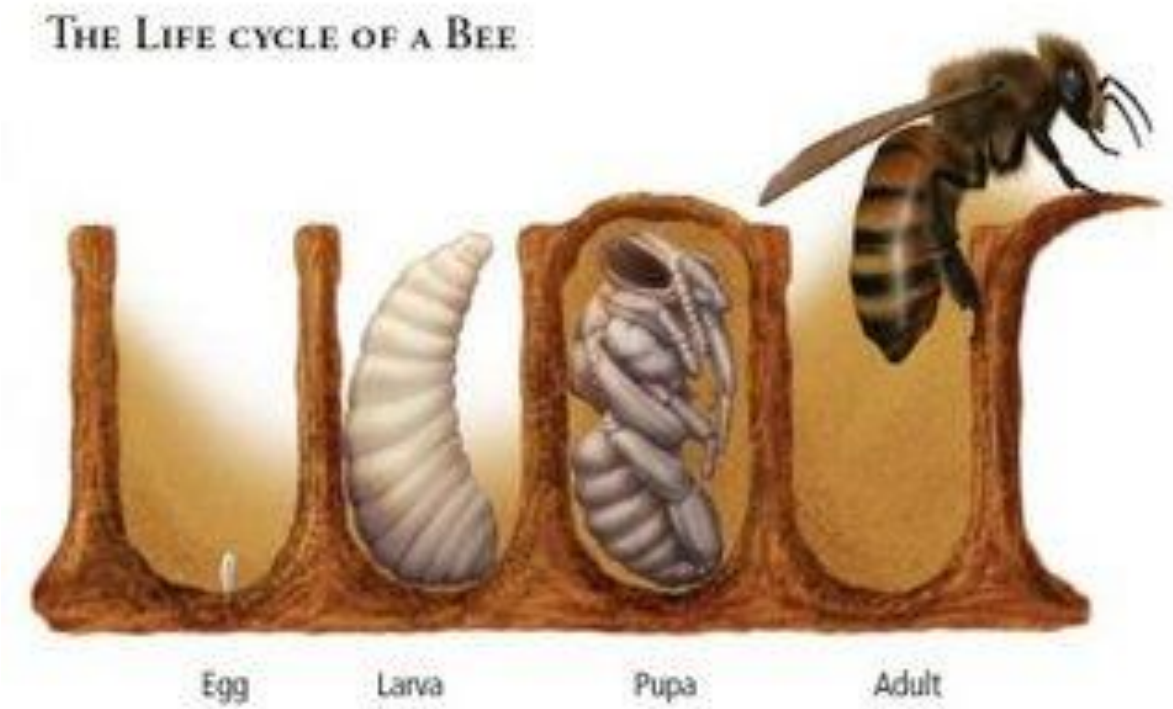
Drone **Male – up to 500 plus**

Honey Bee Development

Egg - Larva – Pupa - Adult

G 2 Larva: (Larve – plural): A developing bee in the worm stage: second stage of bee metamorphosis.

G3 Pupa : (Pupae – plural): Third stage of bee metamorphosis, during which the larve changes to an adult: *also known as capped brood*.



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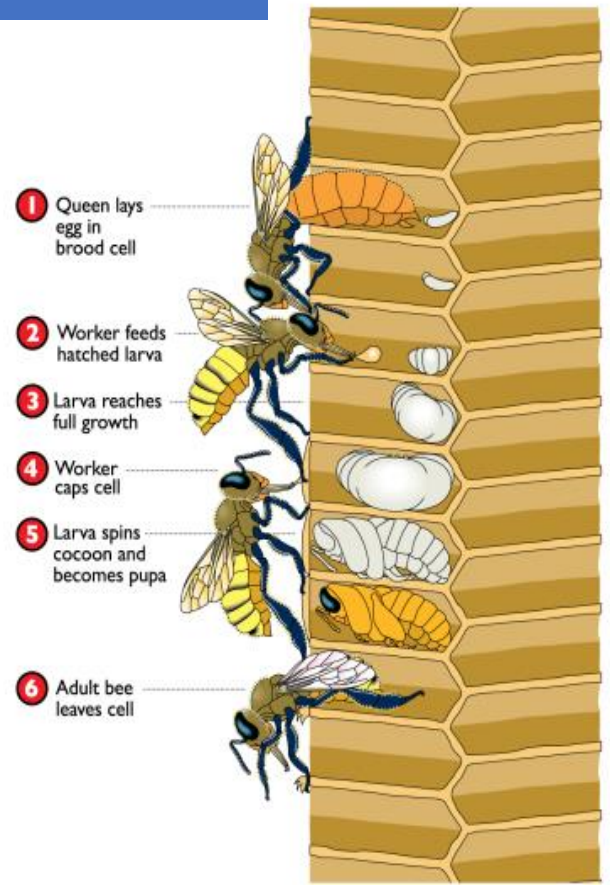
Honey Bee Development

Brood

Egg - Larva – Pupa - Adult

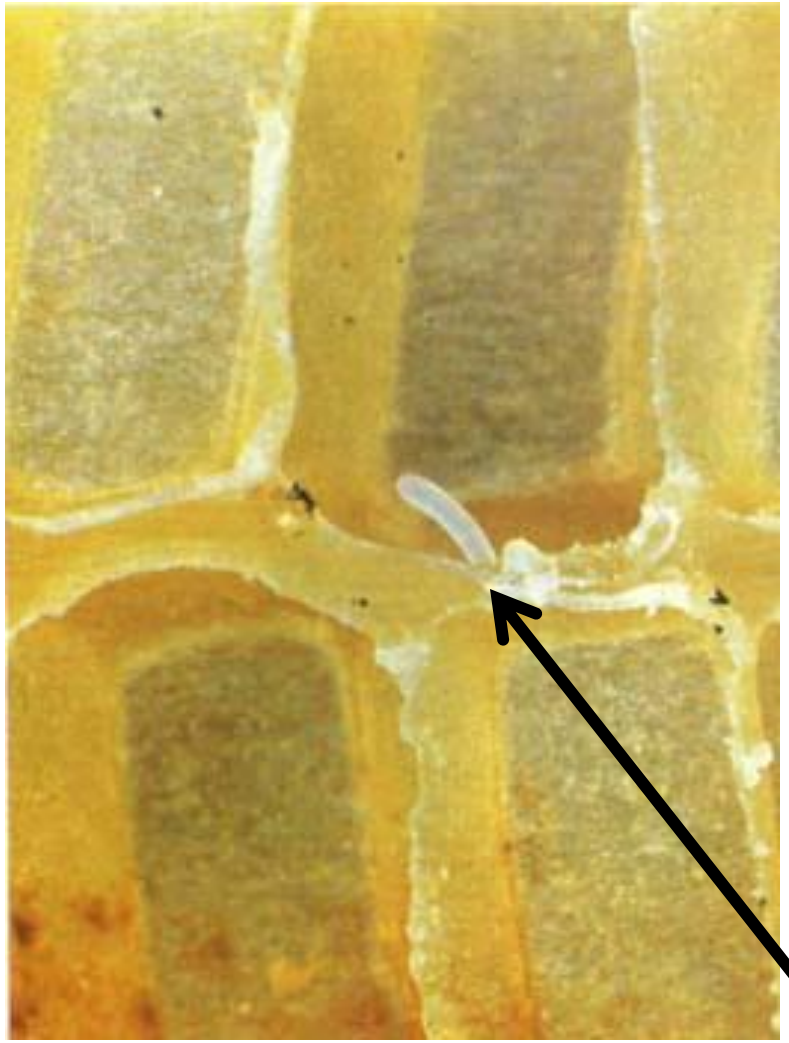
Caped Brood

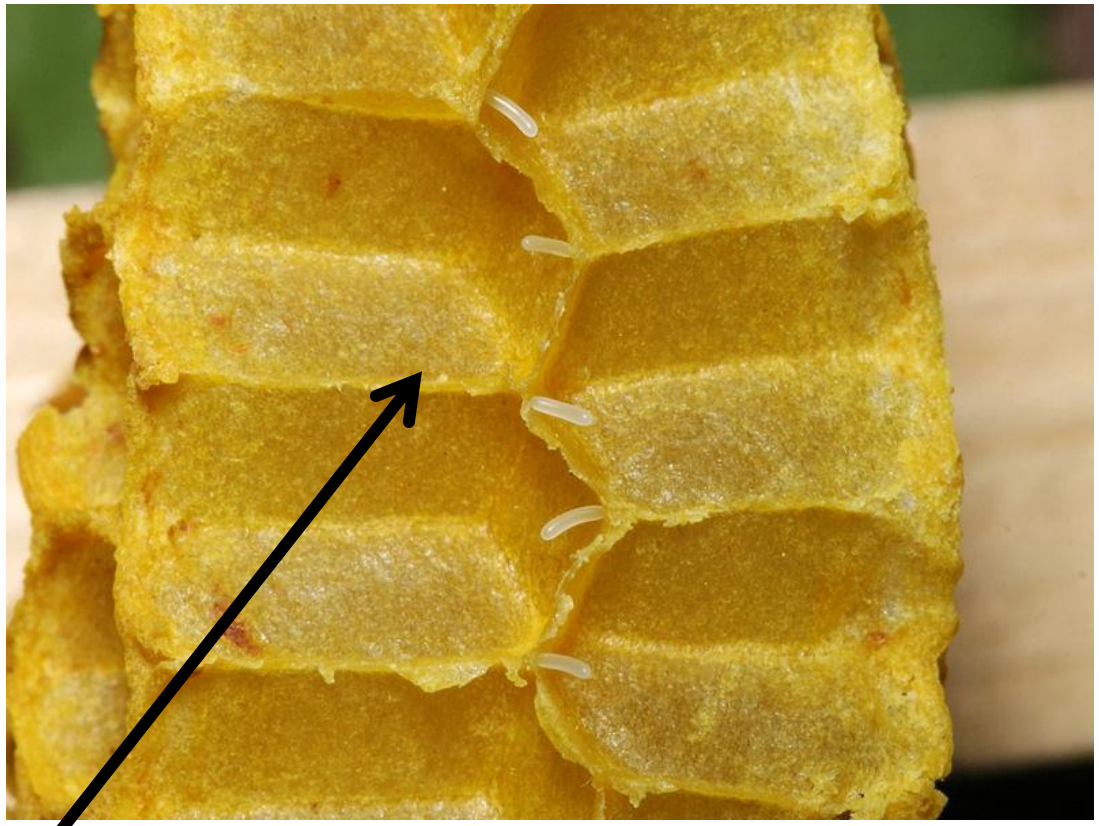


G 4 Brood: Immature bees (eggs, larva, and pupae) in the comb.

G5 Brood Nest: The area of a hive containing brood.

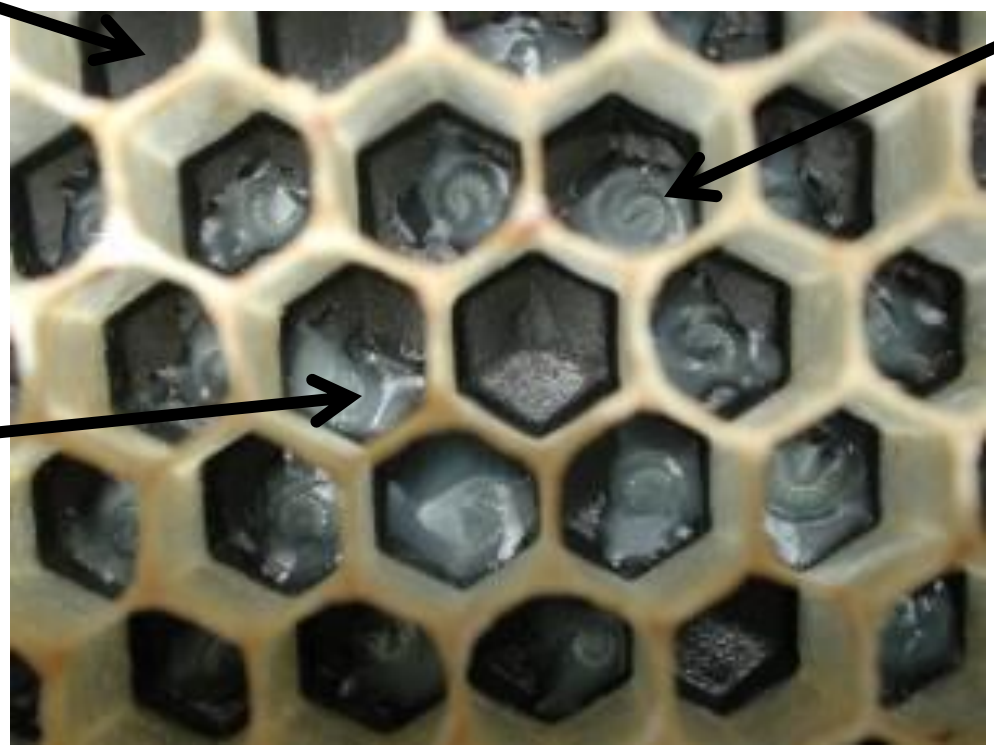
Egg





Egg

LARVA



G 6 Comb: A wax construction of six-sided cells made by honeybees in which they rear their young and store their food.

G 7 Royal Jelly: A milky white jelly secreted from the hypopharyngeal glands on worker bees.

Egg & Larva

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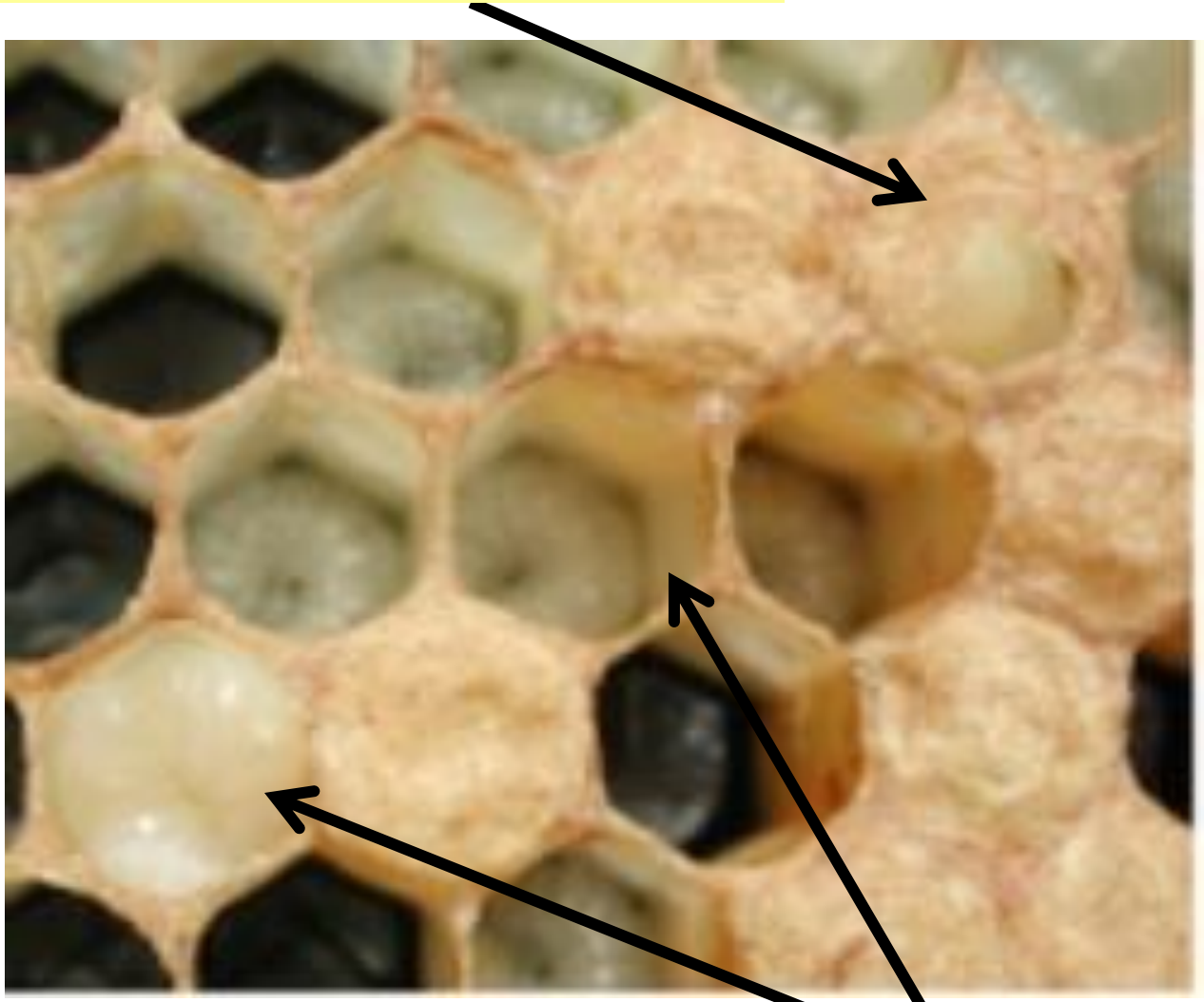
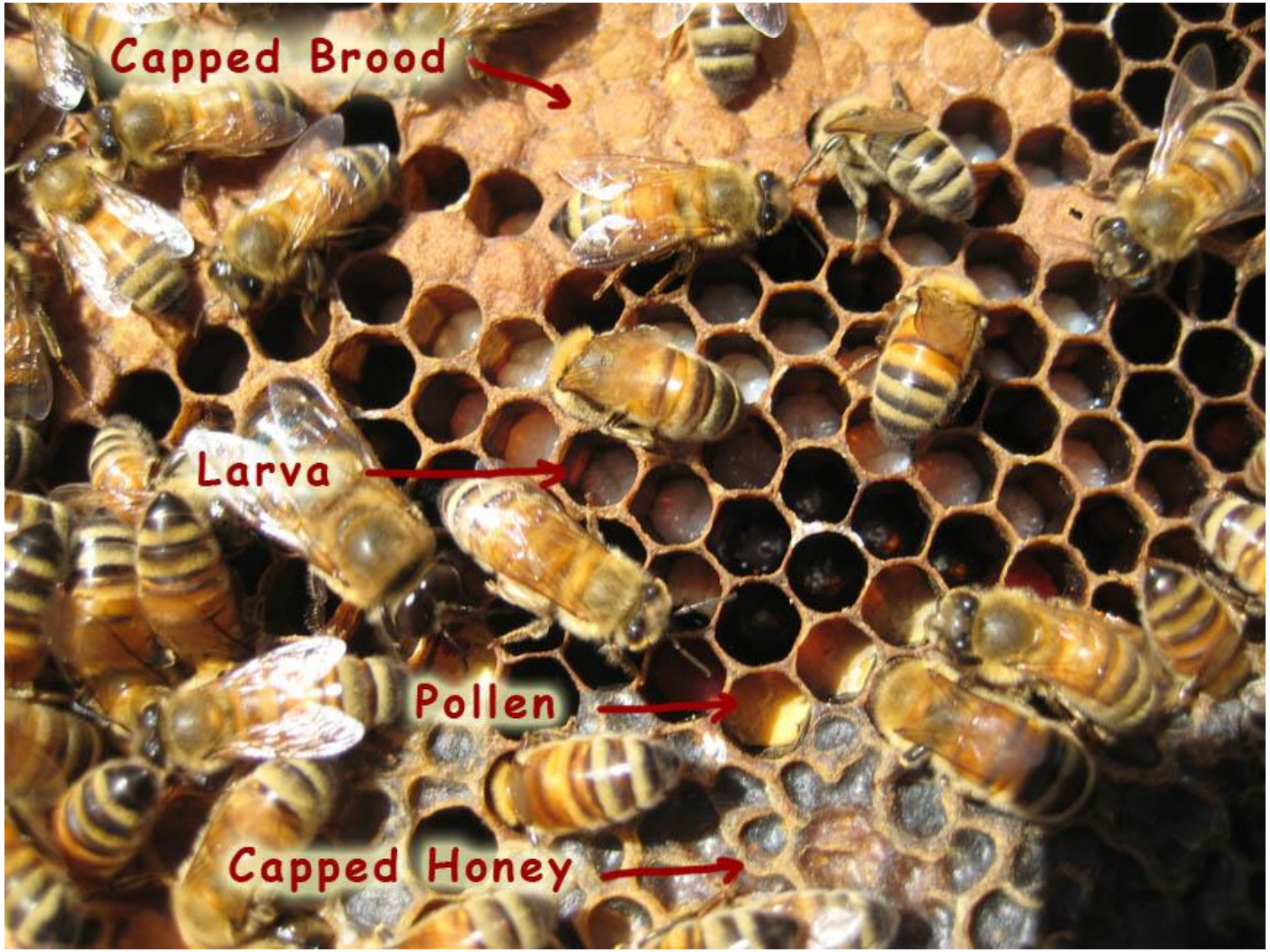
Notice the brood capping under construction



Brood Frame



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Frame of Capped Brood

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Honey Bee Development Time

Table II Honeybee Eggs

	EGG	LARVA	WAX CAP SHAPE	PUPA	EMERGE ON:
QUEEN	3 days	4 days	Peanut shell	8-9 days	Day 16
WORKER	3 days	6 days	Concave	12 days	Day 21
DRONE	3 days	6 days	convex	15 – 16 days	Day 24

Table 1-1 Average Development Time of a European Honey Bee

	Egg[a]	Larva	Pupa	Total	Adult Life Span	Weight[b]
Queen	Fertilized 3 days	4.6 days	7.5 days	15 to 17 days	2-5 years	178-292 mg
Worker	Fertilized 3 days	6.0 days	12.0 days	19 to 22 days	15-38 days summer	81-151 mg
					140-320 d winter[c]	
Drone	Unfertilized 3 days	6.3 days	14.5 days	24 to 25 days	8 weeks	196-225 mg

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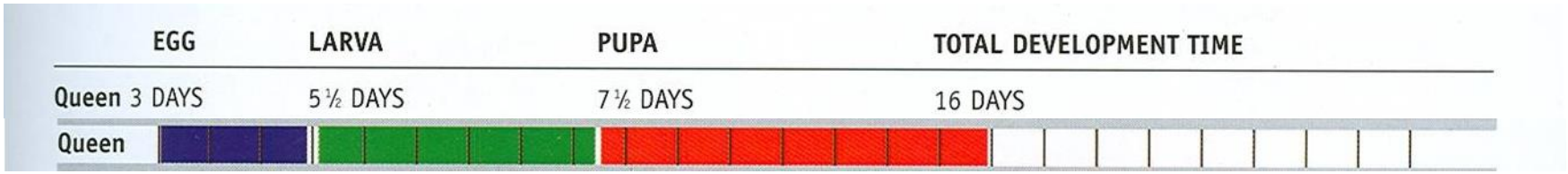
THE QUEEN!

Queen

- Larger than workers
- Long abdomen
- Can Live up to five (5) years
- Is productive for one (1) to two (2) years

Queens

- Fertilized egg, identical to worker but fed **“ONLY”** royal jelly
- Development - 16 days
- Complete ovaries (only bee in hive that lays eggs)
- Up to 2,000 eggs per day
- Mandibular gland produces “queen substance” pheromone that regulates behavior of the hive
- Fed and cared for by workers
- Capable of multiple stinging



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Queen
Being fed and cared for by workers

Retinue

G 8 Queenright: The condition of a colony having a laying queen.

G 9 Retinue: Worker bees that are attending the queen.

International Color Code for Queens

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

Retinue

Retinue

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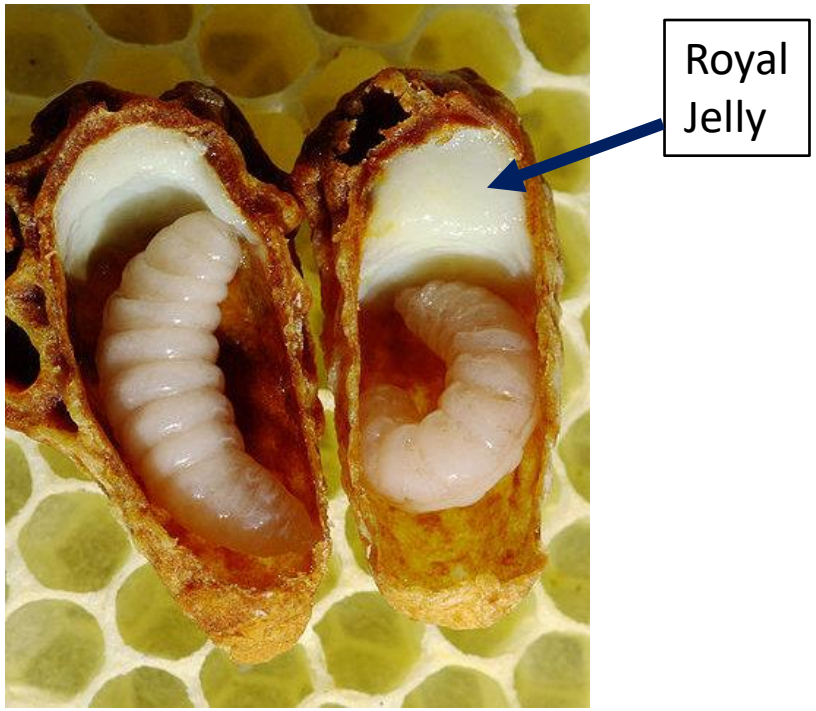
Cell Cup

G 10 Cell Cup: A queen cell when it is only about as deep as it is wide. Artificial cell cups can be bought or made.

Queen Cell

G 11 Queen Cell: A cell in which a queen is reared. It has an inside diameter of about ½ inch and hangs down from the comb face or edge an inch or more.

Queen Cell on Frame



- The queen cells resemble a peanut hanging on the side or bottom of a comb. If the queen died or was killed the bees will take a young larvae and feed it Royal Jelly and build a large hanging cell for the larvae.

Virgin Queen Emerging From Cell

- Virgin queen goes out on several mating flights.
- Flights occur in mid-afternoon time frame
- Can mate with up to 20 drones.

G 12 Virgin Queen: An unmated queen
G 13 Fertile Queen: One that has mated with several drones and has a supply of spermatozoan in her spermantheca

Review of the Queen

Table 3

Queen

NUMBERS *Just one*

GENDER: Only sexually **developed** female - In some cultures caller the "Mother"

SIZE: Largest in the colony; abdomen protrudes well past her wings

MARKS Often marked by a dot of color on her thorax; color is one of five and identifies birth year.

ROLE: Reproduction

Lays up to 2000 eggs/day (selects male/female egg based on comb size)

NOTE: Workers lead the Queen to the size cell they think they need in the colony

BEHAVIOR Mates only once over a period of days with up to 40 drones (avg. 12)

Mates in Drone Congregation Areas (DCA); drone 'hang outs'

Her pheromones:

- keep the colony "Queen-Right",
- regulates worker tasks, and encourages 'retinue' response in workers- grooming & feeding her

Only leaves the hive, 1) her mating flights;

2) with an initial swarm from a colony

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Types of Queen Cells

-Supersedure Cells

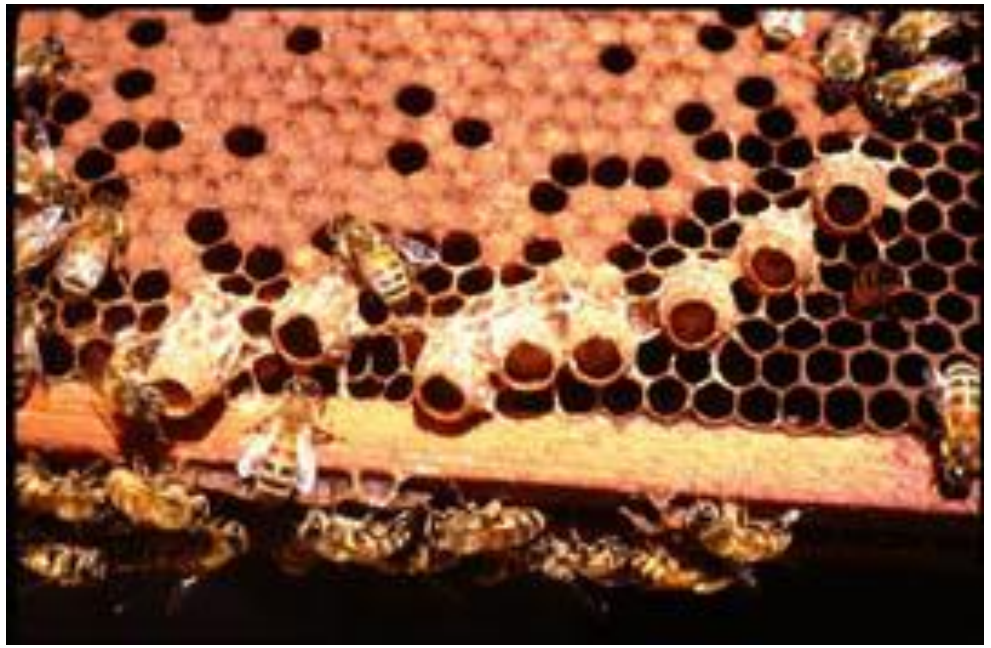
-Swarm Cells

Supersedure Cells

- In supersedure the bees are trying to replace a queen they perceive as failing.
- She is probably 2 to 3 years old and not laying as many fertile eggs and not making as much Queen Mandibular Pheromone (QMP).
- These cells are ***usually*** on the face of the comb about 2/3 of the way up the comb.
- Do not destroy – Call your mentor!!!

G 14 Supersedure: The natural replacement of an older queen by a daughter queen.

Swarm Cells



G 15 Swarm: The group of worker bees, queen, and drones that leave the parent colony to establish a new colony; the natural method of propagation of the honeybee colony.

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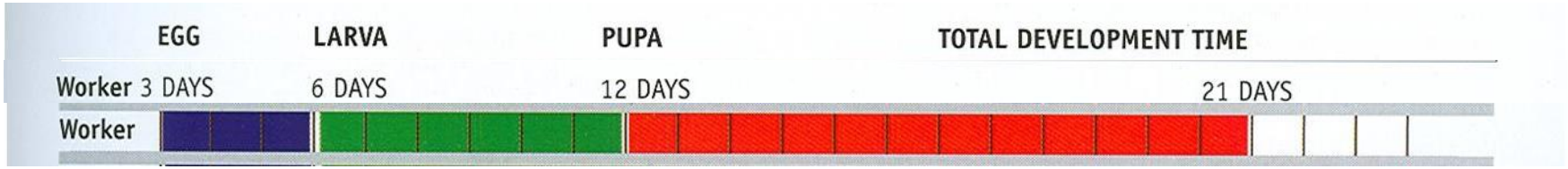
THE WORKERS!

Workers

- Female (fertilized egg) – they are non-fertile female
- 15,000-60,000 workers in a colony (winter vs summer)
- "Winter bees" life span - up to six months
- "Summer bees" life span – 6 - 7 weeks
- All are daughters of the queen
- Up to 20 different fathers
- Development - 21 days,



G 16 Worker Bee: A female bee whose reproductive organs are underdeveloped. **They do all the work** in the colony except lay fertile eggs.

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Workers

- During development fed a very small amount of royal jelly and lots of “Bee Bread” a mix of honey and pollen.
- Have sharp mouth parts for chewing and biting
- Stings once,– dies upon stinging.
- **Do all the work in the hive**
- Work tasks are based on age
- All same size from birth

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Workers

- Predictable sequence of tasks:
  - Nurse bees
    - (Housekeeping Bee, Mortuary Bee)
  - Construction bees
    - Comb building Bees)
  - Storage bees
    - (Meet & Greet Bees)
  - Guard bees

  3 weeks

  - Scout bees
  - Forage bees (Field Bees)

  3 - 4 weeks

  6 - 7 weeks

- Reversion possible
  - Decrease life span
  - Less efficient at tasks

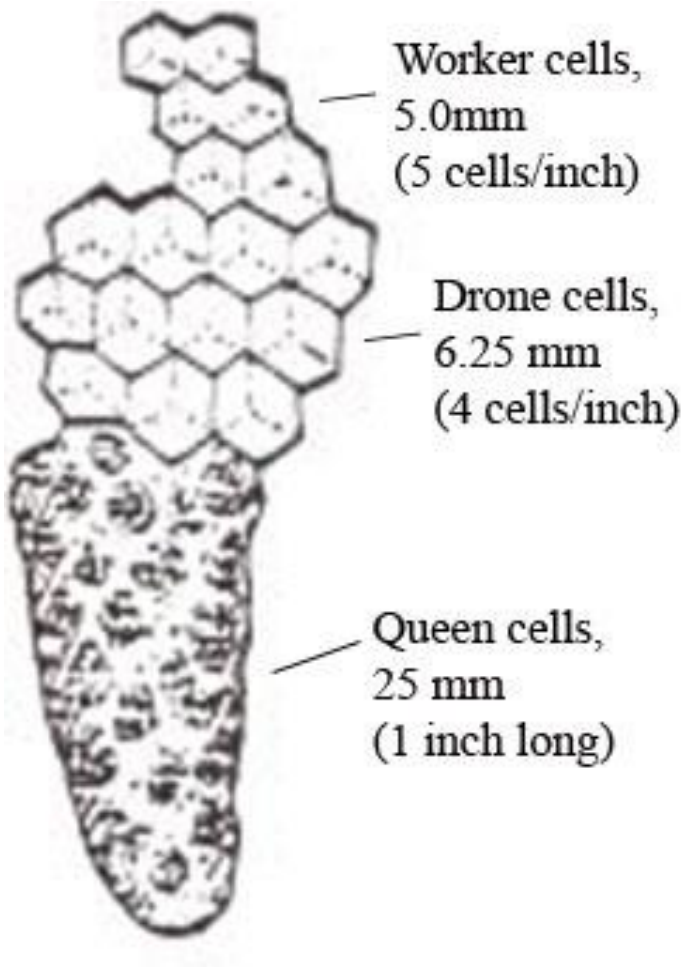
Workers on Brood Cells
(Nurse Bee, Housekeeping Bee, Mortuary Bee)

Nurse Bee – Care & Feeding of larva, cleaning cells of newly hatched bees
Housekeeping Bee – cleaning detritus & debris out of the hive
Mortuary Bee – cleaning dead bees from the hive

Workers (Construction Bees) Wax Production

- Worker bees develop special wax-producing glands on their abdomens and are most efficient at wax production during the 10th through the 16th days of their lives.
- Bees consume honey (6-8 pound of honey are need to produce a pound of wax) causing the special wax-producing glands to covert the sugar into wax which is extruded through small pores.
- The wax appears as small flakes on the bees' abdomen.

Workers (Construction Bees) Cell Production



NOTE:
Queen will always measure a cell size to determine if she will lay a fertilized or a non-fertilized egg.

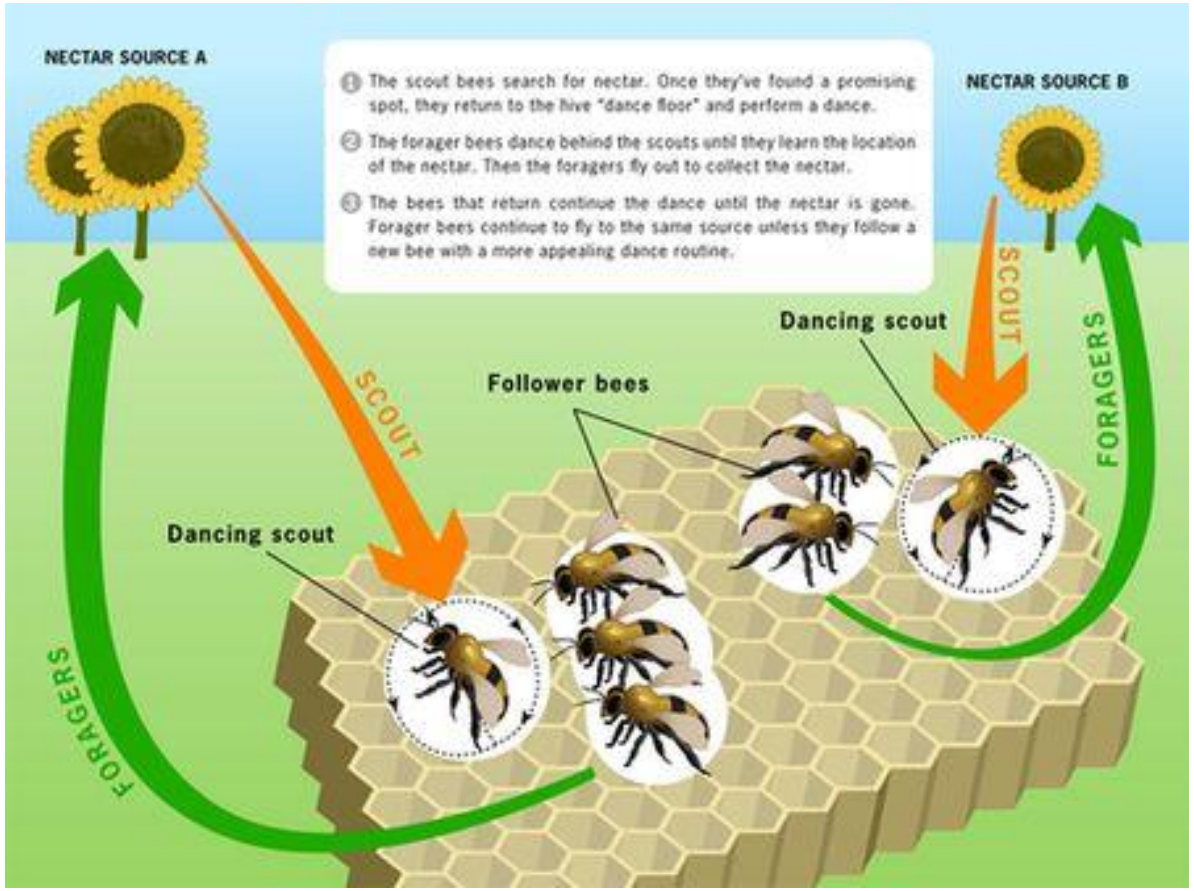
Workers (Storage Bees) Moving Nectar

Workers (Storage Bees) Producing Honey

Notice white beeswax cappings

Workers (Guard Bees)
On watch at hive entrance

Workers (Scout Bees)
Dancing food locations



Workers (Scout Bees) Dancing food locations

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Workers (Foraging Bees)
What it brings back to the hive.

- Water
- Nectar (Carbohydrates)
- Pollen (Protein/Fatty Acid)
- Propolis (Glue/Antiseptic)

G 17 Propolis: A kind of glue or resin of plants collected by the bees and chiefly used to close up cracks and anchor hive parts. (Also called Bee Glue.)

Workers (Foraging Bees) Collecting Nectar

G 18 Proboscis: The tongue or combined maxillae and labium of the bee

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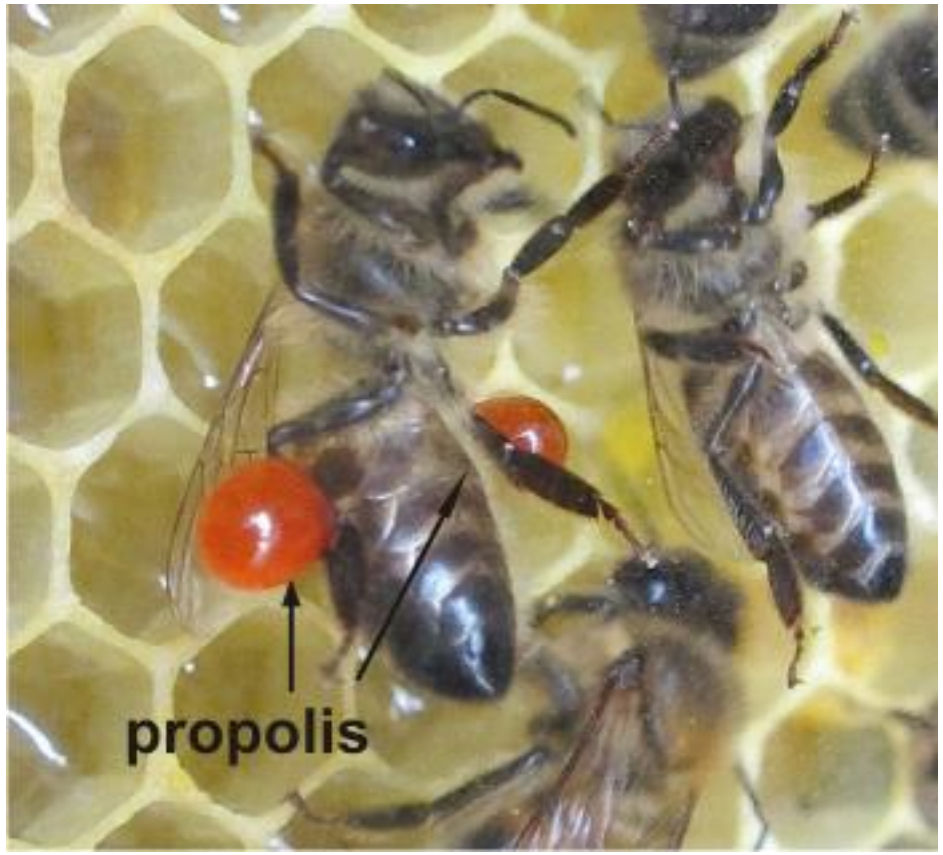
Workers (Foraging Bees) Collecting Pollen

Pollen

G 19 Pollen Basket: A flattened depression surrounded by curved spines or hairs located on the outer surface of the bee's hind legs adapted to carry pollen from flowers to the hive.

Propolis



Review of the Worker

Table 1

WORKER

NUMBERS: *Thousands; 85% - 90 % of colony population*

GENDER: *Female*

SIZE: *Smallest bee in the colony*

ROLE: Field bees* are pollinators and a major force in US agricultural economy

Hive Duties d dependent on age. (Emergencies may demand reverting to previous roles)

- Nurse Bee – *care & feeding of larva, cleaning cells of newly hatched bees*
- Housekeeping Bee – *cleaning detritus & debris out of the hive*
- Mortuary Bee - *Cleaning dead bees from the hive*
- Comb building Bee – *Builds comb*
- HVAC Bess – Keeps the hive warm or cool as needed; ensure ventilation
- Meet & Greet Bees - take pollen, nectar or water from incoming field bees
- Guard Bees - patrol the hive entrance, menacing anything not of the hive.
- *Field Bees - gather pollen, nectar, and water; pollinate 1/3 of everything we consume
- Scout Bees - search for new homes prior to swarming

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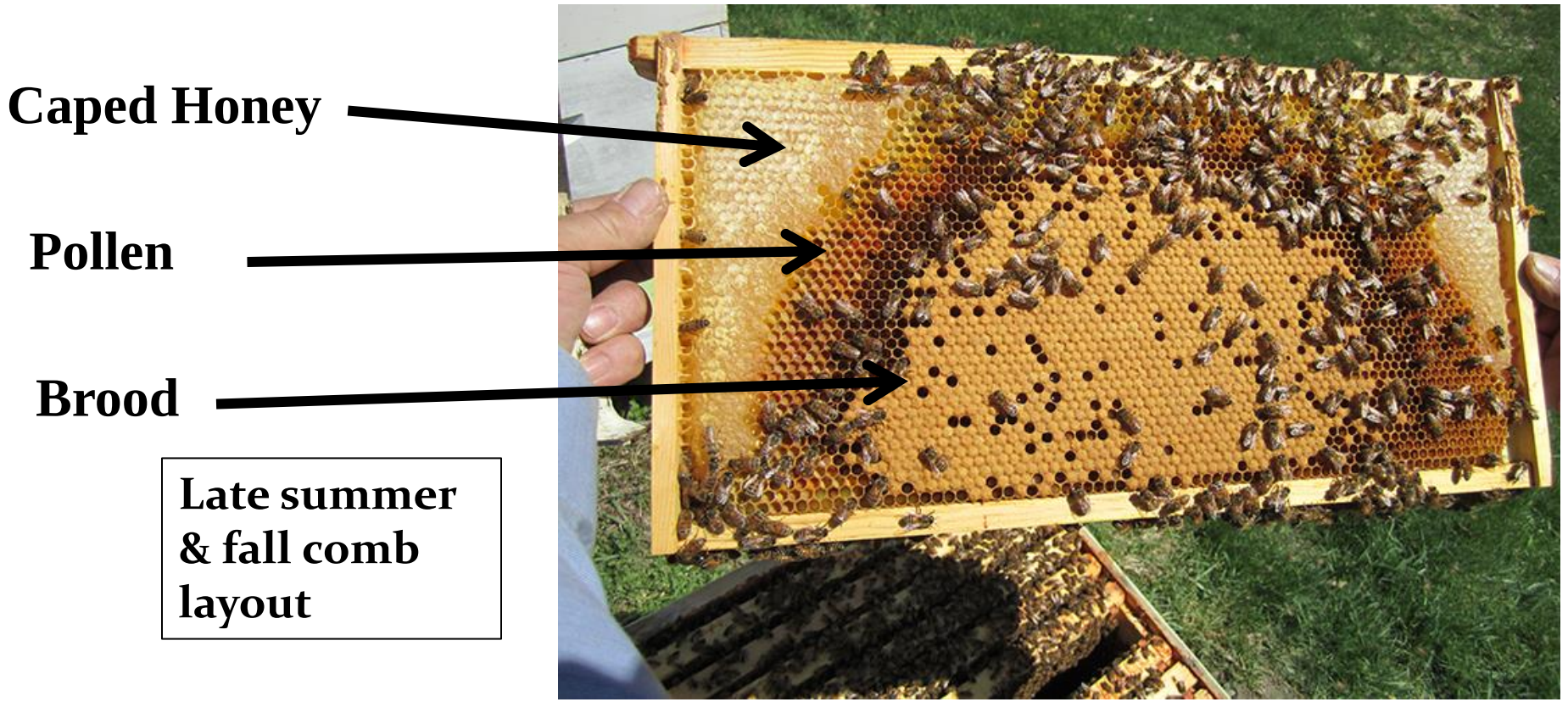
Worker Comb



G 20 Worker Comb: Comb having cells which measure about five to the inch in which work are reared and honey and pollen stored

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THE DRONES!

(The Male)

Drones

- Male (Unfertilized Egg)
- Colony has 0-500 drones in spring and summer
- Largest eyes
- Big and have large wings
- Wings extend to end of abdomen
- Do Not have a stinger
- During development fed mostly “Bee Bread” a mix of honey and pollen.
- Development - 24 days

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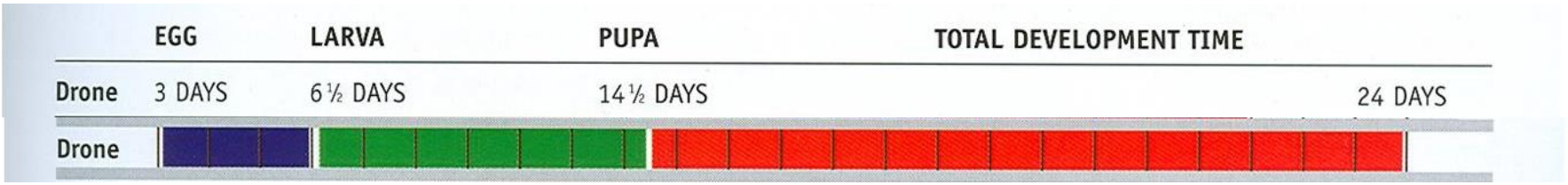


Males or Drones

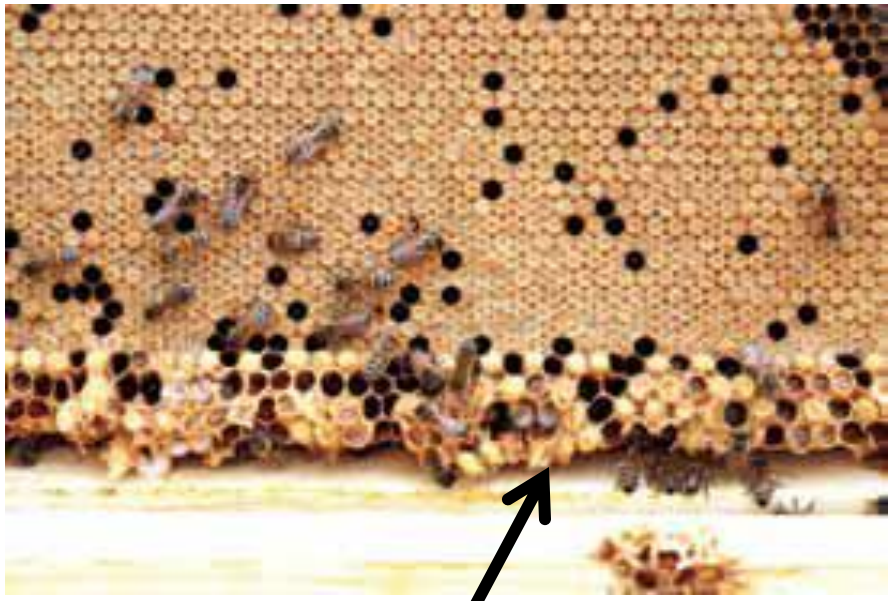
- **Do no work in hive** & must be feed by worker bees
- Only purpose is to mate with a virgin queen

  on her mating flights
- Dies at point of completing in-flight mating
- Drones driven out of colony in fall (none in hive during winter)
- If your hive is full of drones you have a bad queen

G 21 Drone: The male bee.

Drone

Drone Cells on Frame



Drone Cells
Along Bottom of Frame

Review of the Drone

Table 2

Drone

NUMBERS: *Hundreds; 10% - 15 % of colony population*
GENDER: *Male*
SIZE: *Smaller than the Queen; larger than the worker*
ROLE: *Mate with Queens*

DO NOT: pollinate, gather nectar/pollen; defend the hive (no stinger); conduct any work; must beg food from the workers; ousted from the hive in the fall.

MATING: *After mating with a queen, they die*

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THE HONEY BEES!

A Colony of Honey Bees
Three Types of Bees in a Hive

Worker

Queen

Drone

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A Colony of Honey Bees
Three Types of Bees in a Hive

Types of Bees in U.S.

Apis *mellifera ligustica*	**Italian**
Apis *mellifera carnica*	**Carniolan**
Apis *mellifera caucasica*	**Caucasian**
Apis *mellifera Hybrid*	**Russian**

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Italian Honeybee
Apis mellifera ligustica

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Italian Honeybee
Apis m. ligustica

- Italian Honey Bee Originally from Italy and Sicily
- Distinctive yellow- or orange-banded abdomen
- Now the most popular race (worldwide) honeybees.
- Quick buildup in Spring (over winter in large clusters)
- Less hardy in cooler regions
- Overwinter well but eat a lot of food
- Build comb fast in spring
- Gentle

Italian Honeybees

- Reasonably quiet and do not usually run on the combs
- Due to the almost solid yellow color the queens are said to be more easily located on the comb than the queens of the dark races.
- Enter winter with large numbers
- Require large winter stores (food)

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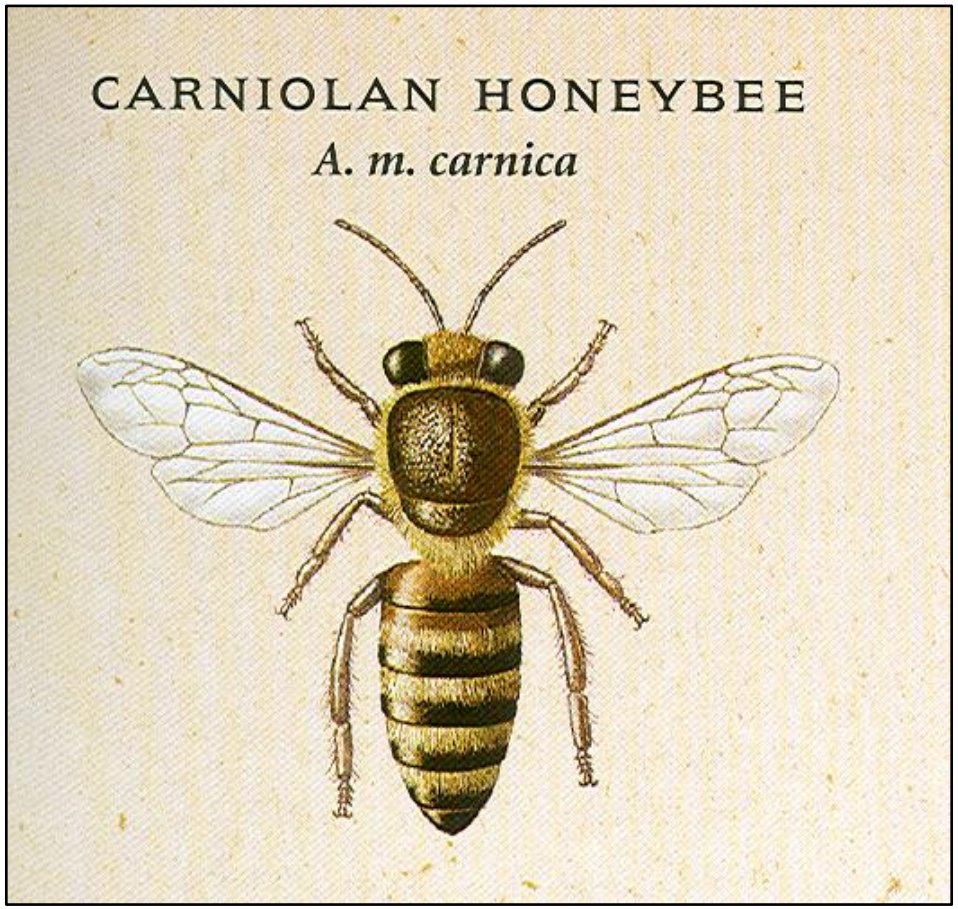
Carniolan Honey Bee
Apis mellifera carnica



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Carniolan Honeybee
Apis m. carnica

- Carniolan
- Southern Austrian alps and the Balkan regions
- Now the second most popular race (worldwide) after Italian honeybees.
- Gentle
- Dark Dusky brown-gray with more muted orange bands
- Well adapted to colder climates (overwinter well in smaller clusters)
- Late start but build up quickly
- High yields of honey
- Swarms readily

Carniolan Honeybee
Apis m. carnica

- More conservative of winter stores & begin spring brood rearing later than Italians
- Due to color it can be difficult to find the queen
- Best All Round Bee For Eastern Washington

Their Traits ???????

HONEYBEE SUB-SPECIES AND THEIR TRAITS		
Traits	*Italian*	*Carniolan*
Origin	Southern Italy	Southern Austrian Alps and Slovenia
Original Climate	Mediterranean	Temperate
Coloring	*Light/Yellow*	*Black/Gray/Brown*
Gentleness	*Relatively gentle/calm*	*Exceptionally Gentle/Docile*
Honey Processing	*Very Good*	*Good*
Propolizing	*Little*	*Little*
Excess Swarming	*Moderate*	*High*
Spring Buildup	*Good*	*Rapid*
Overwintering	*1. Good in general 2. Poor with long/ cold winters*	*Very Good*
Other Traits	*1. Heavy Robbers 2. Tend to drift 3. Most popular Bee*	*1. Good Comb builders 2. Low Robbing 3. Hardiness*

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Which One To Have?

Wintering Ability: **1 = Best, 3 = Poorest** 1. Carniolan 2. Italian	**Winter Honey Consumption**: 1 = Least, 3 = Most 1. Carniolan 2. Italian
Spring Buildup: 1 = Best, 3 = Poorest 1. Italian 2. Carniolan	**Speed of Buildup:** 1 = Best, 3 = Poorest 1. Carniolan 2. Italian
Swarming: 1 = Most, 3 = Least 1. Carniolan 2. Italian	**Bee Populations Throughout the Year:** 1 = Most, 3 = Least 1. Italian 2. Carniolan
Tracheal Mite Resistance: 1 = Best, 3 = Poorest 1. Carniolan 2. Italian	**Varroa Mite Resistance:** 1 = Best, 3 = Poorest 1. Carniolan 2. Italian

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Physical Movement

- **Nighttime activity**
  - All bees return to their hives just before dark and/or the occurrence of inclement weather
- **Orientation flights**
  - learning local landmarks
  - purge flight
  - occur anytime during daylight
  - moving the hive
- **Stronger pheromones** in one hive to attract bees from other hives
- **Eyes** (5 total) – 2 compound & 3 Ocelli (UV)
- **Foraging**
- **Absconding**

Bee Orientation Flights

BEES BEARDING

- All bees return to their hives just before dark and/or cold temperature

ON an exceptionally hot day

- bees clustering at the front (both entrance/landing board and front panel) of the hive, in an attempt to make space inside the hive

- bees at the entrance facing in the same direction, fanning, trying to cool down the temperature of the hive

- witnessed on days with higher humidity and heat

- as temperatures drop in the late evening, bees should go back into the hive

BEES BEARDING

BEES BEARDING

Pheromones

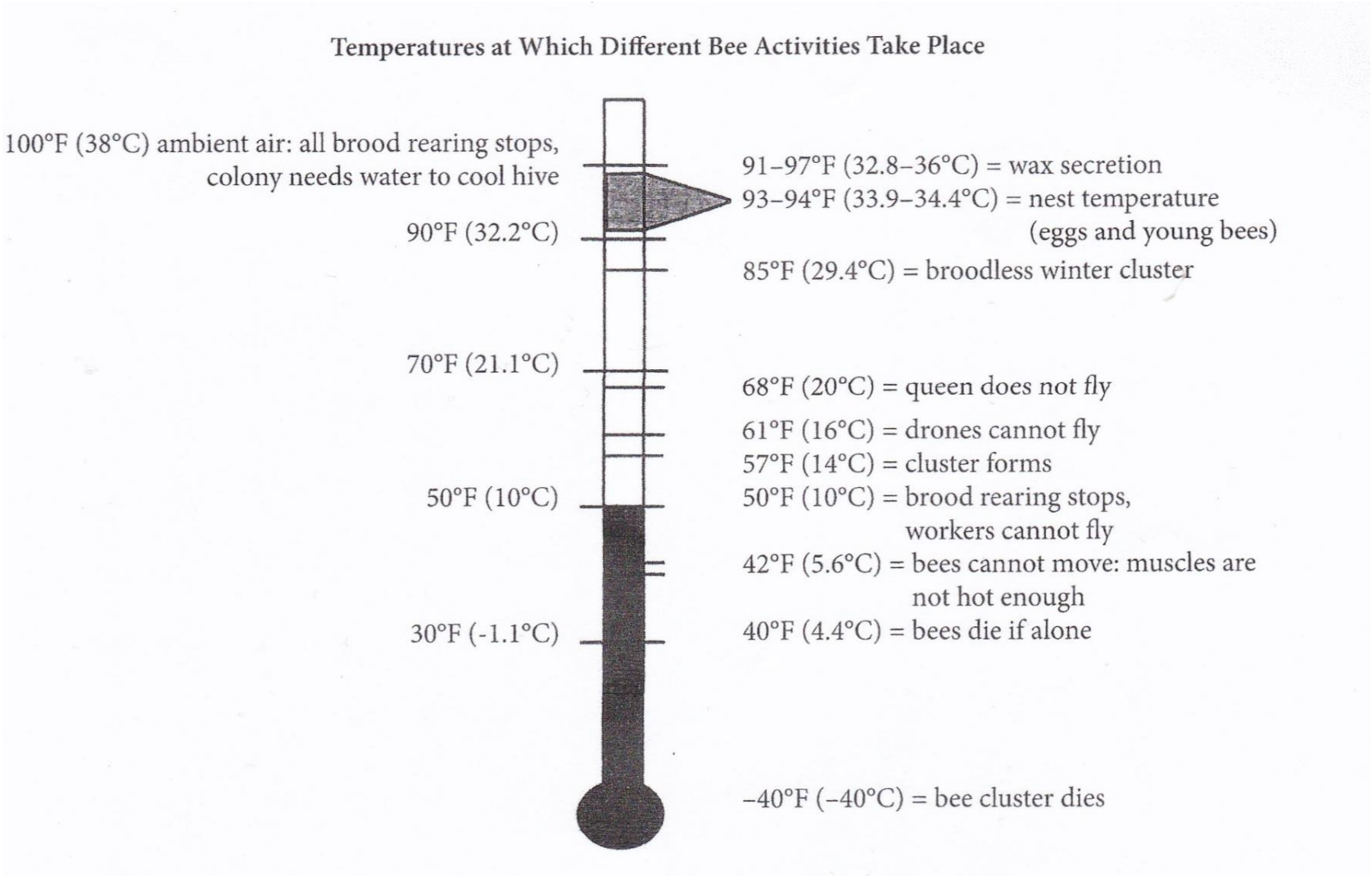
Queen: Mandibular gland produces "queen substance" pheromone that regulates behavior of the hive

Worker: Stinging scent to mark invader.

Drone: Drone area for queen mating

Brood: Stimulate feeding from nurse bees.

Temperature



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Honey Products

First Year

Honey

Beeswax

Pollination of Plants

Advanced

Pollen

Propolis

Conclusion

- Beekeeping practices/procedures varies greatly across the USA, be careful of what advice you are adhering to.
- Understand the seasonal changes in your hive.
- Conduct regular hive inspections
  - Keep a record of what you see for each inspection
  - Know what you are looking for before going into your hives
- Never delay re-queening!!!!!!!
- Seek out a mentors help & ask questions…..

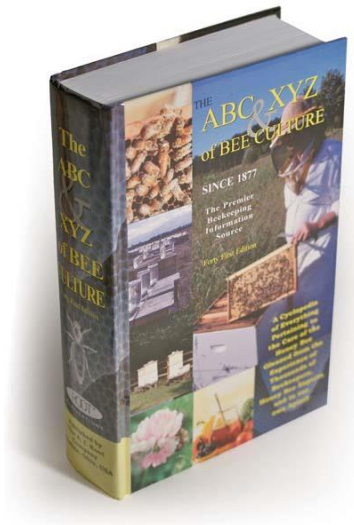
The End

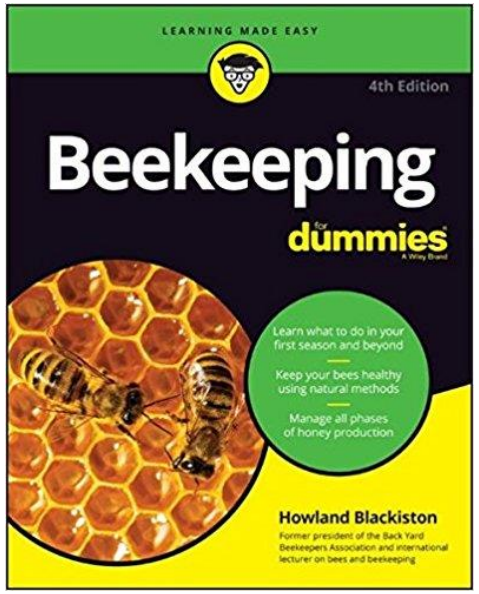
Honey Bee Books and Magazines

ABC and XYZ of BEE CULTURE (Edition 42 pp 832 Published since 1877) ($54.95)

BEEKEEPING For DUMMIES (Edition 4) ($15.63)

Bee Culture (The Magazine Of American Beekeeping) ($27.00 yearly)





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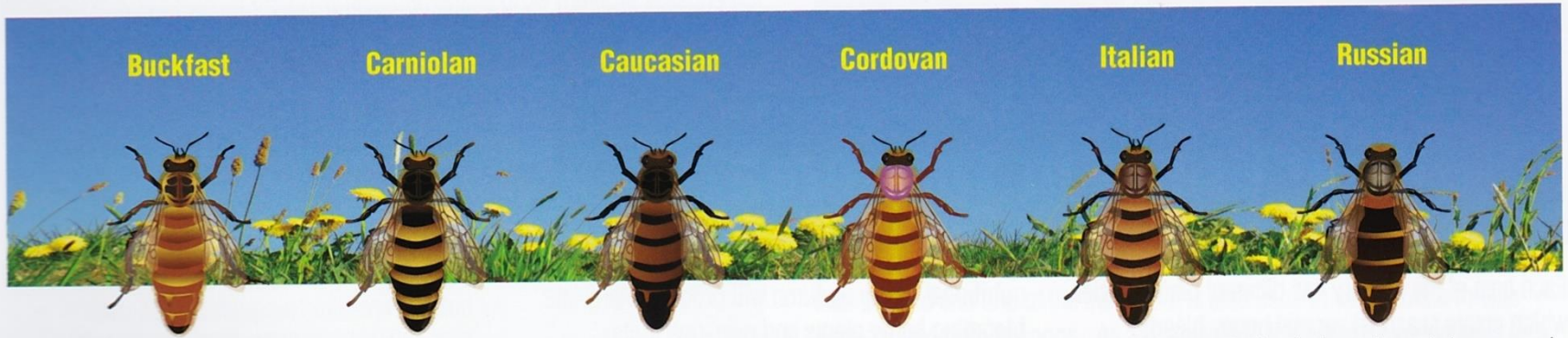
Types of Honey Bees: Africanized bees do not have individualized appearance



Africanized – an excellent honey producer; aggressive nature, defends against invasive threats like Varroa mites; lives in hot and tropical climates effectively; very defensive; swarms excessively and overtakes existing colonies; not a good bee for urban beekeeping or with nearby livestock; has difficulty in cooler climates.

Buckfast – good honey producer; good for northern climates; resists Tracheal Mites and Chalkbrood; gentle bee ideal for urban settings; low swarm risks; queens create large colonies; slows brood production in fall and during drought; fills brood nest with honey for winter; slow spring build up.

Carniolan – good honey producer; tolerates cold and moist days better than other bees so it can forage earlier in the day; builds up fast in spring; stops brood production during times of drought and fall so sometimes looks queenless; uses less stores during drought and winter due to ability to lower population; not as much propolis, burr and brace comb as other bees so inspections are less of a mess; highly successful breeding with other types of bees for generating hybrids; swarms faster than Italian bees due to needing more space.

Caucasian – good honey producer; can forage earlier during the day; low swarm tendency; good queen layer; slows brood production during drought and in fall so sometimes looks queenless or not queen right; good propolis producer; good comb builder.

Cordovan – a beautiful golden bee; excellent fat producing young bees; mild bees; like Italians these consume lots of resources in fall and winter; once season starts they don't slow until fall.

Feral – may be acclimated to area; usually from colonies that have absconded or swarmed from packages; swarm lists enable beekeepers to capture them for minimal expense; if queen is unmarked it is unknown how long she may have lived; may have disease or mites; temperament unknown; natural selection on breeding; variety from colony to colony exists due to how long feral, what stock it came from originally; can be prolific at swarming; should be well inspected in a holding yard prior to bringing into an apiary.

Italian – a very popular bee due to their mild temperament; fast build up; fast comb builder; does not produce much propolis; great honey producer; does not slow down brood production during drought; goes into winter with large colony; consumes lots of resources during drought and winter; poor flight orientation causing bee drift between other colonies.

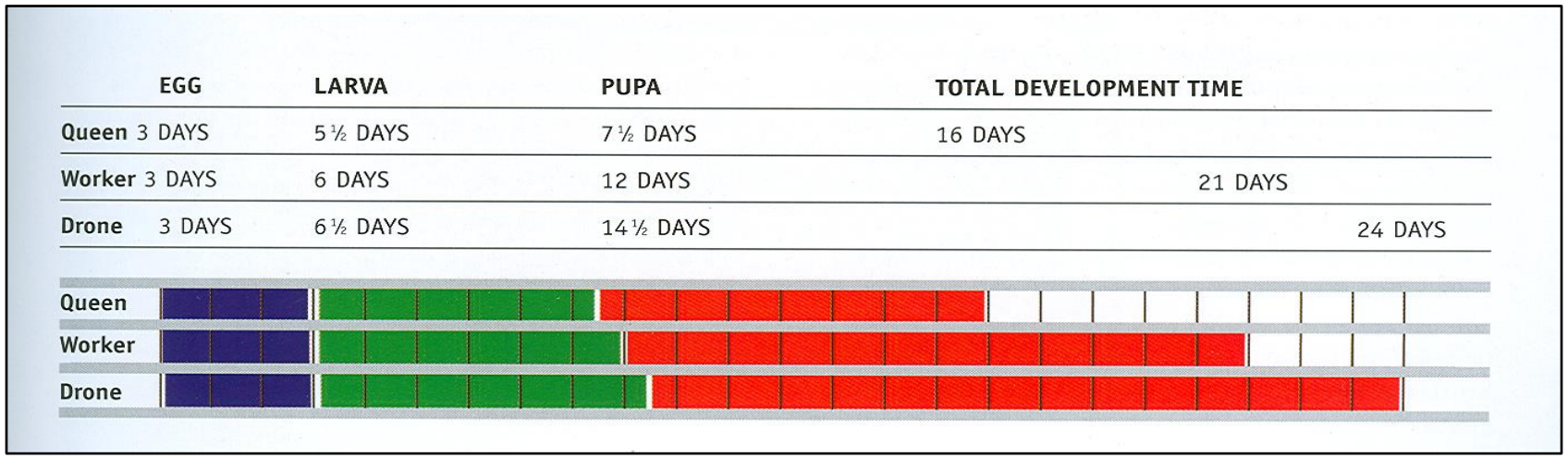
Russian – resistant to Varroa Mites and Tracheal Mites; similar qualities to the Carniolan bee; good honey producer; tolerates cold and moist days better than other bees so it can forage earlier in the day; builds up fast in spring; stops brood production during times of drought and fall so sometimes looks queenless; uses less stores during drought and winter due to ability to lower population; not as much propolis, burr and brace comb as other bees so inspections are less of a mess; highly successful breeding with other types of bees for generating hybrids; swarms faster than Italian bees due to needing more space

Each breed has pros and cons to it, so it's helpful to talk with other local beekeepers to see what bees work for your area. Generally, most people begin with Italian bees due to their docile behavior.

Questions?

Table 1-1 Average Development Time of a European Honey Bee

	Egg[a]	Larva	Pupa	Total	Adult Life Span	Weight[b]
Queen	Fertilized 3 days	4.6 days	7.5 days	15 to 17 days	2-5 years	178-292 mg
Worker	Fertilized 3 days	6.0 days	12.0 days	19 to 22 days	15-38 days summer	81-151 mg
					140-320 d winter[c]	
Drone	Unfertilized 3 days	6.3 days	14.5 days	24 to 25 days	8 weeks	196-225 mg



Caucasians

- **Pros**

- Caucasians Low swarming instinct
- Caucasians honeybees are extremely gentle to work and are quiet on the comb when being examined.
- Forages earlier and on cooler days than other races
- Builds large and strong summer populations
- Overwinters well; stops brood production in the fall
- Longer tongue than most races; able to exploit greater variety of nectar

Caucasians

- **Cons**
  - Builds up slowly in the spring
  - Because they build slowly, they swarm later in the spring
  - Prolific use of propolis makes colony manipulations difficult
  - Cappings “wet” due to absence of air space; not good for comb honey (not ideally suited for production of comb honey)
  - Increased susceptibility to *Nosema* infection
  - Increased robbing tendency

Bee Traits To Consider When Selecting A New Queen

- Gentleness or excitability
- Resistance to various diseases and the tracheal mite plus the Varroa mite
- Early spring buildup in population
- Wintering ability
- Not prone to excess swarming
- Ripens honey rapidly
- Honeycomb cappings are white
- Minimal use of propolis
- Availability and queen cost
- Color

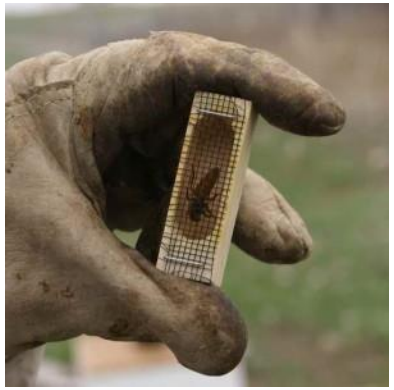
Obtaining Honey Bees

Nucs: Four (4) or five (5) frames of drawn comb covered in bees, brood, honey, pollen and a queen.

Packages: A three (3) pound package of bees includes workers, a queen in a queen cage and a sugar syrup feeder can. (one(1) pound of bees equal 3500 workers)

Swarm: 40% - 60% if worker bees and OLD QUEEN leave hive to start a new hive. (Late Spring Only – Isolate swarms and check before adding to bee yard.)

Queens: Queens in cages can be ordered from Spring into Fall. (Time queen is left in cage will be determined by packaging.)



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Physical Movement

Orientation flights

Night time activity – Return to hive & Bearding

Moving Established Hives (2 feet to 2 mile rule)

Stronger pheromones in one hive to attract bees from other hives

Eyes (5 total) – 2 compound & 3 Ocelli

Antennae

Absconding

Table 1. A comparison of various colony characteristics of Italian and Russian honey bees.

Characteristics	Italians	Russians
Varroa mites	More susceptible	More resistant
Tracheal mites	More susceptible	Highly resistant
Brood rearing	Continuous throughout the summer	Usually only during times of pollen availability
Robbing	High	Low
Queen cells	Only during swarming or queen replacement	Present most of the time
Pollination skills	Small difference from Russian bees	Small difference from Italian bees
Temperament	Gentle, less defensive; not likely to sting	Gentle, less defensive; not likely to sting
Color	Light	Dark

The USDA-ARS Sponsors five bee research labs at

•Baton Rouge, Louisiana – **Honey Bee Breeding, Genetics and Physiology Research Unit**

•Beltsville, Maryland – Conduct research on the biology and control of honey bee parasites, diseases, and pests

•Logan, Utah - **Pollinating Insects - Biology, Management and Systematics Research Unit**

•Tucson, Arizona (**Carl Hayden Bee Research Center)**
• - conduct research to optimize the health of honey bee colonies

•Weslaco, Texas - All web addresses leading to this Site were closed??????????????????

Laying Worker

G 21 Laying Worker: A worker which lays eggs, such eggs producing only drones, found in colonies that are queenless.

Cause

When the hive is queenless, and therefore **broodless,** for several weeks sometimes some workers develop the ability to lay eggs. It's not actually the lack of a queen, but the lack of brood.

Prevention

Regular hive inspection and prompt replacement of missing queen are solutions to the laying worker bee problem.

NOTE: A laying worker can never mate and will only produce unfertilized eggs!! Only DRONES!

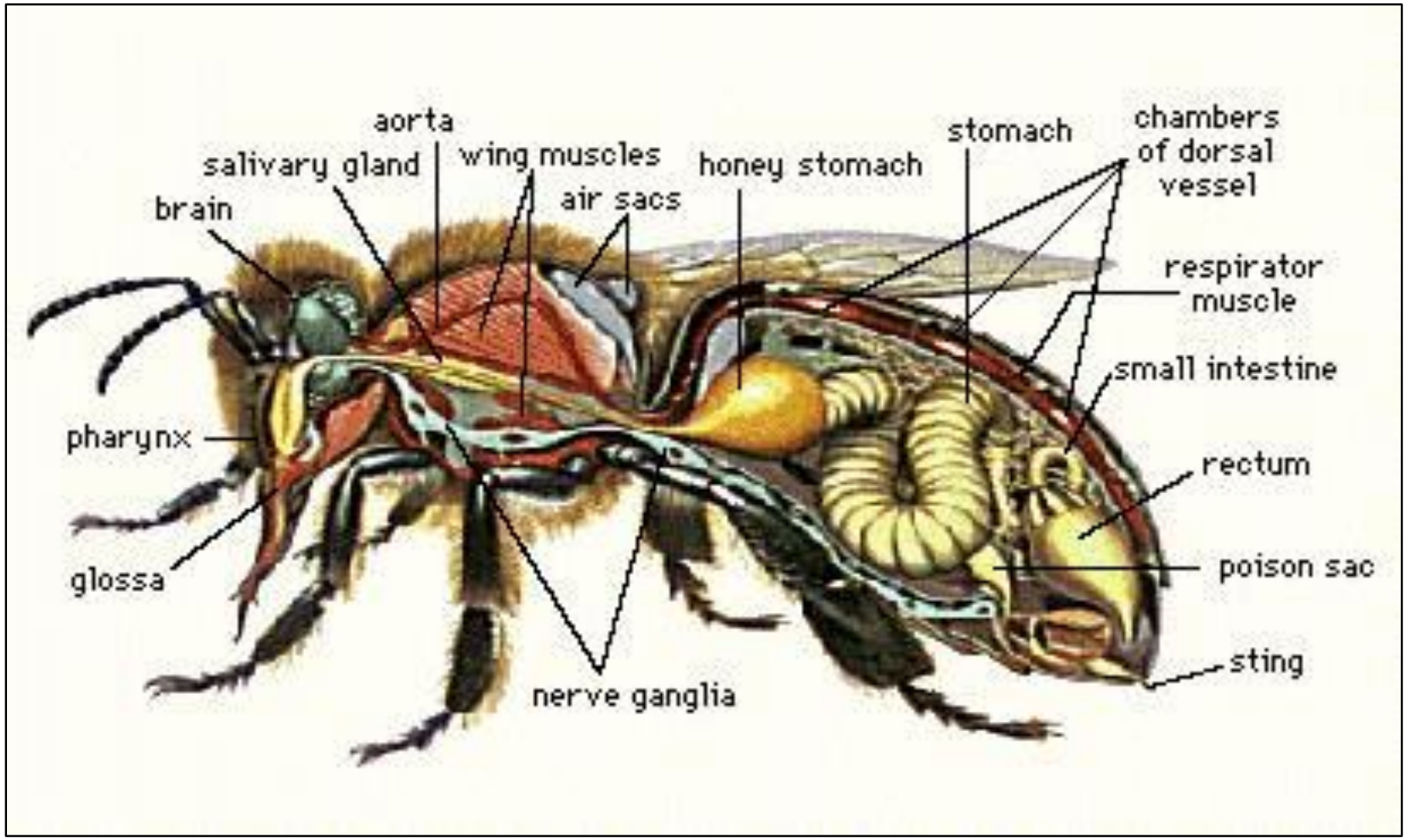
Laying Worker

- **Symptoms**
- The laying workers lay these eggs in worker cells, in addition to drone cells
- Usually lays several in each cell.
- Laying worker eggs are usually on the side of the cell instead of the bottom except in drone cells.
- A hive with lots of drones is a symptom of laying workers as are the multiple eggs in the cell.

Laying Worker

Multiple eggs laid in cells

Unfertilized eggs laid in worker cells


aorta
salivary gland
wing muscles
honey stomach
stomach
chambers of dorsal vessel
brain
air sacs
respirator muscle
small intestine
pharynx
rectum
glossa
poison sac
sting
nerve ganglia

- **Products of the hive**
- The bees produce a variety of things. Most of these are gathered from the bees by people.
- **Bees**
- Many producers raise bees and sell them. Package bees are available from the Southern United States usually in April.
- **Larvae**
- Many people over the world eat bee larvae. It is not that popular here in the US. To raise larvae (which the bees have to do to get bees) the bees need nectar and pollen. Feeding syrup or honey and pollen or pollen substitute is a way to stimulate the bees in the spring to raise more brood and therefore more bees.
- **Propolis**
- The bees make this from tree sap that is processed by enzymes the bees make and mix with it and sometimes they mix in beeswax. It is used in the hive to coat everything. It is an antimicrobial substance and is used both for sterilizing the hive and for structural help. Everything in a hive is glued together with this. Openings that the bees think are too big are closed with this. Humans use it as a food supplement and as a topical anti microbial for cuts and for cold sores etc. It kills both bacteria and viruses. Propolis traps are available. A simple one is a screen over the top of the hive and you roll it up and put it in the freezer and then unroll it while it's frozen to break all the propolis off.

- **Wax**
- Anytime a worker bee has a stomach full of honey and no where to store it, it will began to secrete wax on its abdomen. Most of the wax is then used to build comb. Some falls on the floor of the hive and is wasted. For humans, beeswax is edible, although it has no nutritional value. It is used in foundation, candles, furniture polish and cosmetics. The bees need it to store their honey in and raise their brood in. To get it from the bees, either crush comb and drain the honey, or use cappings from extracting and melt and filter them.
- **Pollen**
- Pollen has a lot of nutritive value. It is high in protein and amino acids. It is popular as a food supplement and is believed by many to help with their allergies, especially if it is pollen collected locally. The bees need it to feed the young. Pollen traps are available commercially or you can find plans to build your own. The principle of a pollen trap is to force the bees through a small hole (the same as #5 hardware cloth) and in the process they lose their pollen which falls into a container through a screen large enough for pollen but too small for the bees (#7 hardware cloth). Some pollen traps must be bypassed about half the time so the hive doesn't lose it's brood from lack of pollen to feed the brood. A week on and a week off seems to work. Other problems with pollen traps is drones not getting access in and out and if a new queen is raised, she has difficulty getting out and can't get back in. If you are allergic and trying to treat allergies with pollen take it in very small doses until you build a tolerance or until you have a reaction you don't want. If you have a reaction either take less or none at all depending on the severity.
- **Pollination**
- A "product" of having bees is that they pollinate flowers. Pollination is often a service that is sold. $50 to $150 (depending on the supply of bees) for 1 ½ deep boxes is a typical charge for pollination. Pollination charges are usually based on having to move the hives in and out in a specific time frame so that the trees (or other plants) can be sprayed etc. It is less likely there will be charges for pollination if the bees can be left there year round and pesticides are not used. In this case it is usually a mutually beneficial situation for the beekeeper and the farmer and there usually is no charge or rent either way, although it's common for the beekeeper to give the farmer a gallon of honey from time to time.

- **Honey**
- This is what is usually considered the product of the hive. Honey, in whatever form, is the major product of the hive. The bees store it for food for the winter and we beekeepers take it for "rent" on the hive. It is made from nectar, which is mostly watered down sucrose, which is converted to fructose by enzymes from the bees and dehydrated to make it thick.
- Honey is usually sold as Extracted (liquid honey in a jar), Chunk comb (a chunk of comb honey in liquid in a jar), Comb honey (honey still in the comb. Comb honey is done in Ross Rounds, section boxes, Hogg Half combs, cut comb, and more recently Bee-O-Pac. It is also sold as creamed honey (where it is crystallized with small crystals).
- All honey (except maybe Tupelo) eventually crystallizes. Some does this sooner and some later. Some will crystallize within a month, some will take a year or so. It is still edible and can be liquefied by heating it to about 100 degrees or so. Crystallized honey can be eaten as is also, or crushed to make creamed honey or feed to the bees for winter stores.
- **Royal Jelly**
- The food fed to the developing queen larvae is often collected in countries where labor is cheap and sold as a food supplement.

August hive after Honey Supers were pulled

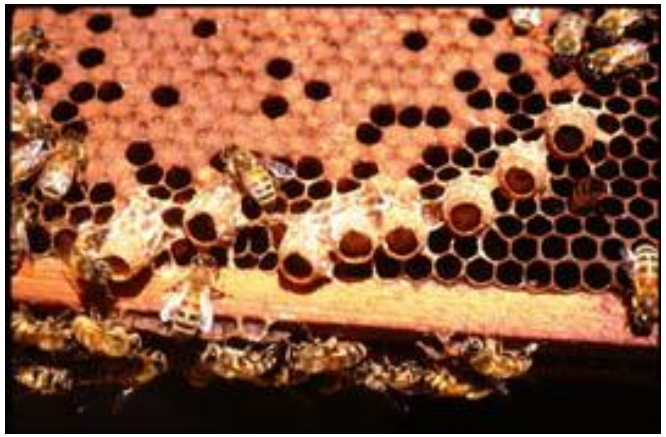
Honey Produced ~ 95 lbs.'

Feeder OUT of hive during Summer

During the Spring/Summer at peak of honey flow

Queen	**1**
Workers	**40,000 – 60,000**
Drones	**several 100**

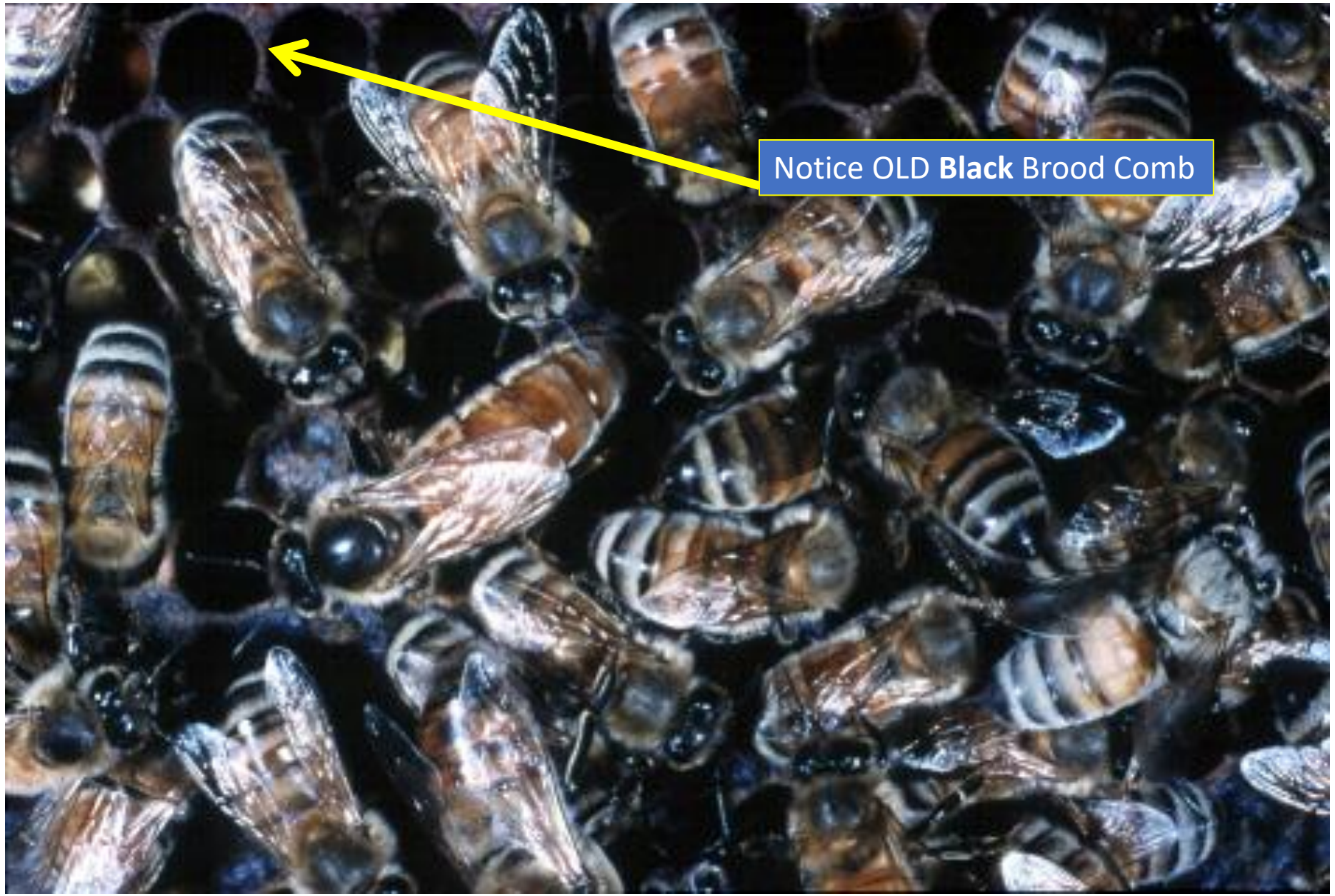
Why do honey bees swarm?



Queen Cells in old colony

- The reason that bees swarm is to create a new colony. This behavior allows the continued reproduction of bee colonies.
- A new colony is formed once the queen bee leaves her original colony. She is followed by about 60% of worker bees.

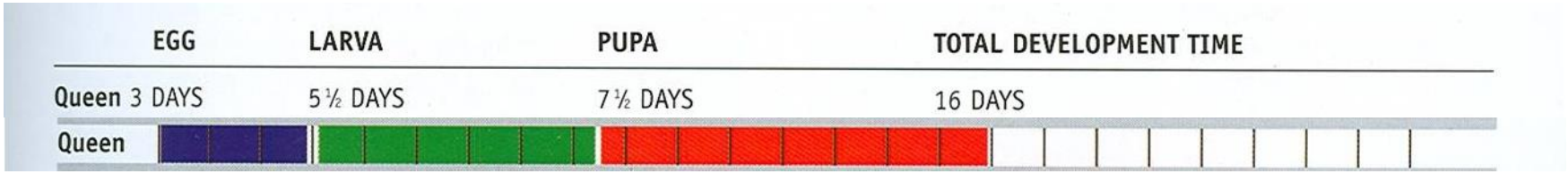
WORKER

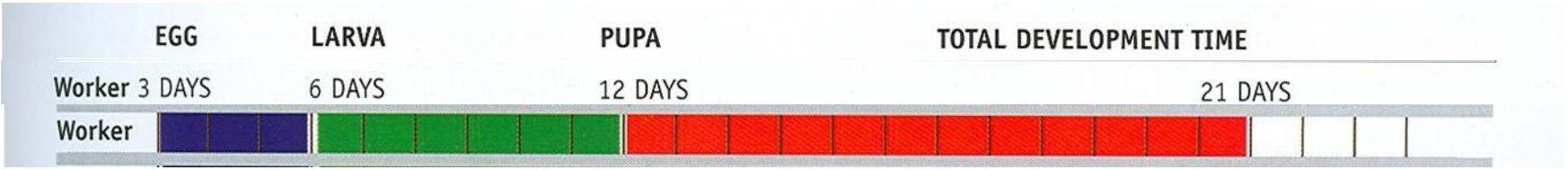

Notice OLD **Black** Brood Comb

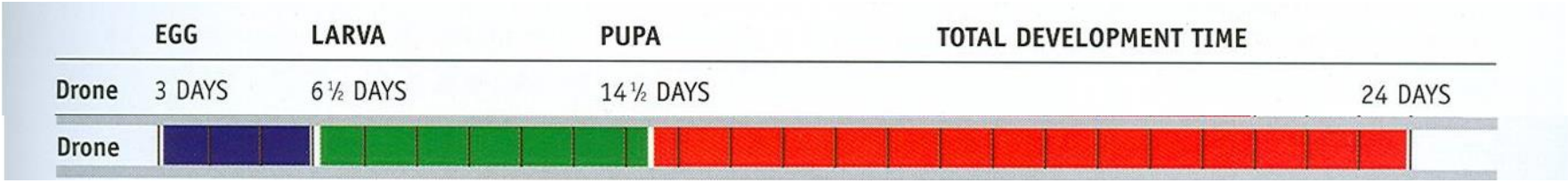
Hive Language Review

Queen
Worker
Drone
Brood
Egg, Larva, Pupa, Adult
Royal Jelly
Brood Food
Super
Brood Frame & Deep

Workers on Honey







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Queen with “Clipped” wing

Caucasians

Could be available in the future from WSU

Worker moving egg


Notice length of Queen's Wings
Photo by P-O Gustafsson

Drone On Comb

Drone

Swarm Cells

- Swarm cells are built to facilitate the reproduction of the super-organism. It's how the colony starts new colonies.
- The swarm cells are usually on the bottom of the frames making up the brood nest.
- They are usually easy to find by tipping up the brood chamber and examining the bottom of the frames.

Caucasian Honeybee
Apis m. caucasica

Russian Honey bees

- Imported by the USDA-ARE for stock release in the US
- Difficult to distinguish Russian from Caucasians and Carniolans by color or size

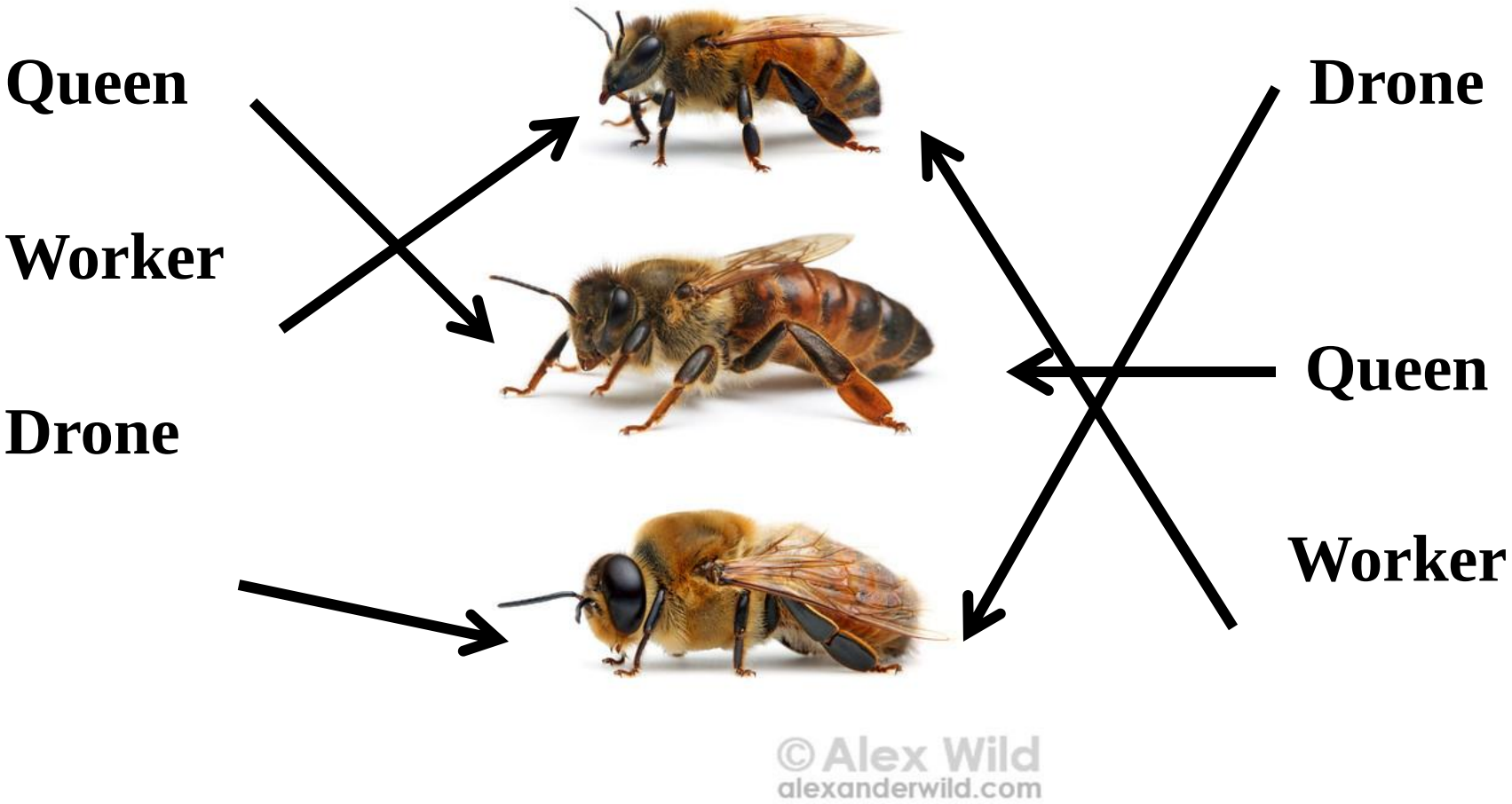
Russian Honey bees

- They are gentle
- They have long Tongues
- They are very winter hardy and frugal in use of winter stores
- They gather and use large amounts of propolis
- They may exhibit increased resistance to parasitic mites
- They were imported to the U.S. for their hygienic traits and resistance to trachea and Varroa mites
- As with most races, hybrid Russians may be aggressive
- Can be bought in the U. S. (NOT recommended for beginning bee keepers!!!!!!)

Laying Worker Tips

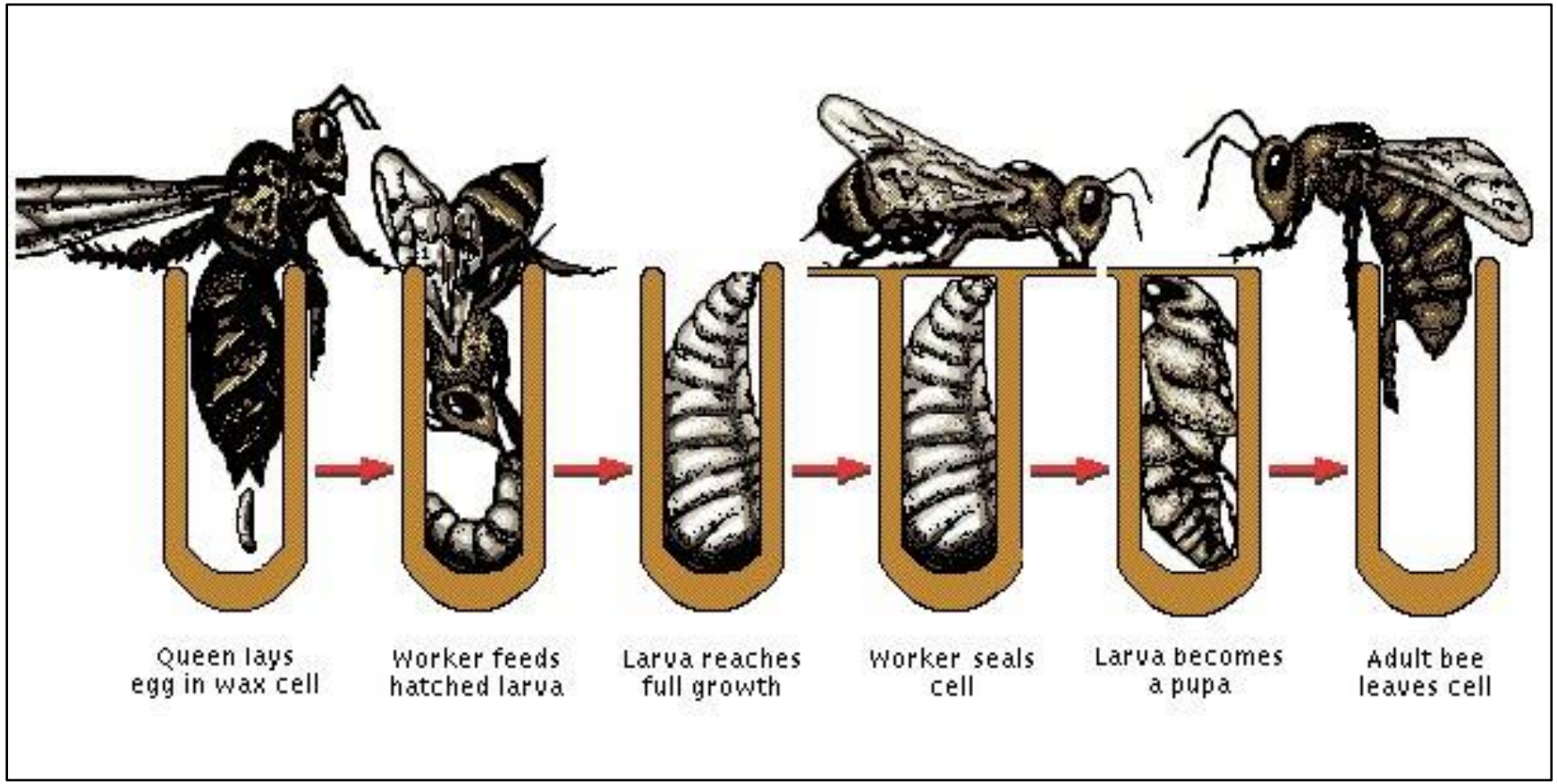
- Never attempt to introduce a queen to a colony with laying workers. She will be killed !!!!!!
- Giving a queen cell to a colony containing laying workers, usually the bees will tear it down
- Don’t unite a colony with laying workers to a queen right colony. The risk of doing is that the bees from the laying workers colony will probably kill or harm the queen from the right hive. First get rid of the laying workers before uniting.
- Regular hive inspection and prompt replacement of missing queen are solutions to the laying worker bee problem.

A Colony of Honey Bees
Three Types of Bees in a Hive



Honey Bee Development

Egg - Larva – Pupa - Adult



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Types of Bees in U.S.

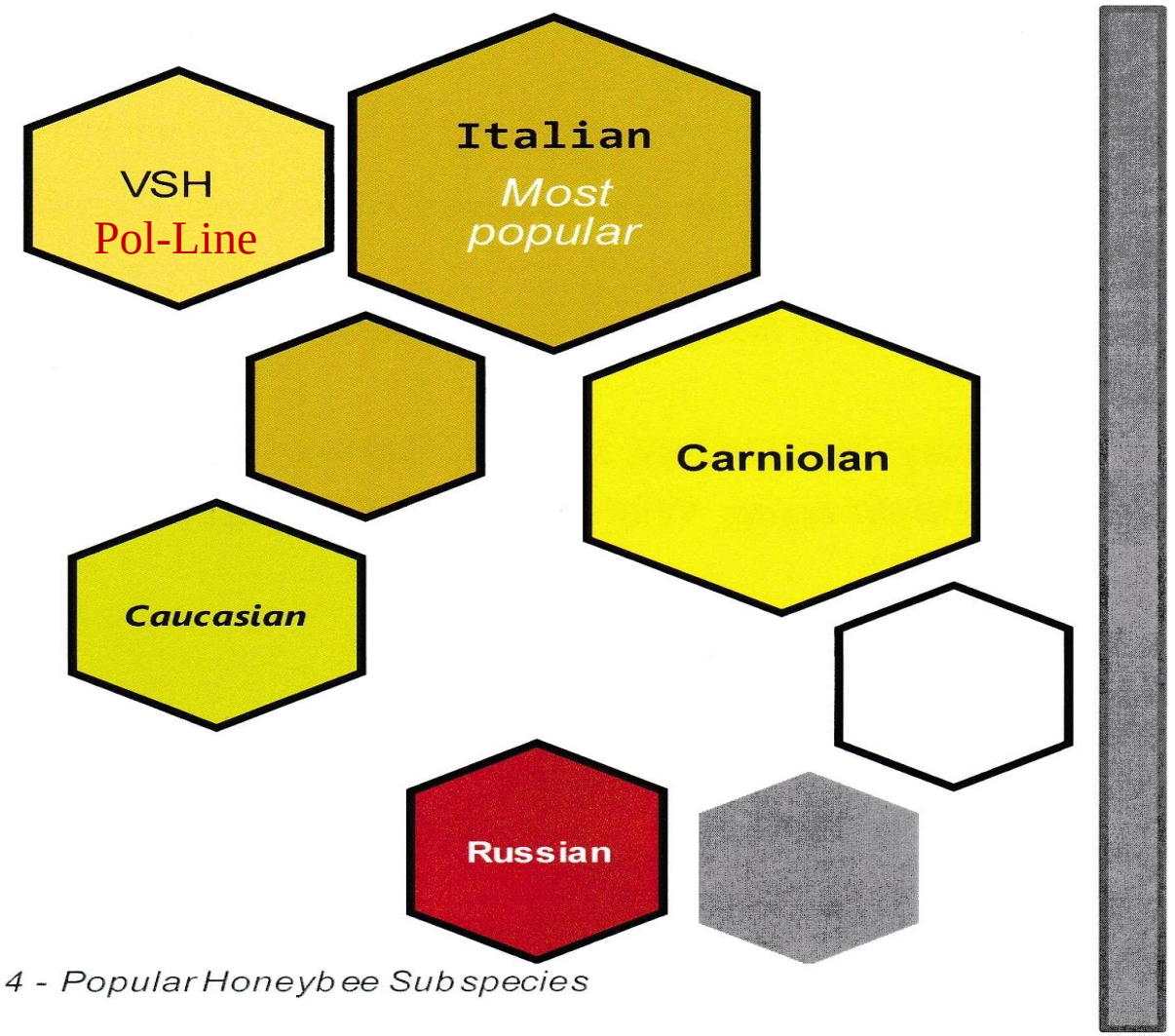

Figure 4 - Popular Honeybee Subspecies

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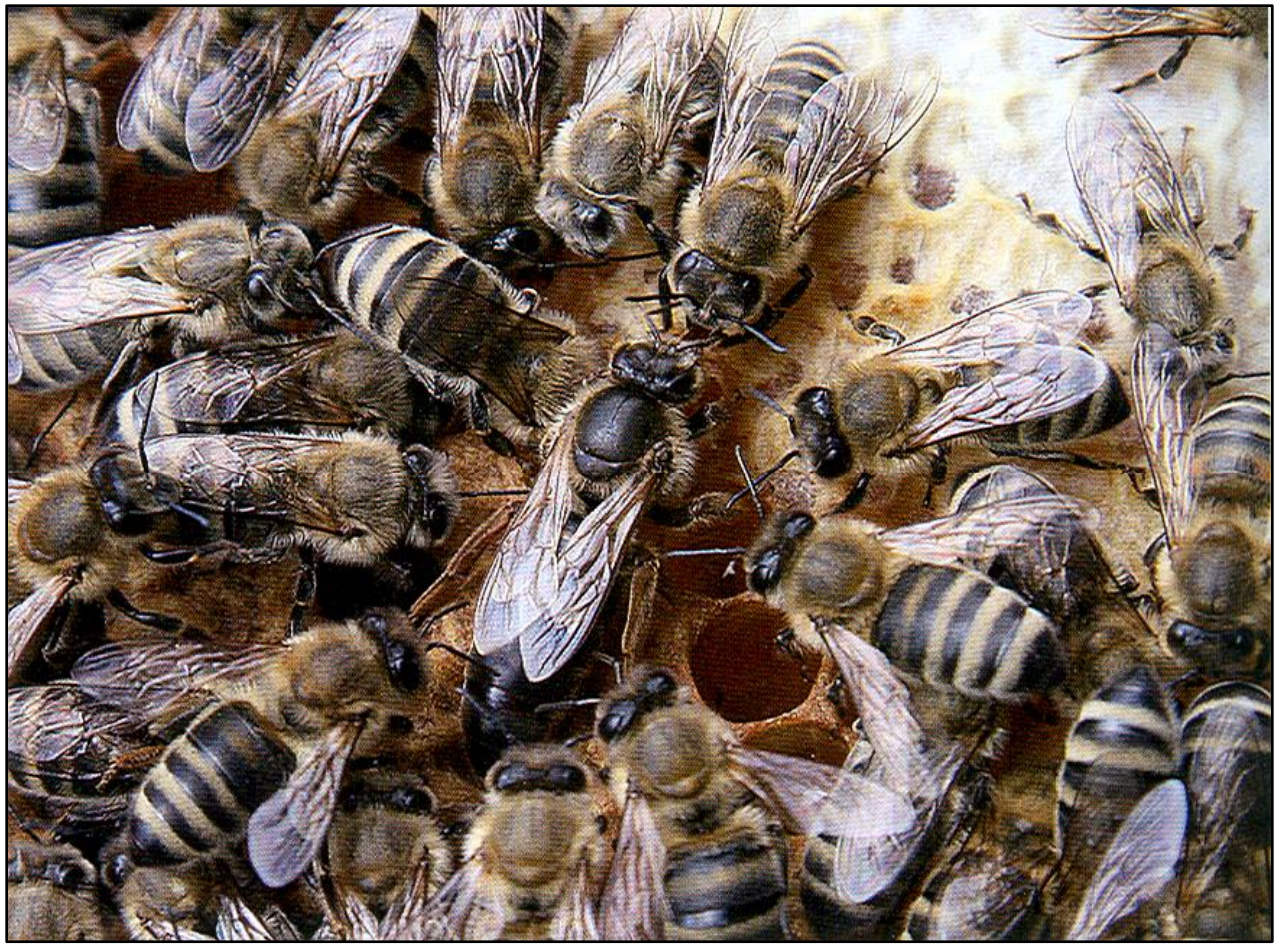
Carniolan Honeybee
Apis m. carnica



Caucasian Honeybee
Apis m. caucasica

Caucasian Honeybee
Apis m. caucasica

- Caucasian originally from the region of Slovenia, the Eastern Alps, and northern Balkans -
- Extreme gentleness
- Dark gray in color
- Colonies are known to shrink to small populations over winter
- Propolis excessive, very sticky; also produces burr comb
- Good bee for colder climates.

Caucasian Honeybee - Apis m. caucasica

- Currently being reintroduced into American bee keeping.

Russian Honey bees
Apis m. rusian

- Imported by the USDA-ARE for stock release in the US
- Difficult to distinguish Russian from Caucasians and Carniolans by color or size
- Not recommended for beginning beekeepers.

Bee Orientation Flights

- - learning local landmarks
- - purge flight
- - occur anytime during daylight
- - moving the hive