

Unit #1

BeeAware!

Presentation



By Nora Spratt

Girl Scout Gold Award Project 2021

In Collaboration with:

Blue Hill Heritage Trust &

Blue Hill Peninsula Explorers 4-H Club



WELCOME!

We are starting with a

_pipe cleaner bee activity



Please use the supplies from your paper bag and instructions from your binder.



Feel free to ask for help!



BACKYARD BEES OF NORTH AMERICA





Program Introduction





Goals:
Raise Awareness
Educate
Empower to Take Positive Action



BEE KIND



The Native Bees' Problems

1. Parasites, Viruses and Diseases
2. Climate change
3. Neonicotinoid Pesticides
4. Habitat Loss and Fragmentation
5. Lack of Public Awareness





What can YOU do to Help?

1. Educate Yourself and SHARE!



2. Provide Nesting Habitat



3. Provide Food





4. Avoid Pesticides



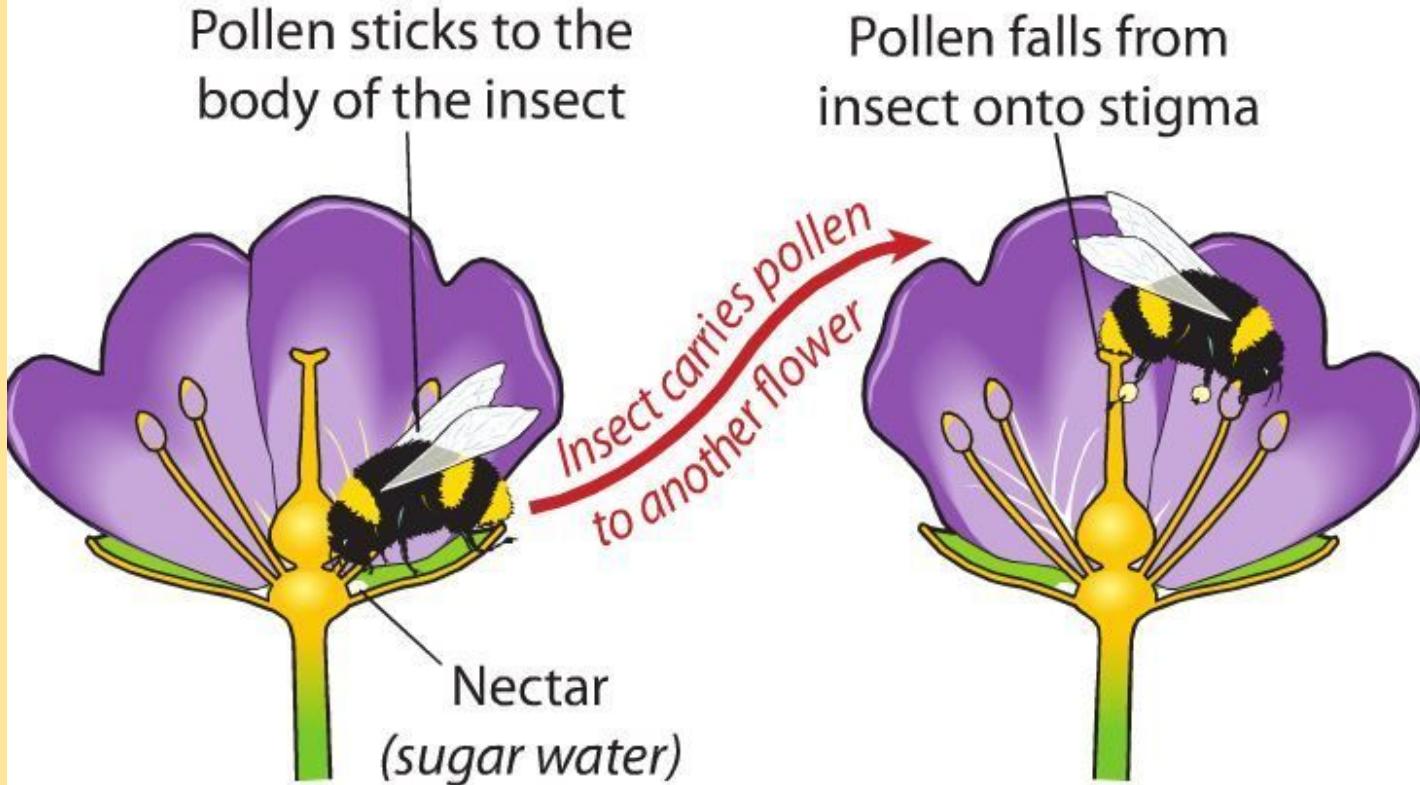
5. Reduce Your Carbon Footprint

Introduction to Pollination

What is Pollination?

- Watch the brief video on [flower pollination](#).
- Watch the video on [Beneficial Pollinators](#) and check out the [Solitary Royals](#) video to learn about and bee excited about solitary bees!
- [This Bee Gets Punched by Flowers For Your Ice Cream](#)
- [Buzz Pollination](#)

Insect pollination



Native Bee 101





- 30,000 Species on Earth
- ~4000 Species in U.S.

1.1 What is a bee?







Bees vs Wasps vs Flies



Next (→)

How To Identify A Bee

Bees vs. Wasps



Honey Bees and Bumblebees vs. Solitary Bees



Bumblebee



Honeybee



Mason Bee



Leafcutter Bee

Native Bees

- Solitary
 - Each female builds her nest, lays the eggs, and gathers all pollen.
 - She doesn't usually meet her offspring.
- Short-lived
 - Fly for about five to eight weeks of the year
- Many specialists
 - Collect pollen from one genus or family of plants.
- Most are ground-nesting.
 - Others live in pre-existing cavities, often in wood.
- Manipulated for pollination, but not domesticated.





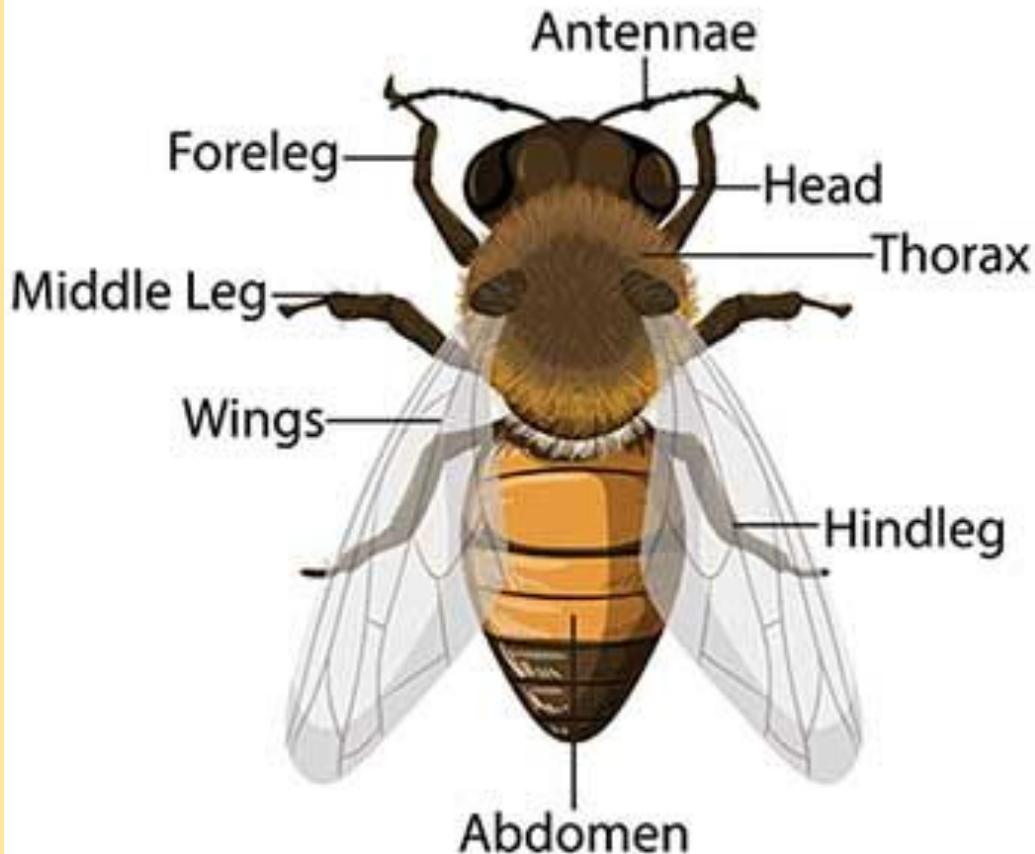
1.2 A Bee's Body

A bee body has three main sections

Head Thorax Abdomen



External Anatomy of a Bee

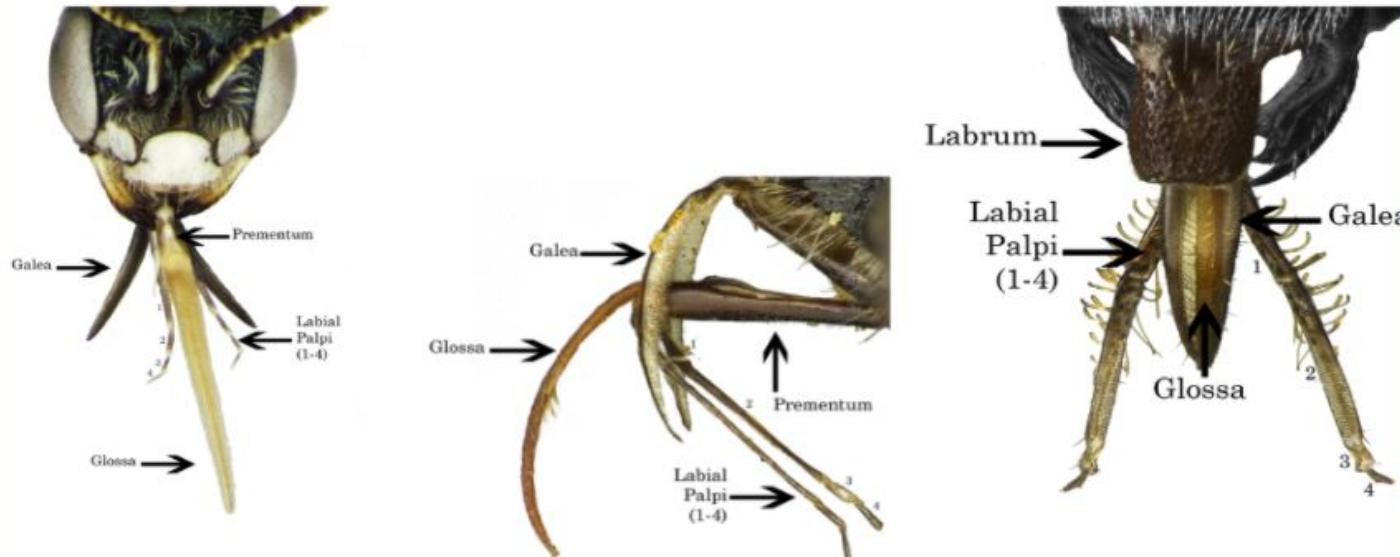


Head: Antennae



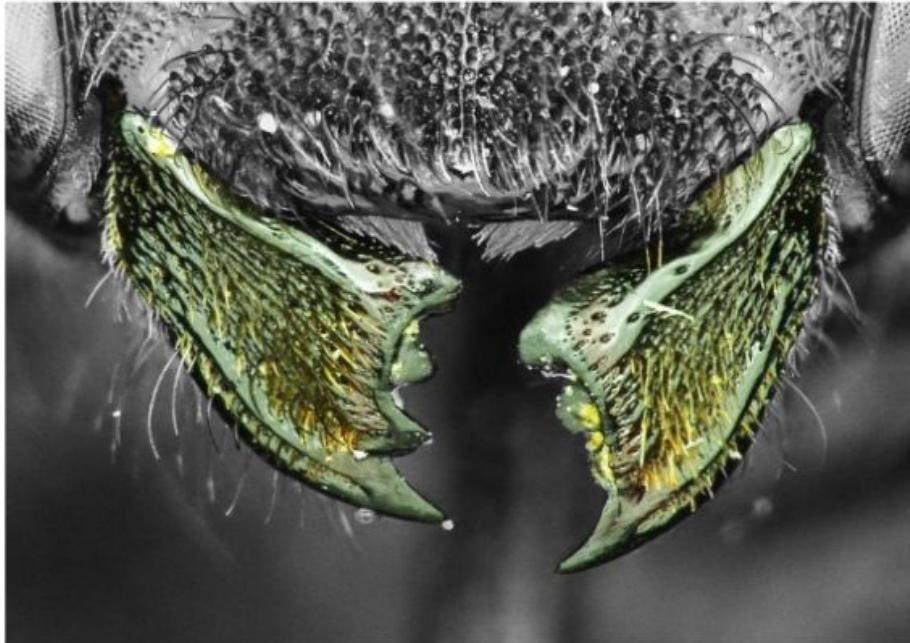
Head: Mouthparts: Tongue

Bees are grouped by whether they have 'short' or long tongues.



Head: Mouthparts: **Mandibles**

Bees have mandibles instead of jaws,
with teeth

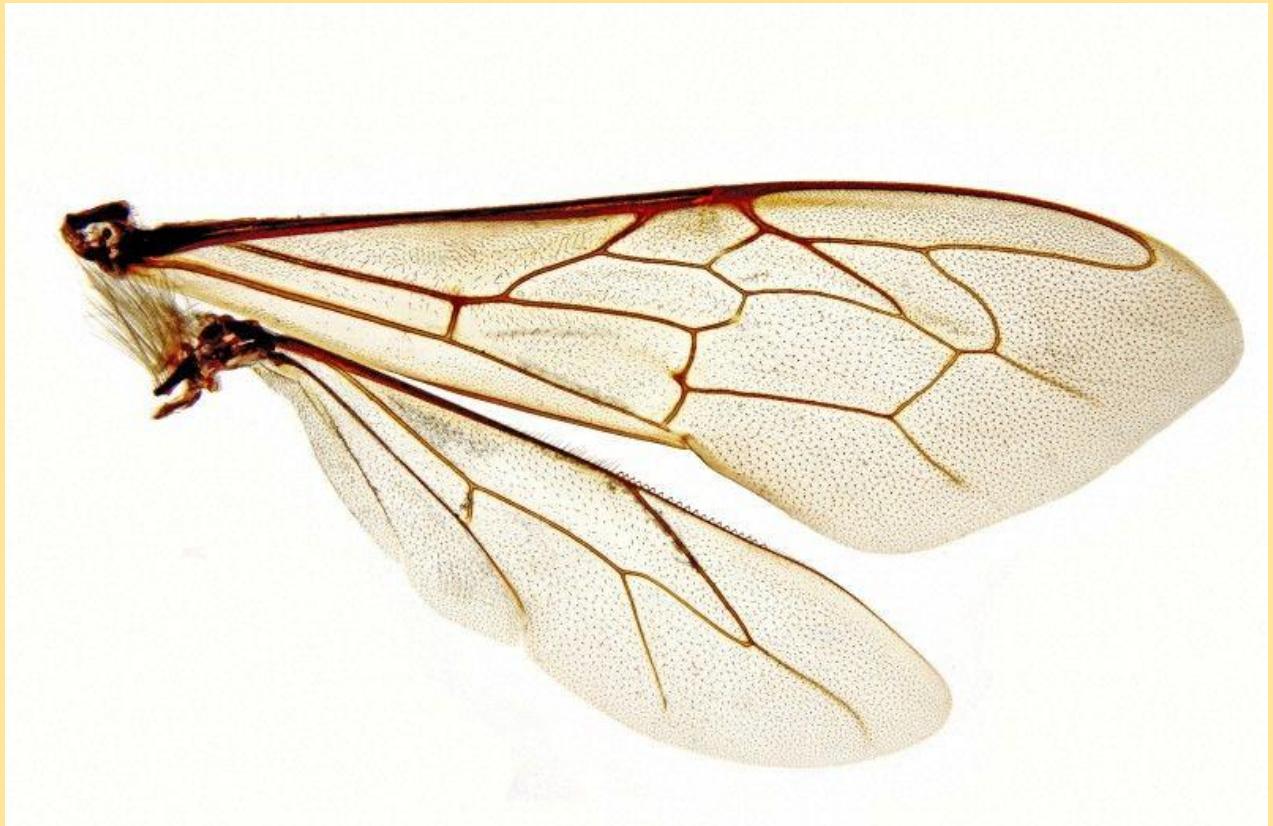


Head: Eyes

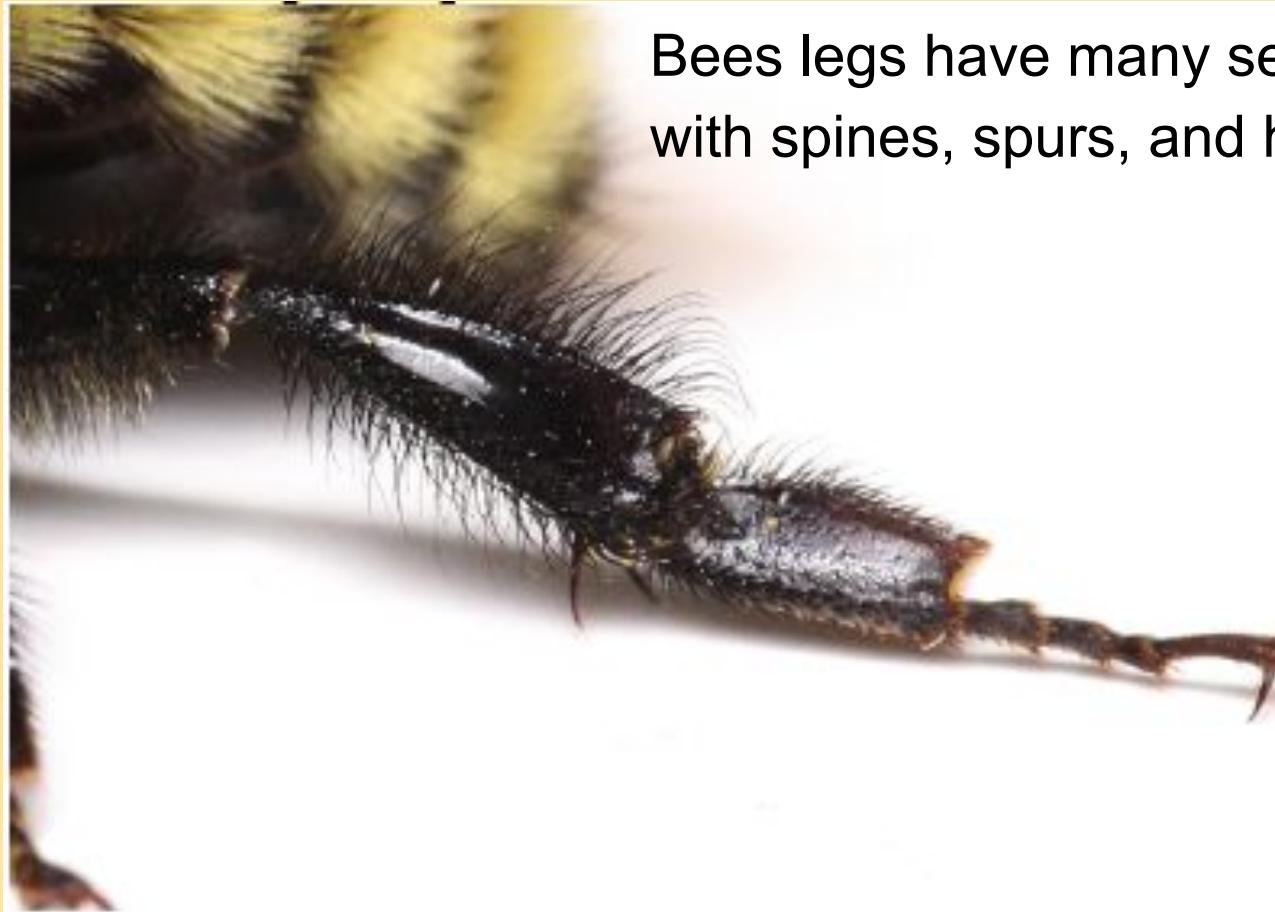
Bees have five eyes, three on top
(simple), two on the side (compound)



Thorax: Wings



Thorax: Legs



Bees legs have many sections with spines, spurs, and hairs.

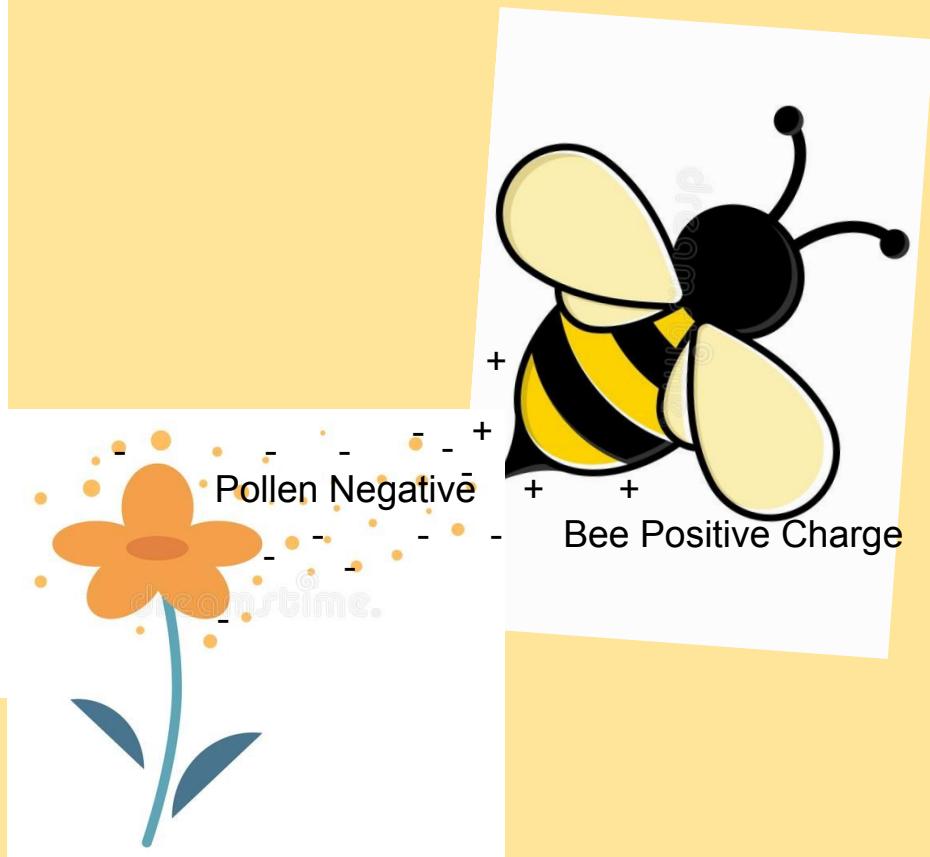
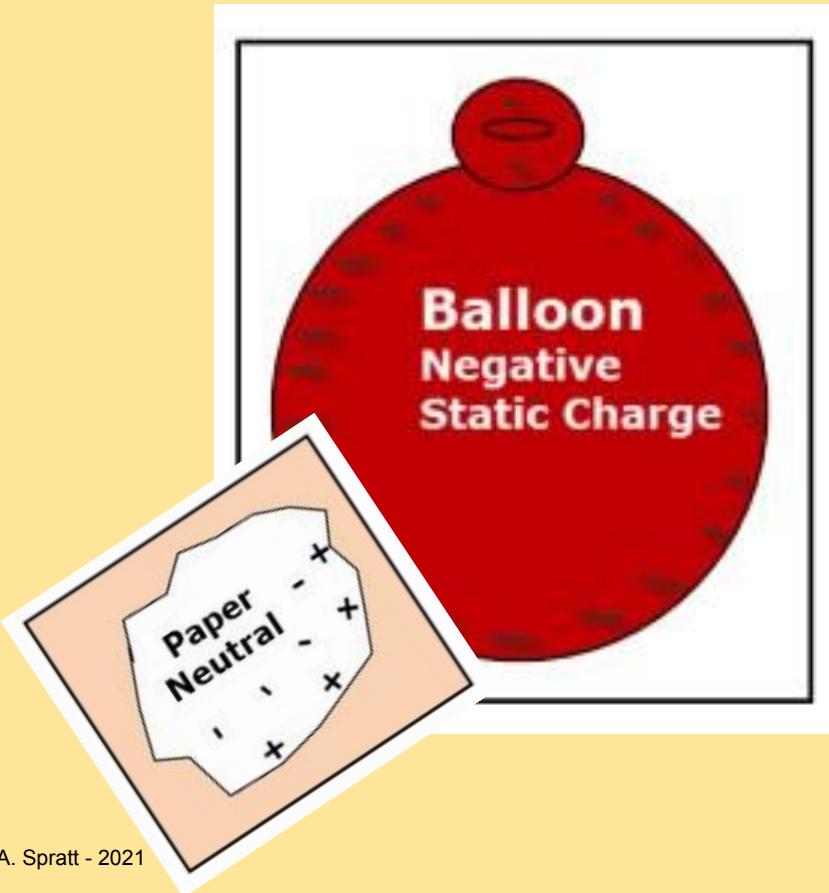
Thorax: Legs: Scopa

Some female bees carry pollen on their legs, some carry it on their bellies (some don't carry pollen, and some carry it internally).

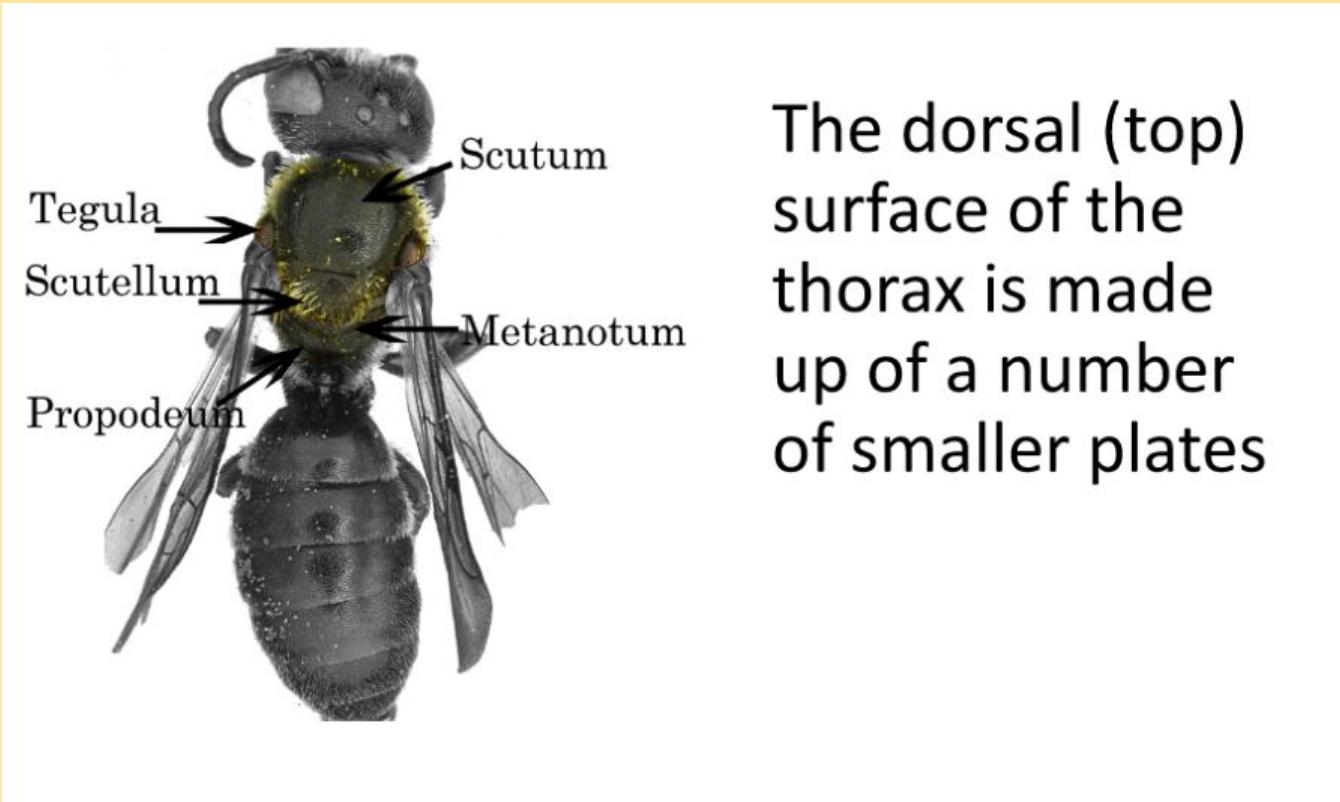


Activity: How do bees carry pollen?





Thorax



The dorsal (top) surface of the thorax is made up of a number of smaller plates

Abdomen



Abdomen: Pygidial Plate

At the very base is (often) the pygidial plate



Abdomen: Stinger



A Bee's Body Activities

1. Bees are insects. Let's sing and dance to the [Head, Thorax, Abdomen song!](#)
2. Complete your Bee Anatomy [diagram/coloring](#) pages!

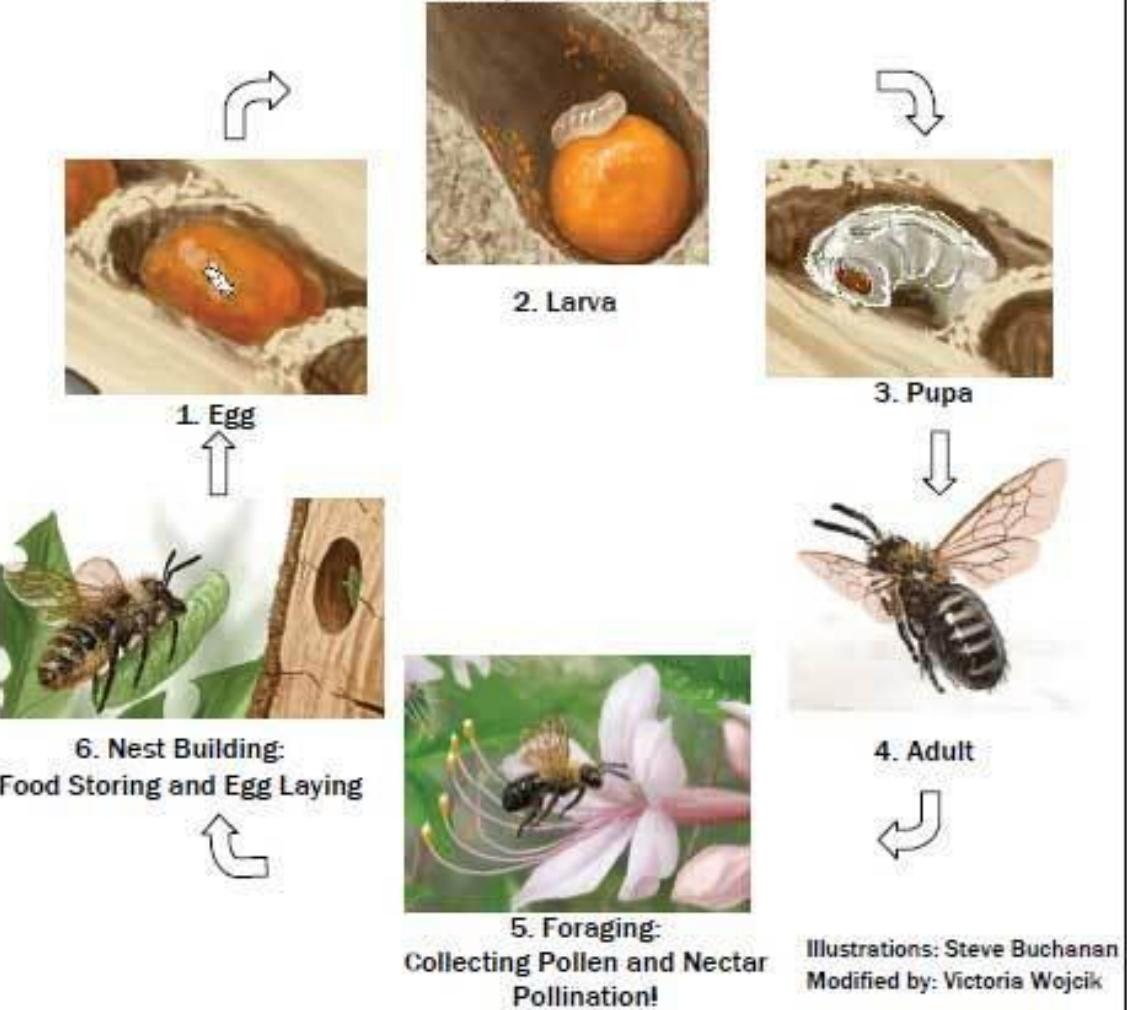
1.3 Life cycle



Honey Bee in Larva/Pupa stage video

Solitary Bee Life Cycle

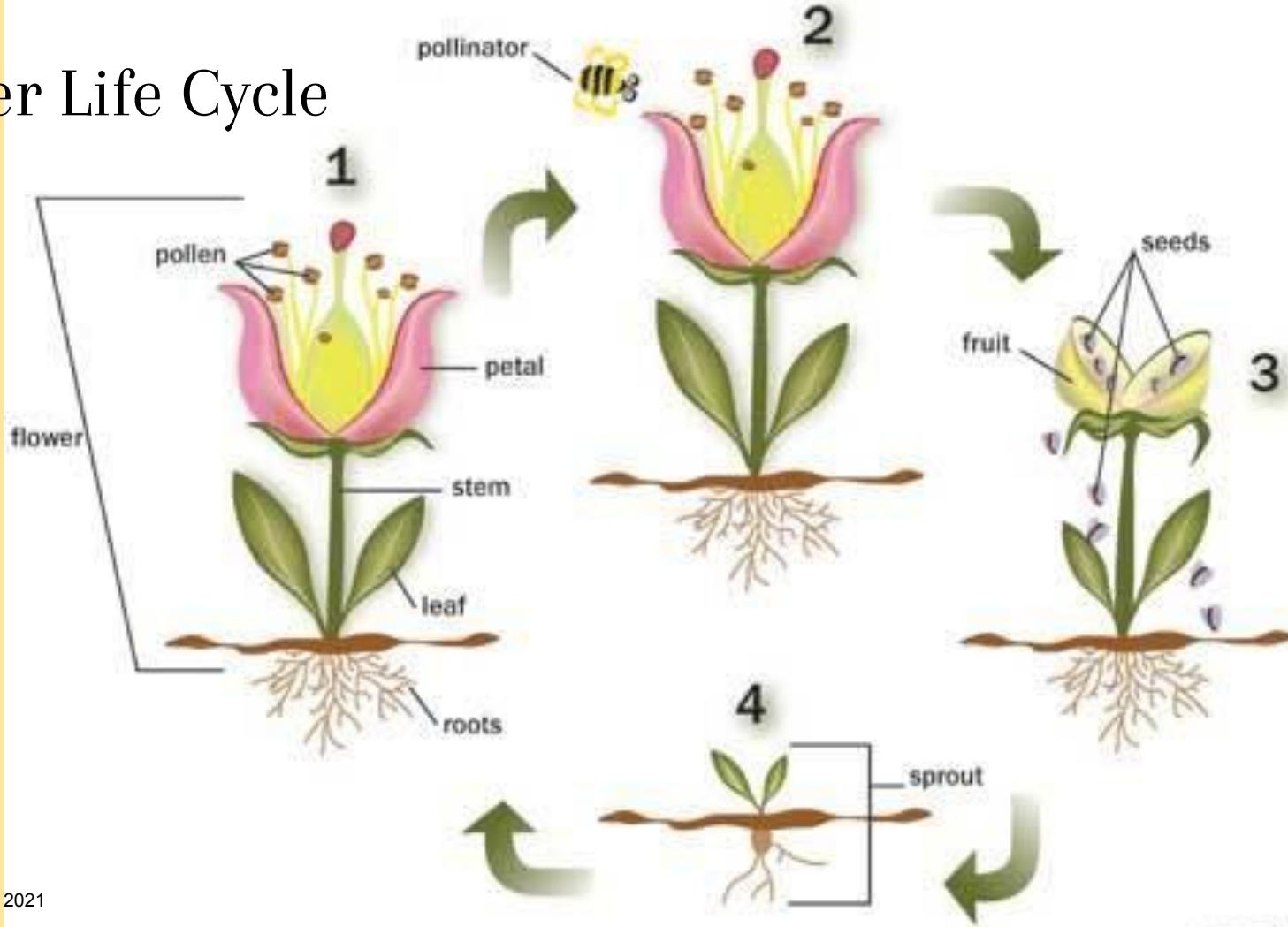
Solitary Bee Life Cycle



Leafcutter bee life-cycle



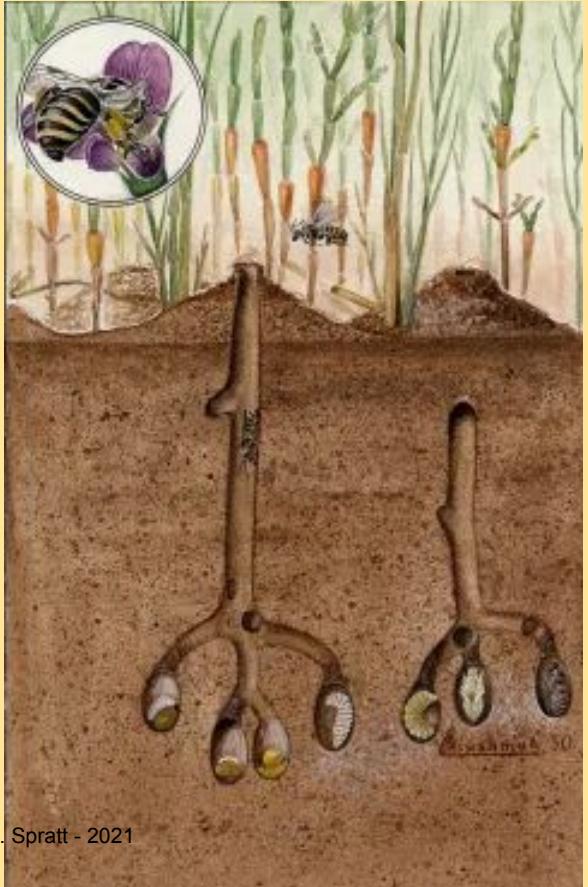
Flower Life Cycle





1.4 Where do bees live?

Underground Nesters



Above Ground Nesters







Questions?



Let's Plant Some
Pollinator-Friendly Plants!



Unit #2

BeeAware!



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BEE KIND

Insect Pollinators

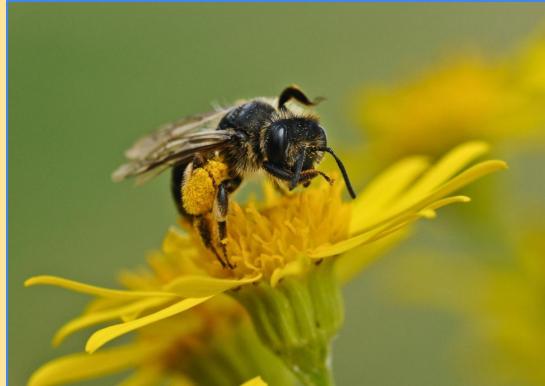


Flies



Beetles

BEEES !



Butterflies and moths



Bee Close-Ups

Photos By Sam Droege















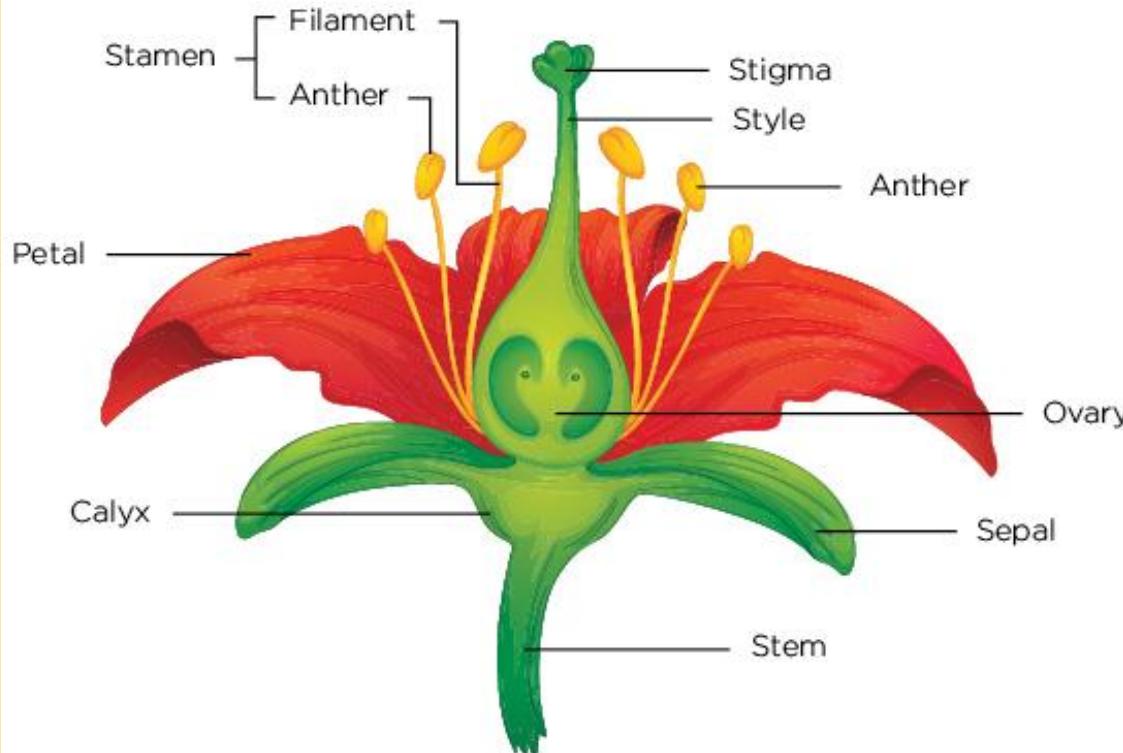


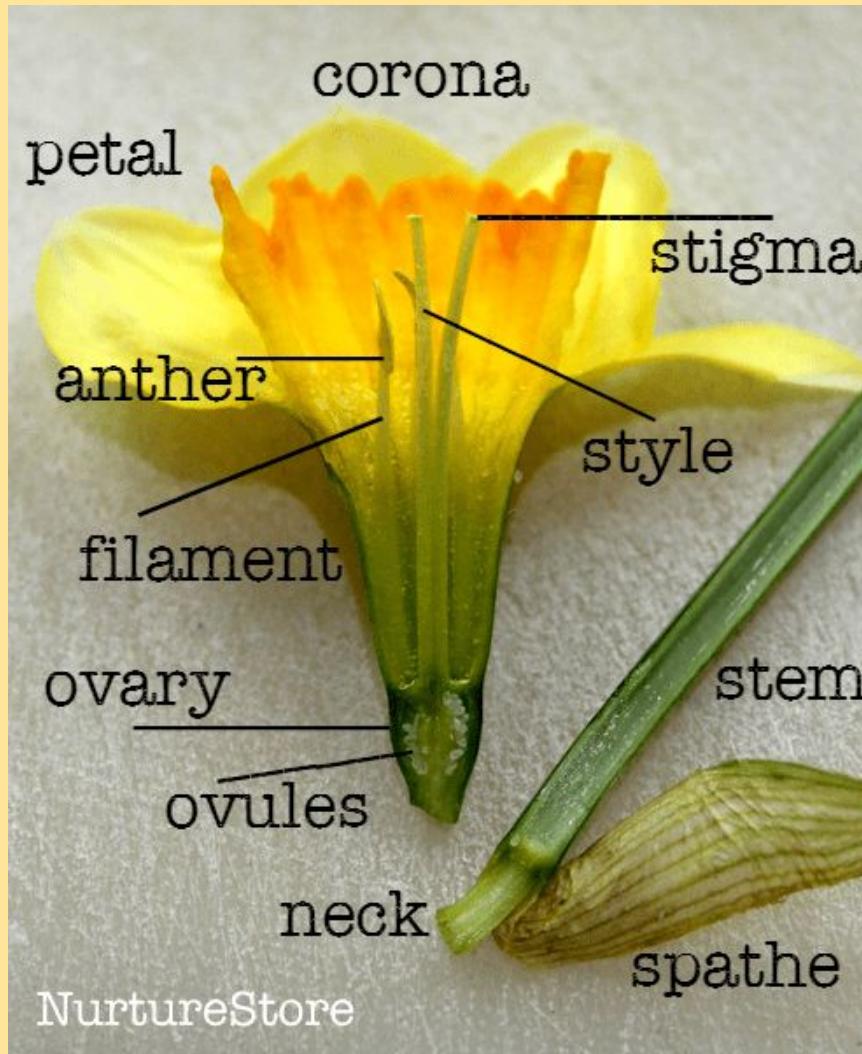


Flower Dissection!



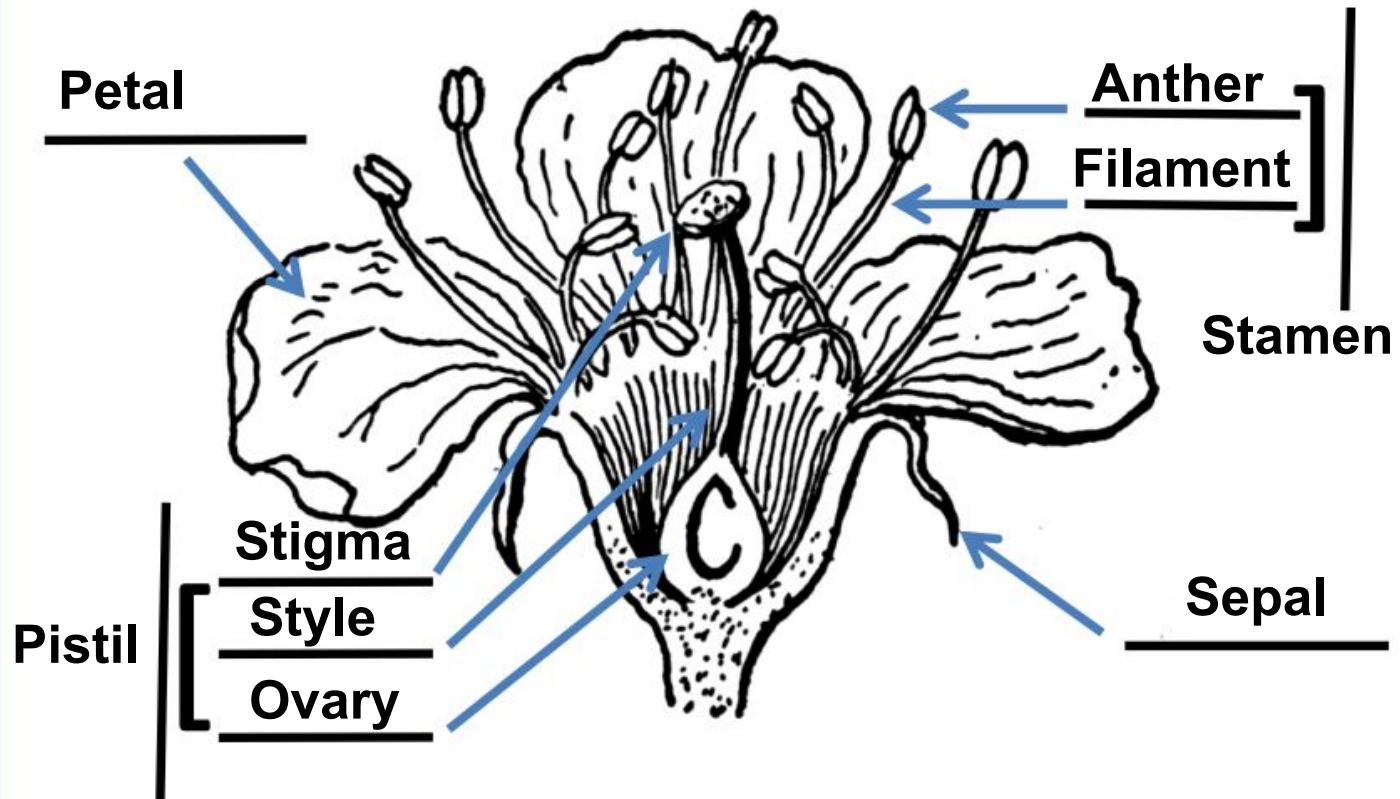
CROSS SECTION OF A FLOWER





Label the Parts of a Flower

Anther	Filament	Ovary	Petal	Pistil	Sepal	Stamen	Stigma	Style
--------	----------	-------	-------	--------	-------	--------	--------	-------



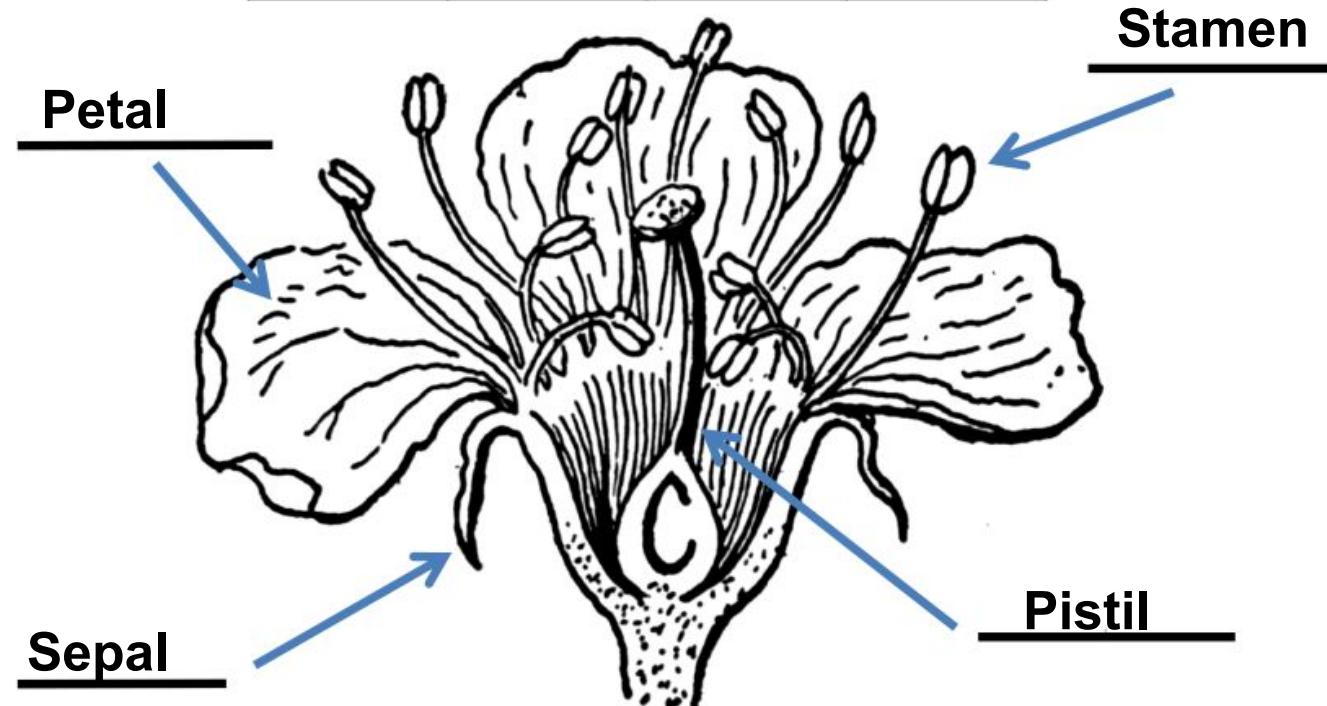
Label the Parts of a Flower

Petal

Pistil

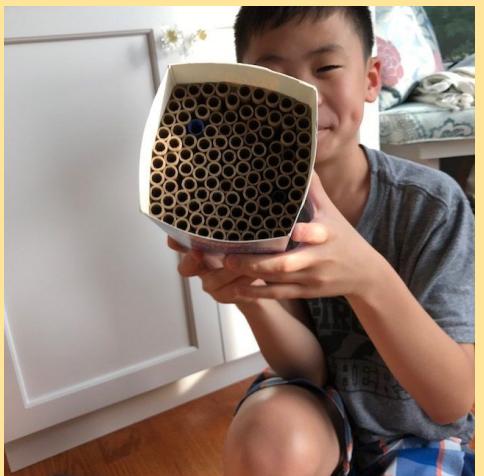
Sepal

Stamen





Milk Carton Bee Houses



Straws protected by overhang



Securely installed bee house



Decorated Cartons with Duct Tape



Sealed/occupied tubes

Nora A. Spratt - 2021



Securely Installed House

Nesting Tube Straws

1. Ensure that straws are short enough to be protected by the milk carton overhang; if protruding, cut and shorten to appropriate length



2. Pinch and flatten one end



3. Tightly roll until sealed

4. Stuff into the house until full and straws are snugly fit

Sealed ends minimize parasites/diseases from spreading!

Bee House Maintenance!!!



- **Straw replacement is absolutely necessary each spring and is critical to the success of the bee houses! This cannot be stressed enough.**
- Bee nests require routine maintenance and regular replacement to prevent the build up of parasites and diseases that may affect the developing brood.
- In the early spring (around May), after the previous season's bees have emerged from their sealed nesting tubes, replace the used and/or diseased nesting tubes with fresh nesting tubes (instructions below).
- If these bee houses are left for too long without being cleaned, bacteria, diseases, parasites, and fungi can all find their way into your houses and end up growing out of control and spreading to all of the bees living inside!



Let's Build Some Bee Baths!





Jacqueline Freeman's Amazing Bee Bath Heaven!

Unit #4

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BEE KIND



Why are Pollinators Important?

1 in 3 bites of food we eat are the result of animal assisted pollination.



Livestock that graze on alfalfa or clover depend on these crops to be replenished from insect-pollinated seed.



Bees keep agriculture buzzing! Bees and other pollinators are directly responsible for economically and nutritionally important crops across the country.



Many animals depend upon the fruits, nuts, and seeds produced as a result of insect pollination, and many pollinators are important food sources for wildlife.



Pollinators assist in the reproduction of plants used for fibres such as cotton and flax.



Insect pollinated foods contain key nutrients, such as vitamin E, that are essential for our diet.



Pollinators beautify the planet by keeping Earth's flowering plants blooming.



Rusty patched bumble bee
(*Bombus affinis*) first bee species
to be listed as endangered
in continental U.S.

28%

of bumble bee
species in decline



19%

of butterflies in
the U.S. at risk
of extinction



27

species of non-native lady beetle have
been established in the U.S. since the
mid-1980's, threatening native species

Once common across the U.S., the
nine-spotted lady beetle is now
locally extinct from many states
where it was once plentiful.



50%

of leafcutter bees

27%

of mason bee species



What Are The Native Bees' Problems?

1. Parasites, Viruses and Diseases
2. Climate change
3. Neonicotinoid Pesticides
4. Habitat Loss and Fragmentation
5. Lack of Public Awareness





What can YOU do to Help?

1. Educate Yourself and SHARE!



2. Provide Nesting Habitat



3. Provide Food





4. Avoid Pesticides



5. Reduce Your Carbon Footprint

Wooden Bee Houses!





96 Board

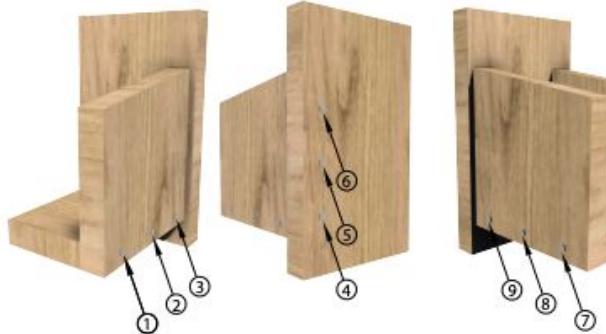


NOTE: ROOF CUT HAS 10° DEGREE MITER ALONG ONE OF THE 6" WIDE EDGES

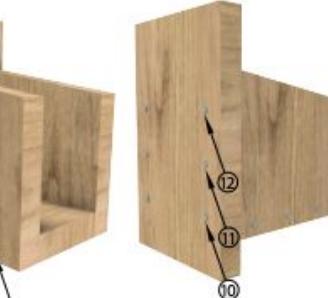
*ALL MEASUREMENTS IN INCHES



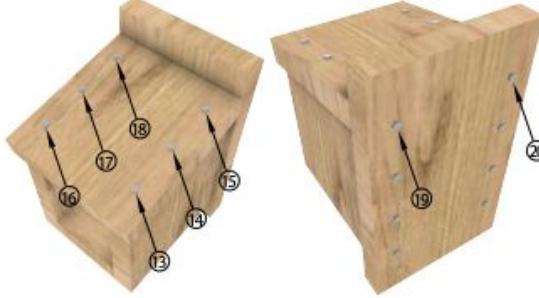
STEP 1:
Assemble side 1 and floor
to back plate (nails 1 - 6)



STEP 2:
Assemble side 2 to floor
and back plate (nails 7 - 12)



STEP 3:
Assemble roof to side 1, side 2
and back plate (nails 13 - 20)



APPLY WOOD GLUE WHILE JOINING FACES PRIOR TO NAILING IN PLACE

PARTS LIST			
ITEM	QTY	DESCRIPTION	MATERIAL
1	1	1" x 6" x 32" board	wood: cedar / pine
2	1	4" x 4" x 5 3/4" post	wood (avoid P.T.)
3	20	2", 6d siding nails w/ annular ring shank	stainless steel
4	2	1/4" x 2 3/8" hex-head lag screws	stainless steel
5	2	1/4" x 5/8" OD flat washers	stainless steel
6	1	exterior, waterproof wood glue	glue

NOTE: A SINGLE 1" x 6" x 8' (96") BOARD WILL YIELD 3 COMPLETE BEE HOUSES

		PROJECT Native Bee House (Gold Standard) TITLE Assembly Instructions Designed by: Nora Spratt		
APPROVED	Nora Spratt	17 May 21	SIZE	CODE
CHECKED	Stephen Spratt	16 May 21	B	Mk. IV
DRAWN	Will Akers	14 May 21	SCALE	1:20
			WEIGHT	
			SHEET	1/1



Cut straws to 5.25-5.5"



Pinch and flatten one end



Tightly roll until 5"

Stuff ~70 into the house
94

Bee Houses MUST be
Maintained;
Beeecome a BeeAware! Steward!





Questions?





Continue to “Bee Aware” about
the Native Bees and Pollinators!



CITATIONS -1



<https://bugguide.net/node/view/754598>

<https://nature.mdc.mo.gov/discover-nature/field-guide/halictid-bees-sweat-bees>

<https://bugguide.net/node/view/1034753>

<https://bugguide.net/node/view/428261/bgimage>

https://www.google.com/search?q=colorful+bees&rlz=1C5CHFA_enUS918US919&source=lnms&tbo=isch&sa=X&ved=2ahUKEwiNkur7ifLvAhVmc98KHS22DwEQ_AUoAXoECAEQAw&biw=1366&bih=609#imgrc=m4vpRINWuNOYSM

https://www.google.com/search?q=solitary+bees&rlz=1C5CHFA_enUS918US919&source=lnms&tbo=isch&sa=X&ved=2ahUKEwiKkueXmPLvAhWFdN8KHbmlDogQ_AUoAXoECAEQAw&biw=1246&bih=553#imgrc=8jqwZ33hMq8MEM

https://www.google.com/search?q=honey+bee+with+honeycomb&rlz=1C5CHFA_enUS918US919&source=lnms&tbo=isch&sa=X&ved=2ahUKEwiY09uVmfLvAhV1QjABHfDoCsYQ_AUoAXoECAEQAw&biw=1246&bih=553#imgrc=YEjl64UYEyc8nM

https://www.google.com/search?q=mason+bees+home&rlz=1C5CHFA_enUS918US919&source=lnms&tbo=isch&sa=X&ved=2ahUKEwjgbfDoPLvAhWmTN8KHW55A04Q_AUoAXoECAEQAw&biw=1246&bih=553#imgrc=18j9F44r_o6veM

https://www.google.com/search?q=diagram+of+bee+tunnel&rlz=1C5CHFA_enUS918US919&source=lnms&tbo=isch&sa=X&ved=2ahUKEwjLwuOXofLvAhUGVd8KHedWBLcQ_AUoAXoECAEQAw&biw=1246&bih=553#imgrc=d-H43Q6ZocAhZM

https://www.google.com/search?q=above+ground+bee+nests&rlz=1C5CHFA_enUS918US919&source=lnms&tbo=isch&sa=X&ved=2ahUKEwiCwp3eofLvAhVrUt8KHasrCjAQ_AUoAXoECAEQAw&biw=1246&bih=553#imgrc=rcicipVGHrW7sM

CITATIONS - 2



https://www.google.com/search?q=above+ground+bee+nests&rlz=1C5CHFA_enUS918US919&source=lnms&tbm=isch&sa=X&ved=2ahUKEwiCwp3eofLvAhVrUt8KHasrCjAQ_AUoAXoECAEQAw&biw=1246&bih=553#imgrc=rcicipVGHrW7sM

https://www.google.com/search?q=native+bee+nesting+unit&rlz=1C5CHFA_enUS918US919&source=lnms&tbm=isch&sa=X&ved=2ahUKEwixtPeaovLvAhUJmuAKHZEqCtoQ_AUoAXoECAEQAw&biw=1246&bih=553#imgrc=n5Ga9QSaeFpFM

https://www.google.com/search?q=inside+of+native+bee+nesting+tube&tbm=isch&ved=2ahUKEwifyejYpPLvAhVSPN8KHcU1CtkQ2-cCegQIABAA&oq=inside+of+native+bee+nesting+tube&gs_lcp=CgNpbWcQAzoFCAAQsQM6AggAOgQIABBDQgcABCxAxBDQggIABCxAxCDAToGCAAQCBxAeUNjbDVitjw5guZEOaABwAHgAgAGwAYqBhxSAQQyNi43mAEEAoAEBqqELZ3dzLXdpei1pbWfAAQE&sclient=img&ei=Sd9wYN-AKtL4_AbF66jIDQ&bih=553&biw=1246&rlz=1C5CHFA_enUS918US919#imgrc=vdyza8lUb72pXM

https://www.google.com/search?q=basic+native+bee+anatomy&tbm=isch&ved=2ahUKEwjo9oSCqPLvAhURQVkKHRwYDjAQ2-cCegQIABAA&oq=basic+native+bee+anatomy&gs_lcp=CgNpbWcQA1D-tqRY-7wEYIq_BGgAcAB4AIABWogBrwOSAQE1mAEAoAEBqqELZ3dzLXdpei1pbWfAAQE&sclient=img&ei=xJwYKiAG5GC5QKcsLiAAq&bih=608&biw=1306&rlz=1C5CHFA_enUS918US919#imgrc=Cy5m1Ynm59MCzM

https://www.google.com/search?q=bumble+bee&rlz=1C5CHFA_enUS918US919&source=lnms&tbm=isch&sa=X&ved=2ahUKEwjKx42ZrPLvAhXDmeAKHZwgBDEQ_AUoAXoECAEQAw&biw=1306&bih=586#imgrc=7LuqmDQDMVBCCm

https://www.google.com/search?q=honey+bee+pictures&rlz=1C5CHFA_enUS918US919&source=lnms&tbm=isch&sa=X&ved=2ahUKEwjO6-qorPLvAhWthOAKHfynBREQ_AUoAXoECAEQAw&biw=1306&bih=586#imgrc=C7w39X9VsYTzmM

https://www.google.com/search?q=mason+bee&rlz=1C5CHFA_enUS918US919&source=lnms&tbm=isch&sa=X&ved=2ahUKEwjTxKzwrPLvAhUCSN8KHcPECXAQ_AUoAXoECAEQAw&biw=1306&bih=586#imgrc=1qeYUJaMhrRfzM

https://www.google.com/search?q=leafcutter+bee+top&rlz=1C5CHFA_enUS918US919&source=lnms&tbm=isch&sa=X&ved=2ahUKEwim2eq3sPLvAhXEm-AKHf5WAjwQ_AUoAXoECAEQAw&biw=1306&bih=586#imgrc=SC2villUzwWg9M

CITATIONS - 3



<https://beebettercertified.org/digging-deep-inside-look-how-bees-nest>

<https://www.museumoftheearth.org/bees/nesting>

https://www.google.com/search?q=native+bee+antenna&rlz=1C5CHFA_enUS918US919&source=lnms&tbo=isch&sa=X&ved=2ahUKEwjFnLW_U2PLvAhWkUt8KHcQ-ByoQ_AUoAXoECAEQAw&biw=1280&bih=808#imgrc=nlWuwuIL-3ko5M

https://www.google.com/search?q=bee+wings&rlz=1C5CHFA_enUS918US919&source=lnms&tbo=isch&sa=X&ved=2ahUKEwik4e7V2_LvAhVmneAKHainCCcQ_AUoAXoECAEQAw&biw=1280&bih=808#imgrc=8K5A-egl9I2t0M

<https://www.sharpeatmanguides.com/how-bees-carry-pollen?lightbox=datalitem-izt28hey2>

<https://homeschool.scienceprojectideasforkids.com/2021/static-electricity-pollination/>

<https://www.sharpeatmanguides.com/how-bees-carry-pollen?lightbox=datalitem-izt5cwbj>

https://www.google.com/search?q=native+bee+abdomen&rlz=1C5CHFA_enUS918US919&source=lnms&tbo=isch&sa=X&ved=2ahUKEwino6Tx4PLvAhVPiuAKHbvCB1sQ_AUoAXoECAEQAw&biw=1280&bih=808#imgrc=a_0JdW3HXHJSPM

https://www.google.com/search?q=native+bee+stinger&rlz=1C5CHFA_enUS918US919&source=lnms&tbo=isch&sa=X&ved=2ahUKEwj7r8zC4fLvAhVlh-AKHbnbAXkQ_AUoAXoECAEQAw&biw=1280&bih=808#imgrc=Mupjc7LX6asl5M

https://www.google.com/search?q=pollination+diagram&rlz=1C5CHFA_enUS918US919&source=lnms&tbo=isch&sa=X&ved=2ahUKEwjY_aaxsfLvAhVkk-AKHZ_9CIUQ_AUoAXoECAEQAw&biw=1306&bih=586#imgrc=1LsqYa4MxGCVtM

CITATIONS - 4



https://www.google.com/search?q=bumble+bee+nest&tbm=isch&ved=2ahUKEwjXxqqWtPLvAhWIIN8KHfL1BTMQ2-cCegQIABAA&oq=bumble+bee+nest&gs_lcp=CgNpbWcQAzICCAAyAqgAMgIIADICCAAyAqgAMgIIADICCAAyAqgAMgYIABAHEB4yBggAEAUQHjoHCAAQsQMQQzoECAAQZoFCAAQsQNQhm5Y7HRglHZoAHAAeACAAZABiAGyBJBAzAuNZgBAKABAaoBC2d3cy13aXotaW1nwAEB&sclient=img&ei=he9wYJfwDYjB_Aby65eYAw&bih=586&biw=1306&rlz=1C5CHFA_enUS918US919#imgrc=n5Ga9QSSaeFpFM

https://www.google.com/search?q=bee+hive&rlz=1C5CHFA_enUS918US919&source=lnms&tbm=isch&sa=X&ved=2ahUKEwiFoOqWuvLvAhUJQzABHaBsC5kQ_AUoAXoECAEQAw#imgrc=3TPfGFOVNYRIOM

https://www.google.com/search?q=underground+bumblebee+nest&rlz=1C5CHFA_enUS918US919&source=lnms&tbm=isch&sa=X&ved=2ahUKEwjztsDRuvLvAhUtn-AKHeMQCMkQ_AUoAXoECAEQAw&bih=1306&bih=605#imgrc=817QTNmipFzpM

https://www.google.com/search?q=cross+section+of+mason+bee+nesting+tube&rlz=1C5CHFA_enUS918US919&source=lnms&tbm=isch&sa=X&ved=2ahUKEwjymNT1uvLvAhWCq-AKHVUoAM0Q_AUoAXoECAEQAw&bih=1306&bih=605#imgrc=BDqckr5aZ0nAuM&imqdi=QqR55fBcazmhJM

https://www.google.com/search?q=bee+kind&rlz=1C5CHFA_enUS918US919&source=lnms&tbm=isch&sa=X&ved=2ahUKEwjprruZxvLvAhWuUt8KHcWtDrIQ_AUoAXoECAEQAw&bih=1306&bih=605#imgrc=53c8cNbkMIU-™

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CITATIONS - 5



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