

Module 2: Basic Bee Biology and Identification





Hymenoptera: Membranous Wings

- Two pairs of wings
- Haplodiploidy sex-determination
- Complete metamorphosis

Common Characteristics:

- Skinny waists
- Ovipositor
- Long antennae

Rare Characteristics:

- Social behavior (mostly ants)
- Honey production (extremely rare)

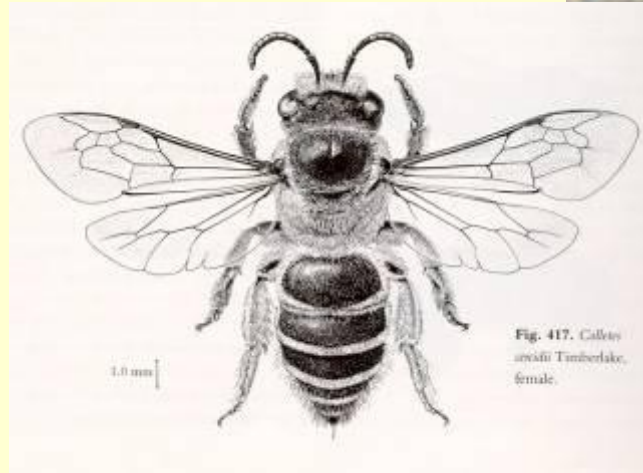


Fig. 417. *Galleo axiafi* Timberlake, female.

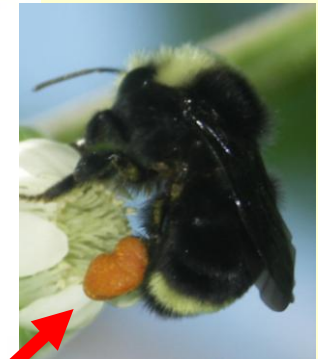




Bees: Distinguishing Characteristics

Characteristics of Bees:

Branched hairs



Long
tongues

Two pairs of
attached wings

Pollen-carrying hairs (scopa)
(on abdomen or hind legs)



Identifying Male and Female Bees

Males

- Smaller than females
- Longer antenna
- Sometimes colored eyes
- No stinger
- Often white or yellow facial hair



Females

- Larger than males
- Black eyes (usually)
- Scopa (pollen-carrying hairs on abdomen or rear legs)





Identifying Bees vs Flies

Flies

- One pair of wings
- Short, stout antenna
- Huge round eyes that “meet” in the middle
- No pollen-carrying structures
- Hair usually sparse (except bee mimics)
- Short, sponge-like mouthparts

Bees

- Two pairs of wings (connected)
- Long antenna
- Skinny, constricted waists
- Pollen-carrying structures
- Usually hairy (except cuckoo bees)
- Long tongues





Wasps

- No pollen-carrying structures
- Body hairs usually sparse and non-branched (shiny hairs)



Bees

- Pollen-carrying structures
- Usually hairy (except cuckoo bees)
- Branched hairs (not shiny)





Not a Bee!





A Bee!





To Bee or Not to Bee?



Not a Bee!



To Bee or Not to Bee?



A Bee!



Not a Bee!





A Bee!

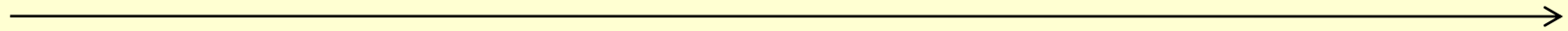






Body Size and Shape

Overall body shape:



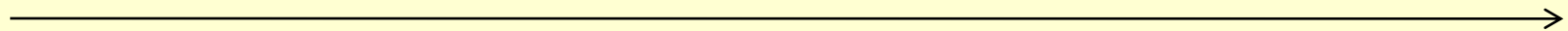
Slender

Moderate

Robust



Body size:



Small
(4 – 8mm)

Medium
(9 – 14mm)

Large
(15 - 25mm)



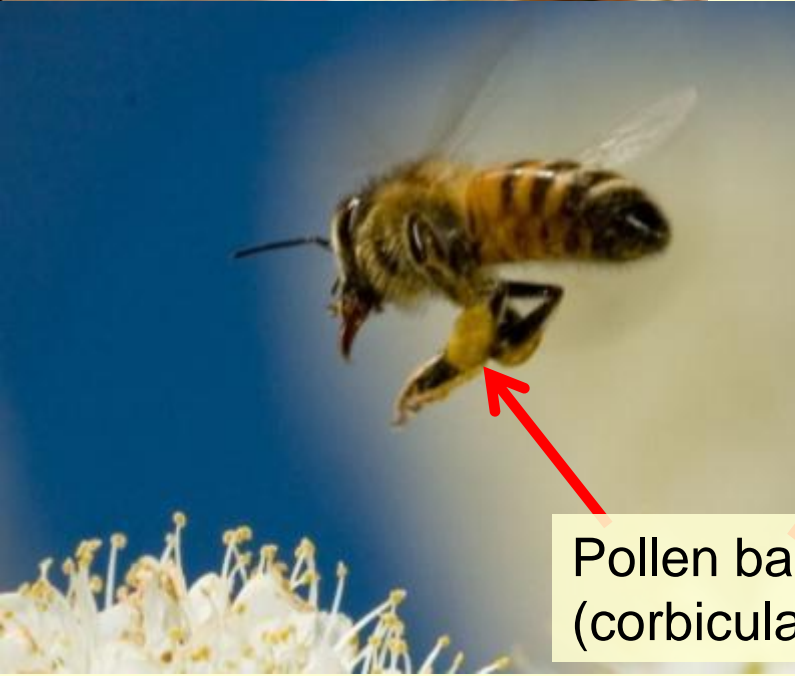
Honey Bees (*Apis mellifera*)

Characteristics:

- Medium size and build
- Black and orange-brown coloration
- Only species with hairs on eyes
- Pollen basket on hind leg



Hairy eyes



Pollen basket
(corbicula)

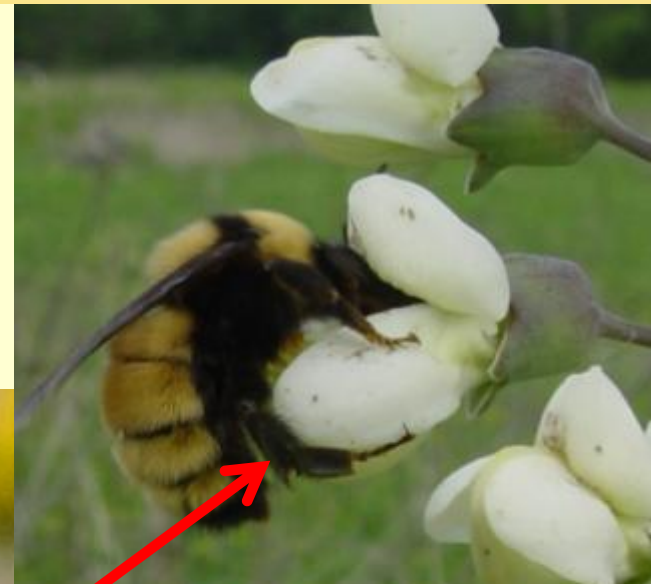




Bumble Bees (*Bombus* spp.)

Characteristics:

- Large size, very hairy, robust bodies
- Black and yellow (and orange, brown)
- Pollen basket on hind legs (corbicula)



Pollen
basket



Long-Horned Bees (*Melissodes*, *Eucera*, and *Svastra* spp.)

Melissodes



Melissodes



Svastra



Scopa

Characteristics:

- Medium to large size, robust build
- Long antenna
- Some with pale stripes
- Dense hind leg scopa hairs (chaps)
- Often associated with sunflowers



Carpenter Bees (*Xylocopa* and *Ceratina* spp.)

Large Carpenter Bees (*Xylocopa* spp.)

Characteristics:

- Large size
- Yellow or black hair on thorax
- Shiny abdomen
- Scopa on hind legs



Small Carpenter Bees (*Ceratina* spp.)

Characteristics:

- Small, slender size
- Dark metallic blue or green color
- Shiny, hairless abdomen
- Scopa on hind leg



Smooth abdomen



Mining / Plasterer Bees (*Colletes* and *Andrena* spp.)

Mining bee (*Andrena*)



Characteristics:

- Small size, drab color
- Hairy hind legs and thorax (“hairy armpits”)
- Facial depressions (*Andrena* only)
- Pale stripes on abdomen
- Many species emerge in Spring

Mining bee (*Andrena*)



Plasterer bee (*Colletes inaequalis*)





Yellow-faced bee (*Hylaeus*)



Sweat bee (*Halictus*)



Characteristics:

- Small size, drab colors (black, brown, dull green or blue)
- Short hairs, some with pale stripes
- Very common
- Some attracted to perspiration

Sweat bee (*Lasioglossum*)





Characteristics:

- Small size, less hairy
- Bright metallic green
- Some with pale stripes
- Common, generalist visitors
- Some attracted to sweat

Agapostemon



Augochlora pura



Augochlora

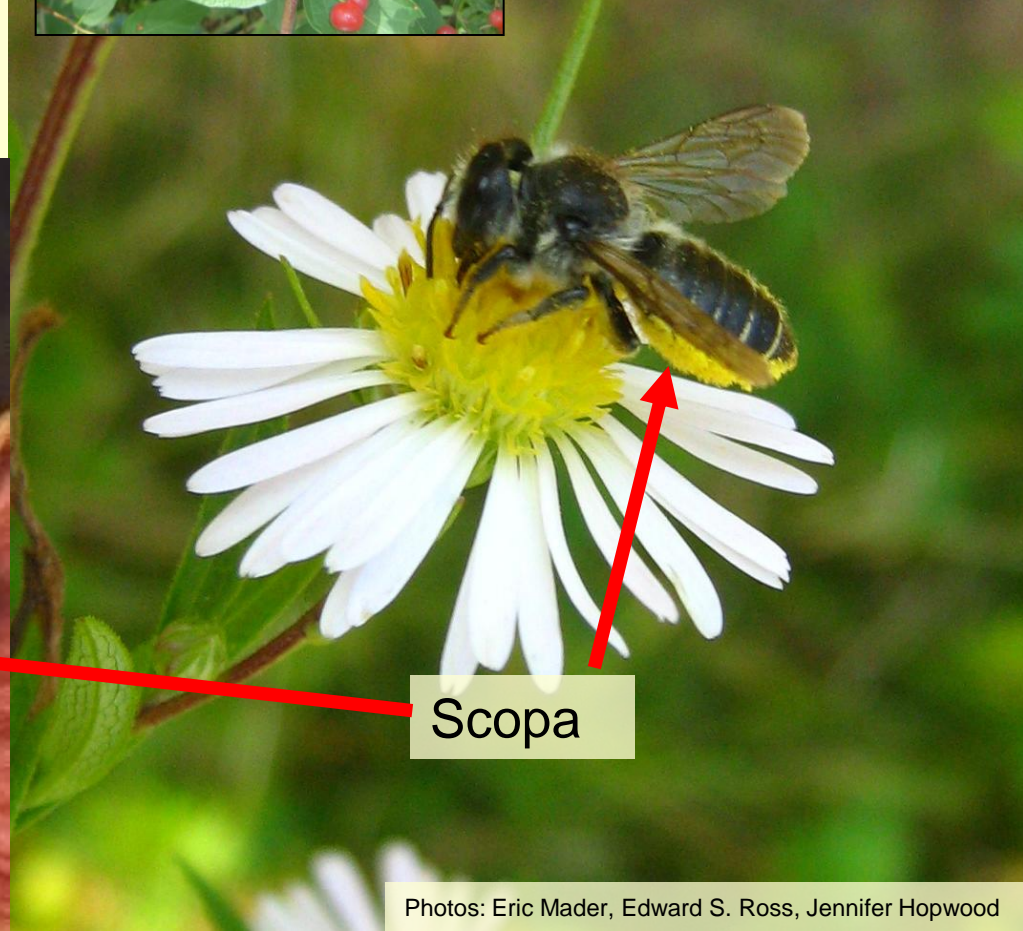




Leafcutter Bees (*Megachile* spp.)

Characteristics:

- Small to large size
- Wide bodies and heads
- Dark, typically with pale stripes
- Scopa on underside of abdomen





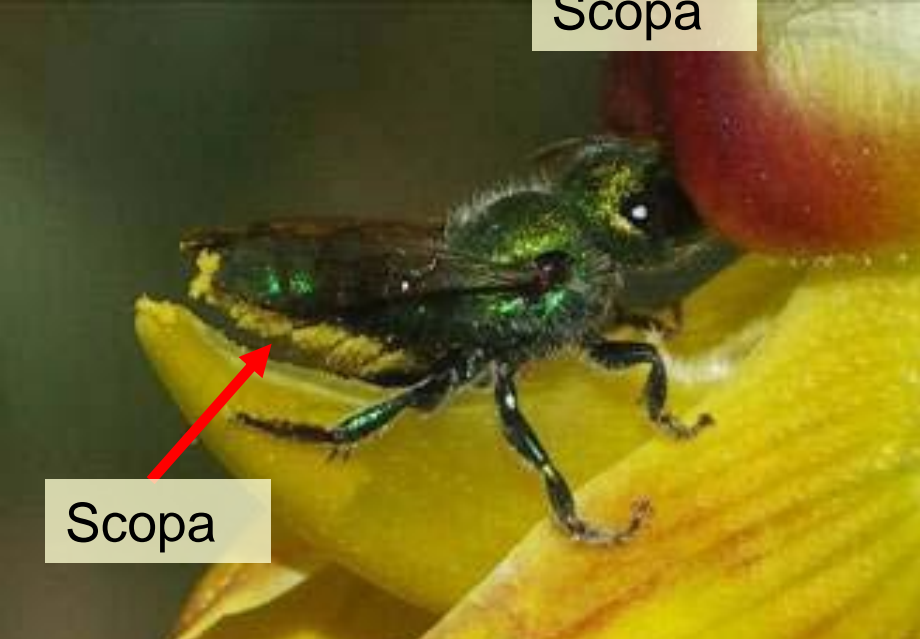
Mason Bees (*Osmia* spp.)

Characteristics:

- Small to large size, robust build
- Usually metallic blue or green
- Wide bodies and heads
- Scopa on underside of abdomen
- Fly in spring and early summer



Scopa



Scopa





Cuckoo Bees: Nest Parasites

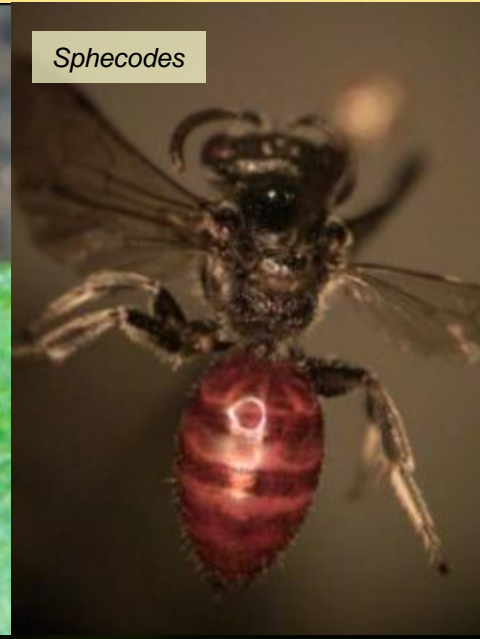
Coelioxys



Epeolus



Sphecodes



Characteristics:

- Slender, wasp-like
- Small to medium size
- Bodies not hairy, no scopa
- Coloration highly variable
- May have spiky projections





Three Broad Groups of Native Bees

Bumble Bees (social)



Ground-Nesting Bees (solitary)



Wood-Nesting Bees (solitary)





Life Cycle of a Solitary Bee



Mining bee (*Andrena* sp.): a year in its underground nest as egg, larva, and pupa before emerging to spend a few weeks as an adult.

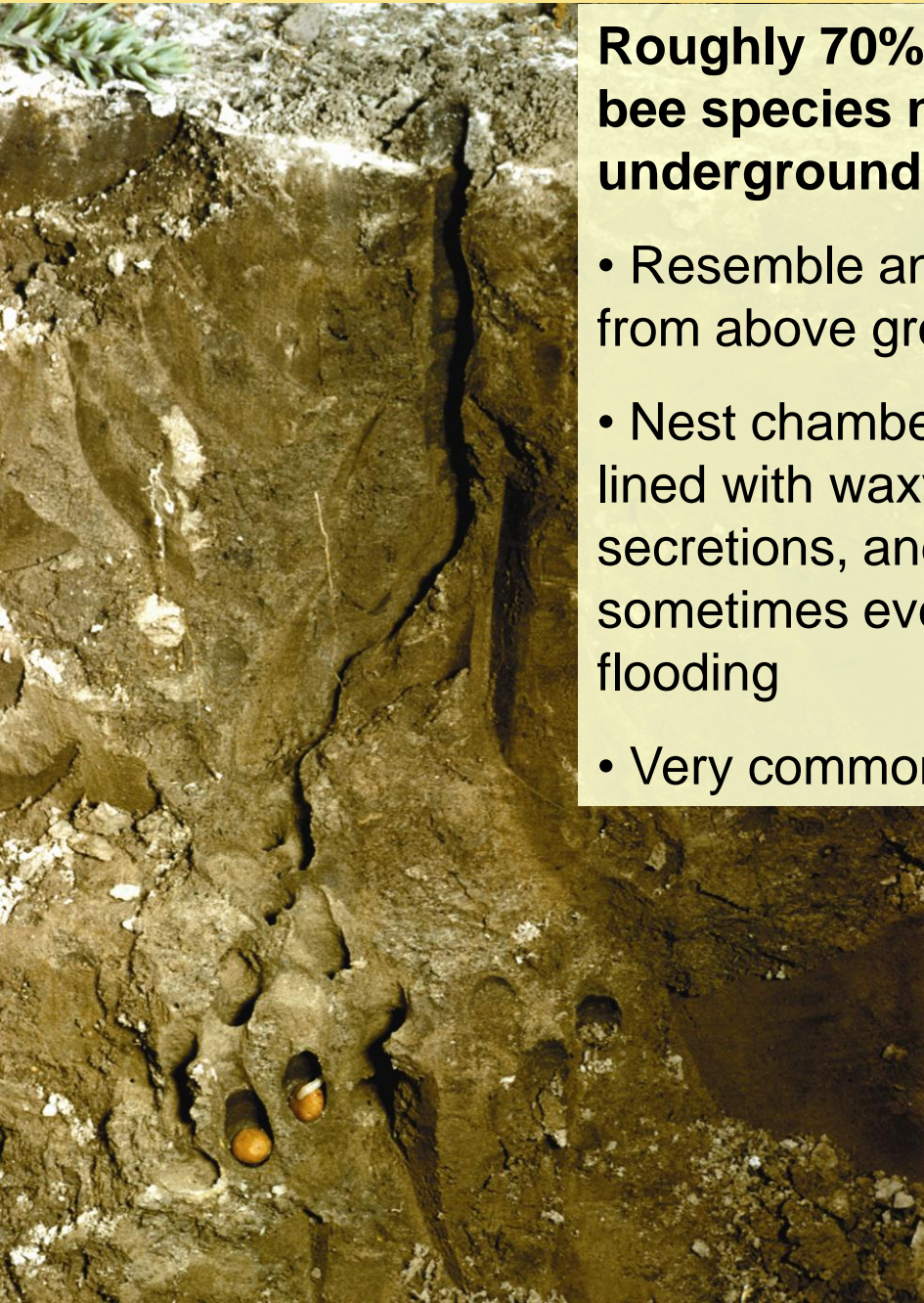




Ground-Nesting Solitary Bees

Roughly 70% of native bee species nest underground.

- Resemble ant-nests from above ground
- Nest chambers are lined with waxy glandular secretions, and can sometimes even resist flooding
- Very common bees





Roughly 30% of native species nest in hollow plant stems, or old beetle borer holes

- Nest tunnel partitions constructed of mud, leaf pieces, or sawdust
- Artificially managed for some crops
- Conserve snags, brush piles



Photo: Edward Ross



Photo: Matthew Shepherd



Photo: Mike Carter



Wood-Nesting Bees

Hollow stem example:

Cross-section of silk cocoons



Larva

Pupa

Adult

Pollen mass

Egg

Mud wall



Silk cocoons with dormant bees inside

Mud cap closure





Wood-Nesting Bees

Nest cells separated with mud or leaf partitions





Wood-Nesting Bees

Managed tunnel nesting bees:

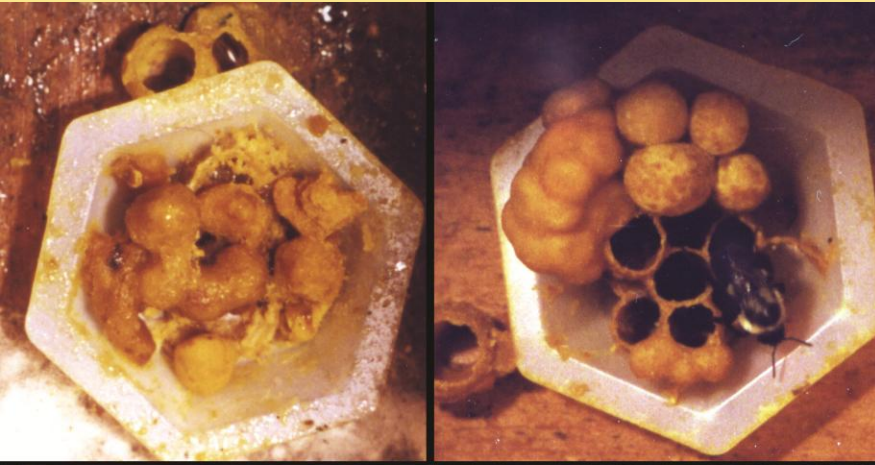
- Mason bees (blue orchard bee)
- Alfalfa leafcutter bee





Bumble Bees

- 45 species in U.S.
- Social colonies founded by a single queen
- Colonies last only one season
- Nest may contain 100-300 workers
- Nests in abandoned rodent burrows or under lodged grasses
- Conserve brush piles, un-mowed areas





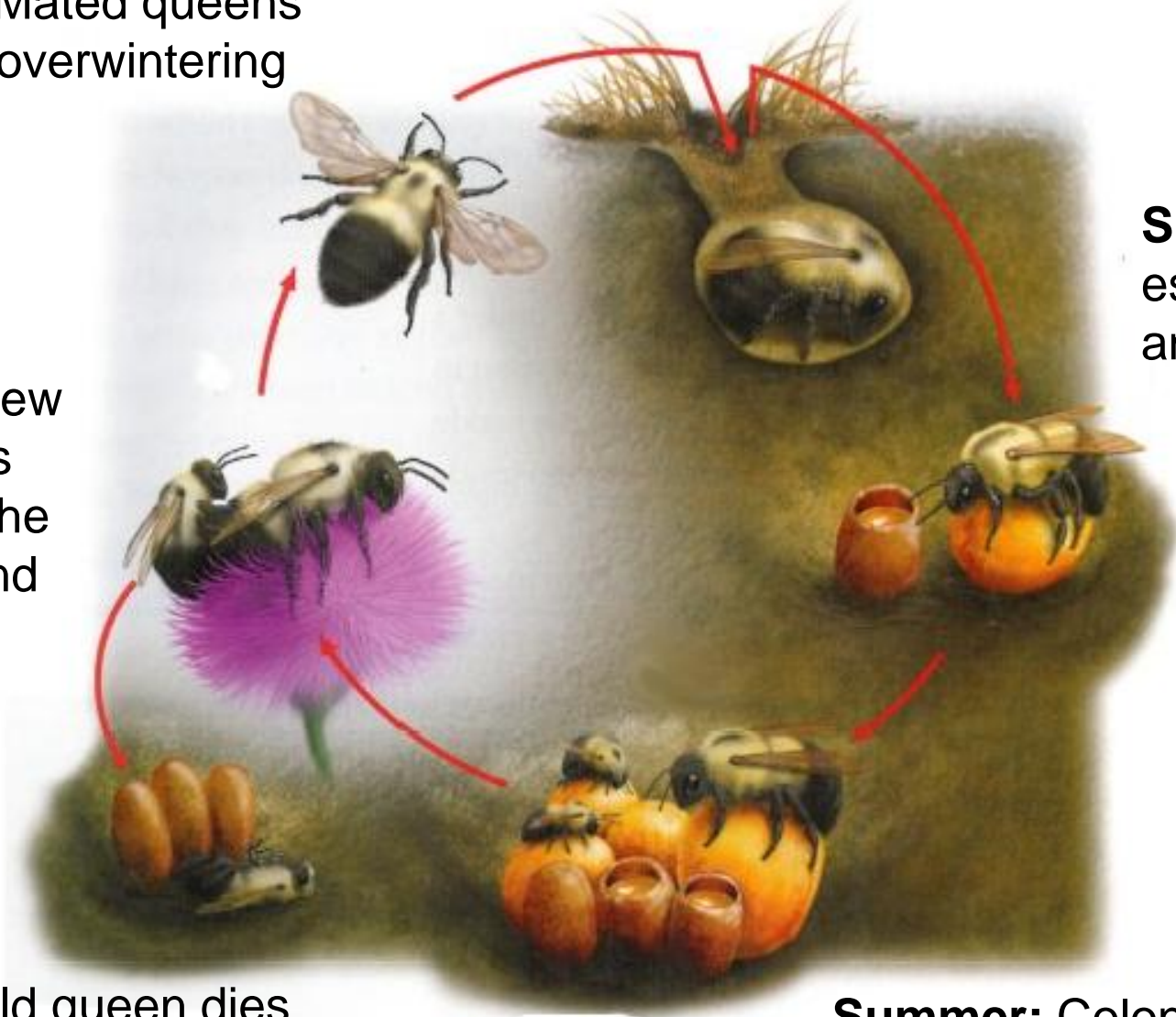
Life Cycle of a Bumble Bee Colony

Winter: Hibernating queen

Fall: Mated queens seek overwintering sites

Fall: New queens leave the nest and mate

Spring: Nest establishment and egg laying



Fall: Old queen dies

Summer: Colony peak



Bumble Bees: Excellent Crop Pollinators

- Pollinators of red clover, tomato
- More efficient than honey bees for blueberry, cranberry, melons, etc.
- Active in cool and wet weather

