Planting for Pollinators

with

Clara Aus

Lewis Ginter Botanical Garden

About Me:

Clara Aus

- Lepidopterist
- Pollination ecologist
- Former Butterflies LIVE! Coordinator at Lewis Ginter
- Current OST Educator in Youth & Family Engagement
- VCU Biology & Entomology
- Native plant lover
- Founder of Pollinator Palooza

About Me:

Clara Aus

favorite pollinator:

zebra swallowtail

Eurytides marcellus

Handouts

For you to download!

Handouts

For you to download!

#1 PLANTING FOR POLLINATORS TAKE HOME POINTS

Planting for Pollinators

1. Add diversity!

Pollinators each have their own unique preferences, whether they be learned preferences or innate preferences. Appeal to a wider array of pollinators by including flowers of different colors, shapes, sizes, heights, species, etc. Make sure you have plants with different bloom times in your garden so it is attractive to pollinators in every season!

2. Be sustainable!

To best support our native wildlife, we should remember the following:

- Plant NATIVES
- Leave the leaves
- Collect rainwater
- Compost
- Use organic
- Reduce pollution
- Buy local
- Don't mosquito spray

3. Go big!

Pollinators are always looking to conserve energy. They want to get the biggest reward with the least amount of effort. When they see a larger group of flowers, it signals to them that there is a larger reward!

4. Get a little messy!

Don't be afraid to let your garden take the lead! Plants know what's best for them and will naturally grow the way they like. Remember to maintain, not detain!

5. Stay aware!

Observe and evaluate your garden. Each new season is a season for growth and improvement!! Notice how you can better support your local pollinators by seeing what they like the best and what they avoid.

Handouts

For you to download!

#2 KEYSTONE SPECIES LIST

KEYSTONE SPECIES

KEYSTONE SPECIES

- High impact on ecosystem relative to population size
- Critical for function / structure of ecosystem
- Often include apex predators

WOLVES IN YELLOWSTONE

A BRIEF HISTORY

The gray wolf historically called Yellowstone home and can be found there today after reintroduction efforts.

1973 **The Endangered Species Act of 1973**

This act was created to protect threatened species and help the conservation of their ecosystem

1978 By this year, all gray wolf subspecies were listed as federally endangered in all states except Minnesota and Alaska

WOLVES REINTRODUCTION TO YELLOWSTONE

1995

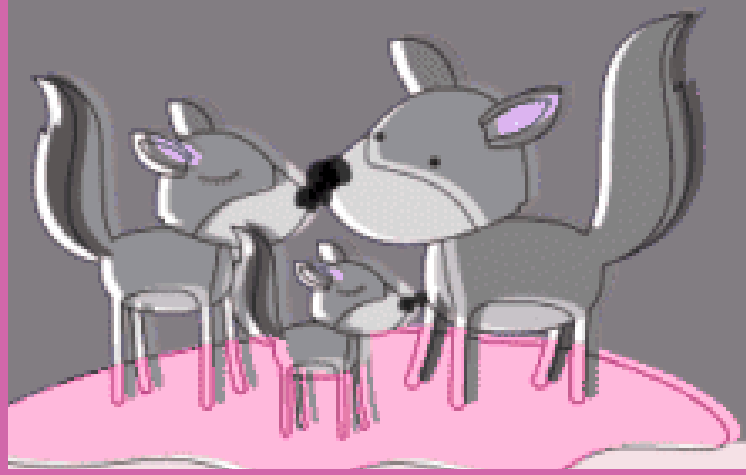
In January of 1995, eight gray wolves were captured in Jasper National Park in Alberta, Canada, and brought to Yellowstone National Park.

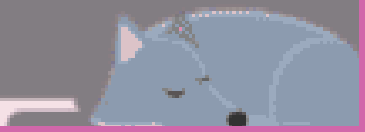
1996

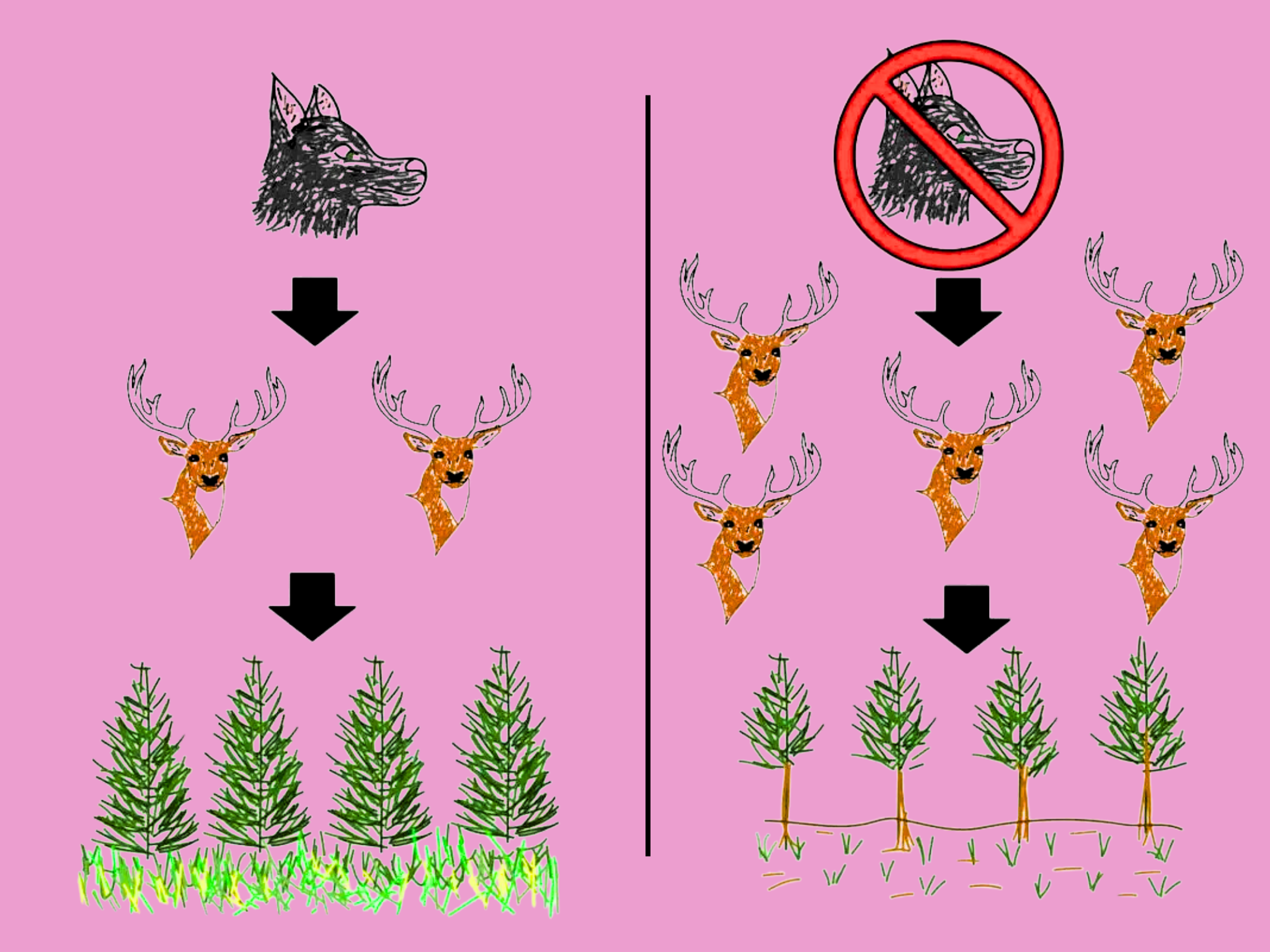
Through scientist's continued relocation, by end of 1996, a total of 31 wolves had been relocated. Many of the wolves currently found in the Greater Yellowstone Ecosystem can be genetically linked to the first wolves brought back to Yellowstone in 1995.

WHY ARE THEY IMPORTANT?

- Wolves are keystone species in the Yellowstone ecosystem which means they are key player for the yellowstone ecosystem to exist altogether and create a balance.
- The presence or absence of wolves in the Greater Yellowstone Ecosystem causes a trophic cascade which means that wolves limit the volume of their prey that helps the survival of the next lower level in pyramid restoring the health of the ecosystem.







KEYSTONE SPECIES:

Top Plants for Food Web Support

COMMON NAME	GENUS	# CATERPILLAR SPECIES SUPPORTED
Oak	*Quercus*	436
Plum	*Prunus*	340
Willow	*Salix*	289
Birch	*Betula*	284
Cottonwood	*Populus*	249
Maple	*Acer*	238
Blueberry	*Vaccinium*	217
Hickory	*Carya*	213
Pine	*Pinus*	200
Elm	*Ulmus*	164
Raspberry	*Rubus*	127
Walnut	*Juglans*	125
Ash	*Fraxinus*	121
Beech	*Fagus*	116
Chestnut	*Castanea*	115
Hazelnut	*Corylus*	108
Goldenrod	*Solidago*	104
Rose	*Rosa*	102
Aster	*Symphyotrichum*	100
Serviceberry	*Amelanchier*	92

Handouts

For you to download!

#3 CLARA'S FAVORITE POLLINATOR PLANTS

CLARA'S FAVORITE POLLINATOR PLANTS

PERENNIALS:

- Phlox
- Boneset
- Asters
- Beebalm
- Golden alexander
- Wild senna
- Mountain mint
- Pussytoes
- Milkweed
- Helianthus
- Goldenrod
- Rudbeckia

SHRUBS:

- Buttonbush
- Red chokeberry
- Mountain laurel
- Viburnum
- Spicebush
- Vaccinium
- Elderberry
- Sumac
- Wild azalea

GRASSES/SEDGES:

- Bluestem
- Bottlebrush
- Purple love grass
- Pink muhlygrass
- Soft rush

TREES:

- Serviceberry
- Dogwood
- Eastern redbud
- Paw paw
- Black Cherry
- Tuliptree poplar
- Hackberry
- OAKS!!!!
- Maple

VINES:

- American wisteria
- Virgin's bower
- Coral honeysuckle
- Passiflora

Pollination

WHO ARE THE POLLINATORS?

Pollination

WHO ARE THE POLLINATORS?

There are

350,000

animals involved in pollination

Pollination

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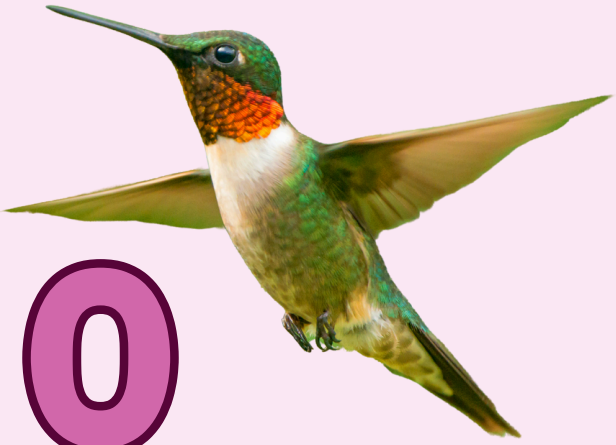

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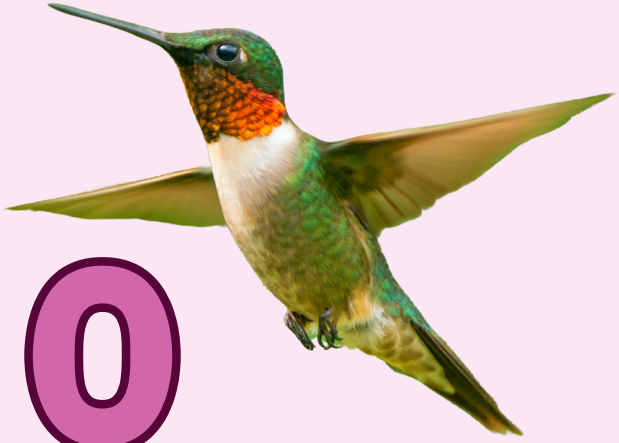

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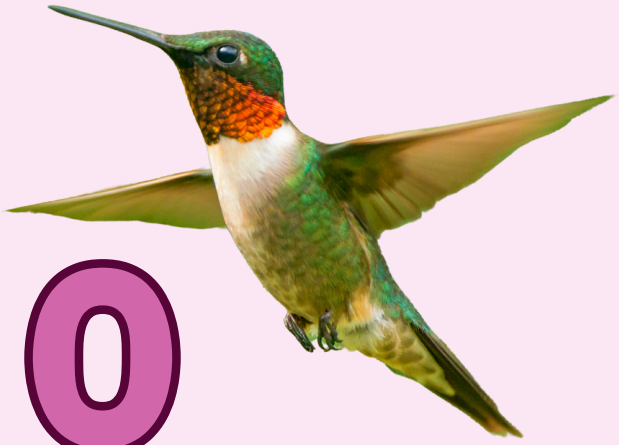

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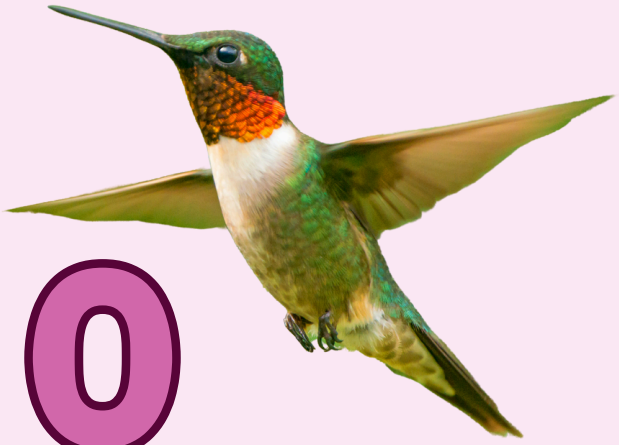

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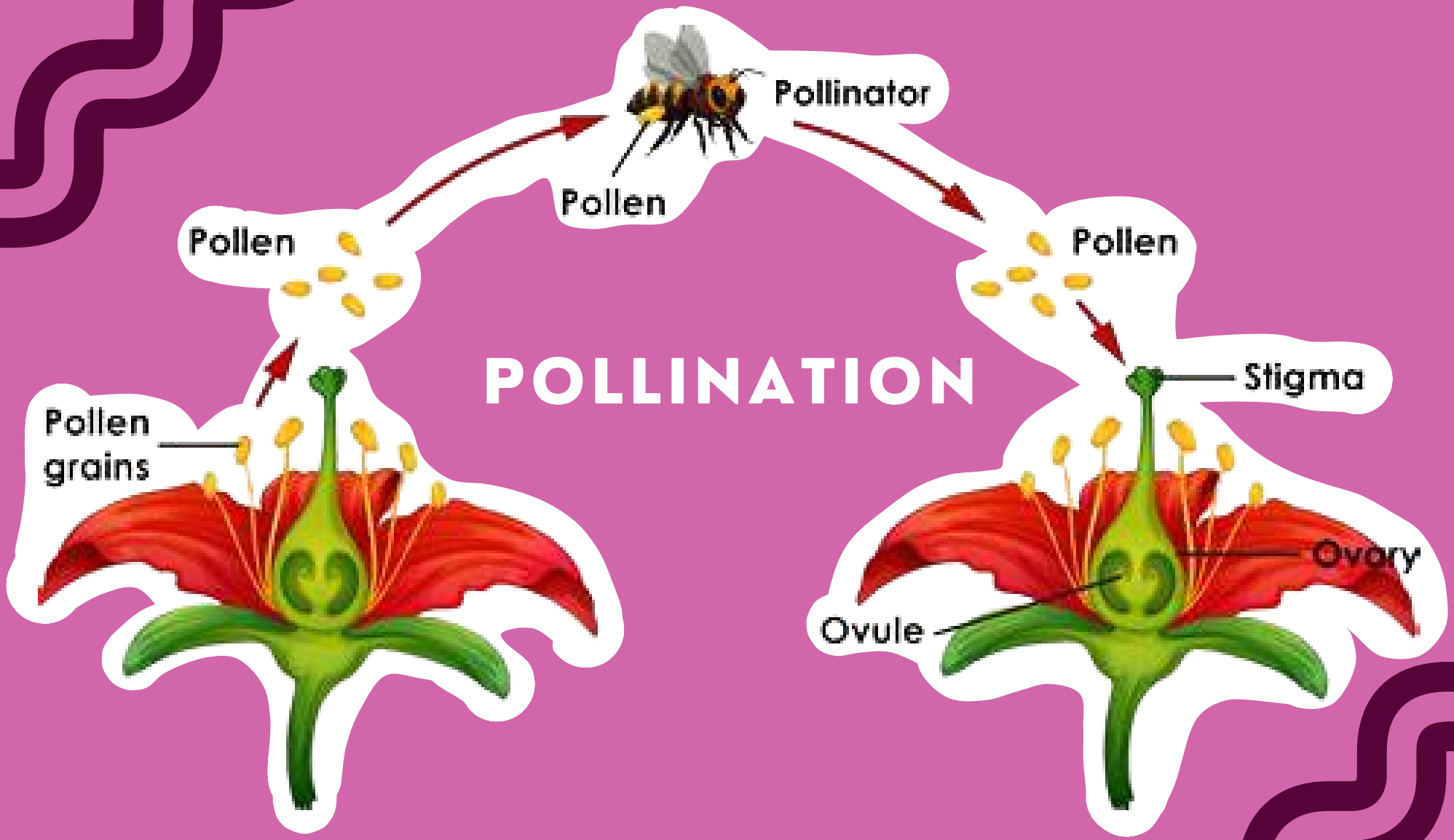
WHAT IS POLLINATION?

POLLINATION



WHY IS POLLINATION ITSELF SIGNIFICANT?

WHY IS SEXUAL REPRODUCTION ITSELF SIGNIFICANT?

Significance

sexual reproduction evolved separately THREE times

Significance

1. PLANTS
2. ANIMALS
3. FUNGI

Significance

allows for improvement of species:

- Increase species diversity
- Disease resistance
- Increase rate of new species

Floral Signals

most living beings attract their own species when it's time to mate.....

Floral Signals

most living beings attract their own species when it's time to mate.....

NOT FLOWERING PLANTS!

Floral Signals

most living beings attract their own species when it's time to mate.....

NOT FLOWERING PLANTS!

they attract specific species of pollinators instead

Floral Signals

THIS CONNECTS POLLEN EXPORT & FLORAL SIGNALS

Floral Signals

FLORAL SIGNALS

=

shape, color, size, height, length, UV, smell

Significance

ATTRACTION → MUTUAL REWARDS

Plant- gets pollinated, can reproduce

Pollinator- food, supplies, heat, shelter, mate

Floral Signals

Pollinator preferences are older than floral signals!!

Floral Signals

so.....

pollinators drive evolutionary change in flowering plants!!!!

Coevolution

Coevolution

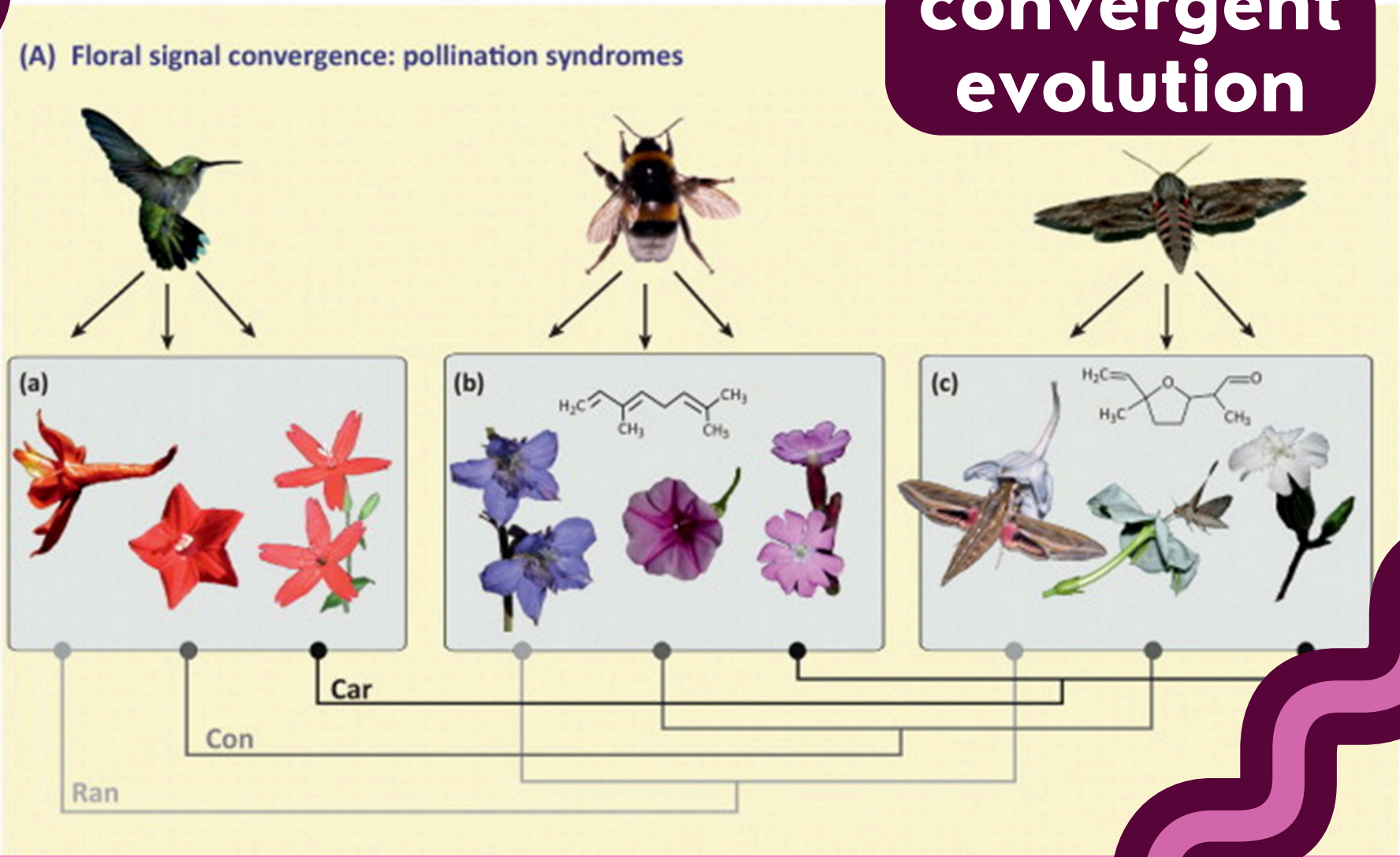
selection leads to reciprocal adaptive evolution in interacting partners

Coevolution

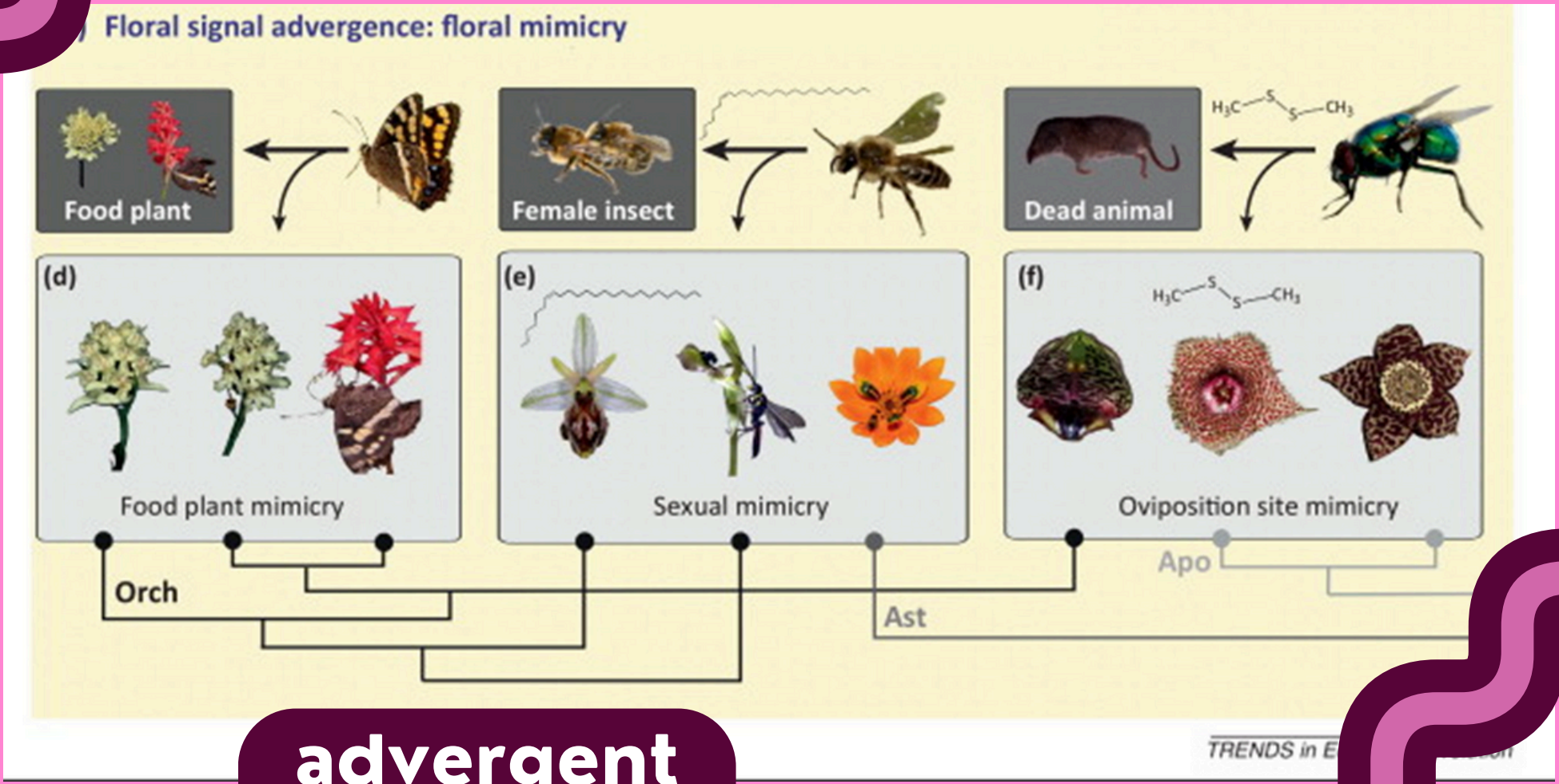
- Shape of flower
- Size / length of flower
- Height of plant
- Color of flower & pollen
- UV markings
- Smell/odor

Coevolution

convergent evolution



Coevolution



advergent evolution

Coevolution

Study will be sent out afterwards!

Schiestl & Johnson 2013

Pollinator-mediated evolution of floral signals.

PLANTS IN VIRGINIA HAVE

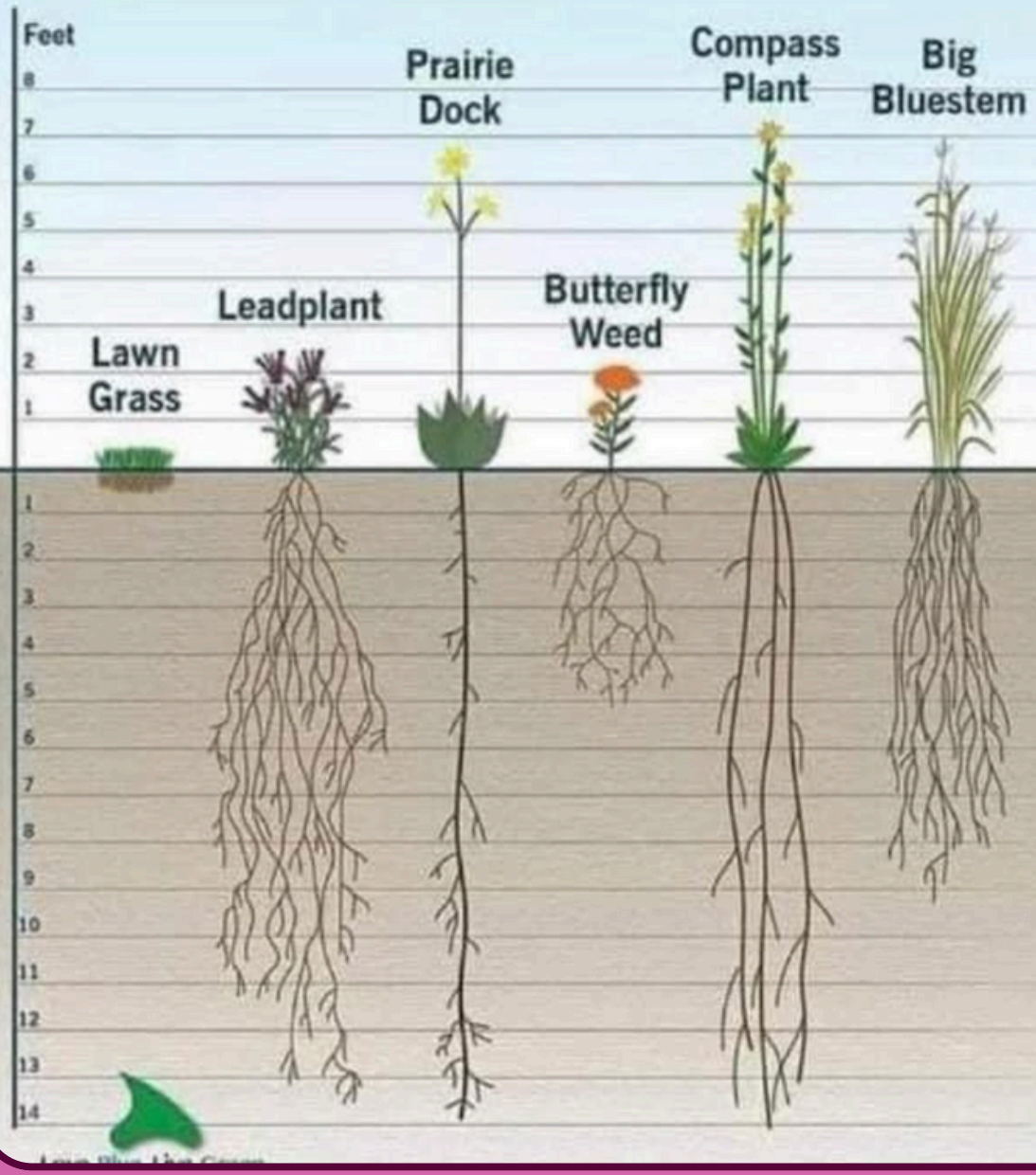
CO-EVOLVED

WITH POLLINATORS IN VIRGINIA FOR MILLIONS OF YEARS

Native Plants

- No fertilizers/pesticides
- Less water required
- Prevent erosion
- Promote biodiversity
- Provide shelter, food, and habitat for native animals

What's So Great About Native Plants?



ABOVE GROUND:

Native landscaping practices can help improve air quality.

Native species attract beneficial wildlife and support healthy and diverse ecosystems.

BELOW GROUND:

Their deep root systems filter pollutants from stormwater runoff.

Natives require less fertilizer, pesticides, and watering than non-native species.

BUY LOCAL ECOTYPES!!

PROVIDE:

1. FOOD
2. WATER
3. SHELTER

HOW CAN YOU SUPPORT IN WINTER?

LEAVE THE LEAVES... AND STEMS!

WHAT IS THE RESULT???

YEAR 1- SLEEP

YEAR 1- SLEEP

YEAR 2- CREEP

YEAR 1- SLEEP

YEAR 2- CREEP

YEAR 3- LEAP

YEAR 1 → generalist pollinators

YEAR 2- CREEP

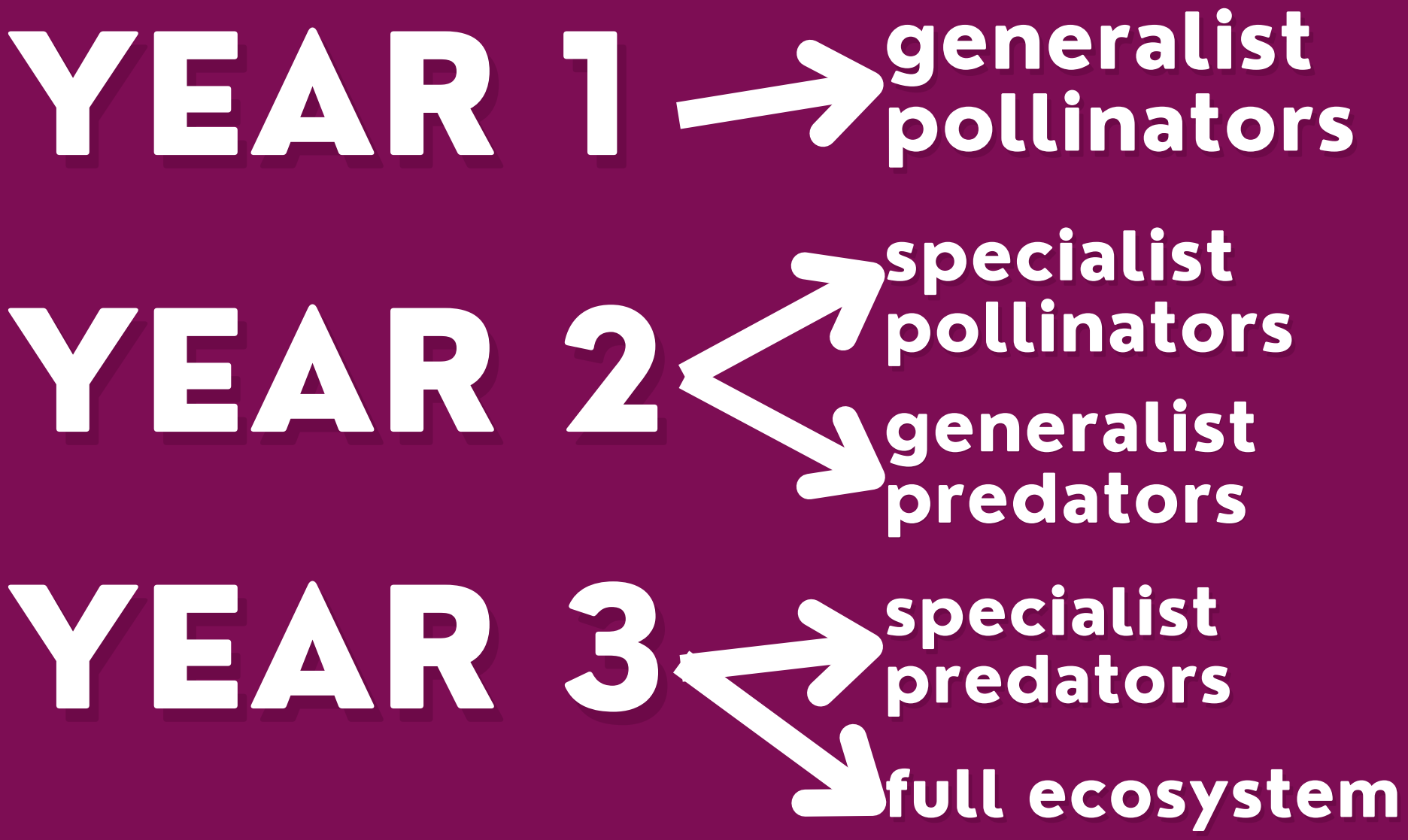
YEAR 3- LEAP

YEAR 1 → generalist pollinators

YEAR 2 → specialist pollinators

YEAR 2 → generalist predators

YEAR 3- LEAP


YEAR 1
generalist pollinators
YEAR 2
specialist pollinators
generalist predators
YEAR 3
specialist predators
full ecosystem

YELLOW GARDEN SPIDER

Argiope aurantia

BUT...

How do I know which native plants I want?

Pollinator Preferences!

BEES

BACKGROUND:

- 4000 species in North America
- Sees in UV but can't see red
- Stinging ability/mimicry
- Fuzzy/Hairy abdomen
- Shorter mouthparts
- Most actively gather pollen – pollen sacs
- Social structure

FLOWER PREFERENCE:

- variety of flower shapes /sizes
- easily acessible nectar source
- purple, blue, white, yellow

BEES

SPOTTED BEEBALM

Monarda punctata

SPOTTED JEWELWEED

Impatiens capensis

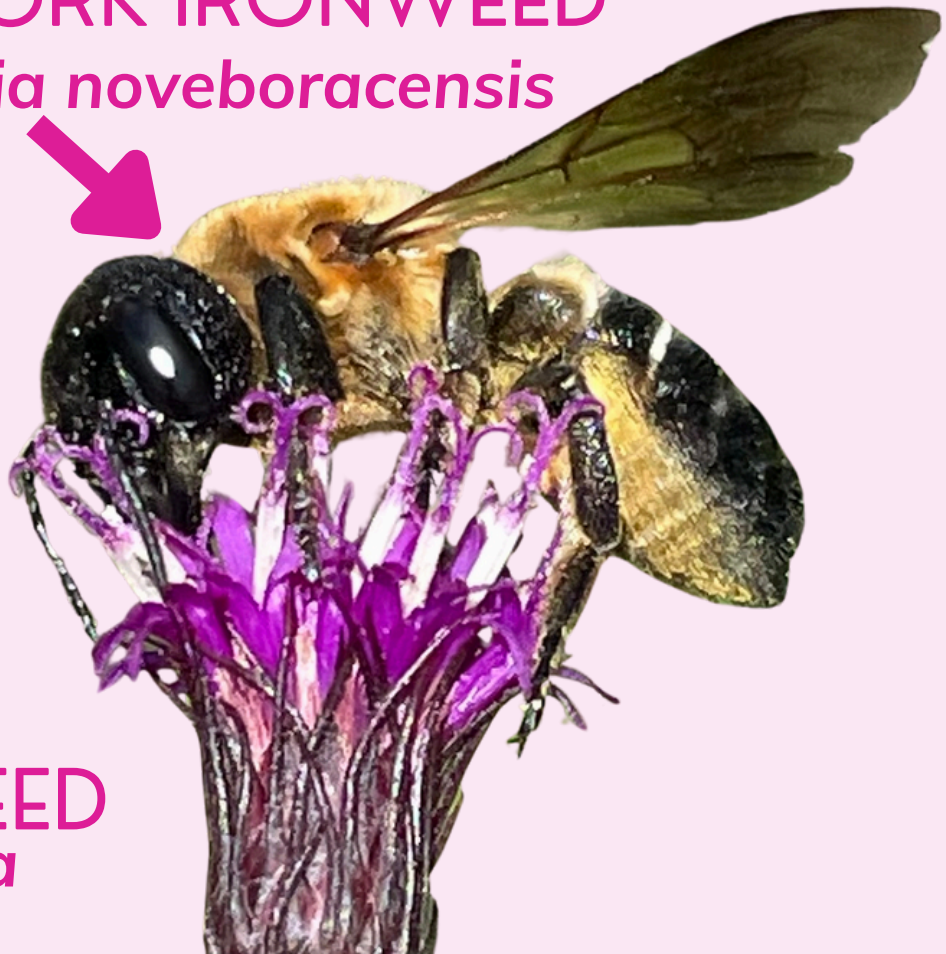
BEES

GREAT BLUE LOBELIA

Lobelia siphilitica

BEES

NEW YORK IRONWEED
Vernonia noveboracensis



SWAMP MILKWEED
Asclepias incarnata

BEES

CARPENTER-MIMIC LEAF-CUTTER BEE

Megachile xylocopoides

BEES

WASPS

BACKGROUND:

- **Mostly carnivorous**
- **Supplement with nectar or fruit**
- **Search for prey on flowers**
- **Less body hair than bees, but can be more efficient/ successful**
- **Specialist pollinators**

FLOWER PREFERENCE:

- exposed & concentrated nectar in shallow flowers
- unusual odor
- yellow or white

WASPS

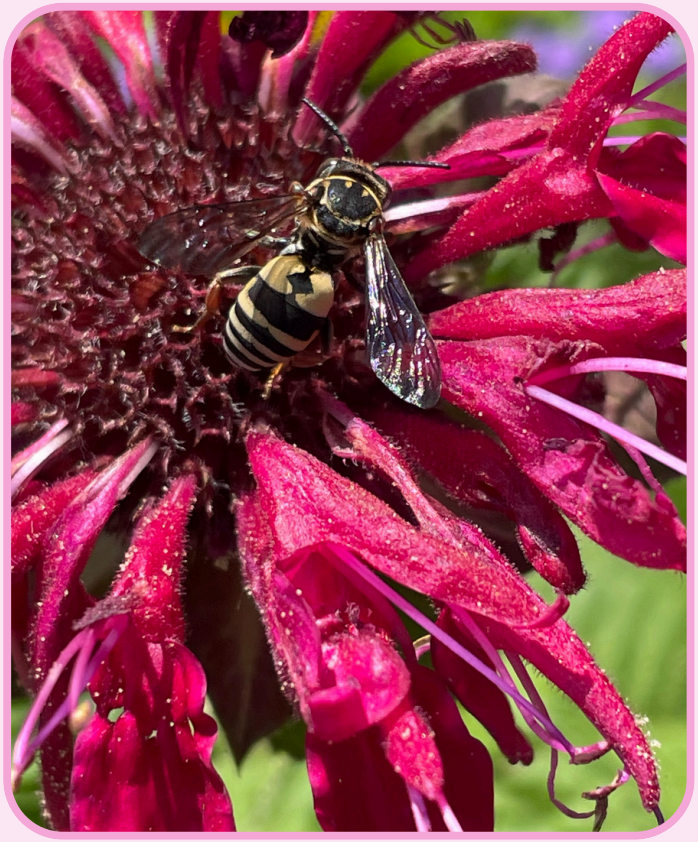
SMALL'S GOLDENROD

Solidago pinetorum

WASPS

CLUSTERED MOUNTAIN MINT

Pycanthemum muticum



SCARLET BEEBALM

Monarda didyma

ANTS

BACKGROUND:

- Omnivores- invertebrates, plant parts
- Generalist foragers
- Mutualism with scales and aphids
- Small size, hairless, and tidy
- Seed dispersers
- Some plants have nectaries outside flowers to encourage ant pollination

FLOWER PREFERENCE:

- Low growing flowers
- Small, inconspicuous & close to stem

ANTS

MOTHS

BACKGROUND:

- Usually nocturnal
- 160,000 species vs 17,500 butterfly sp.
- Existed before butterflies & bees
- Attracted to light → avoid too much artificial light in your garden OR use red light
- More successful than bees?
- Generalists
- Fuzzy body and scaly wings

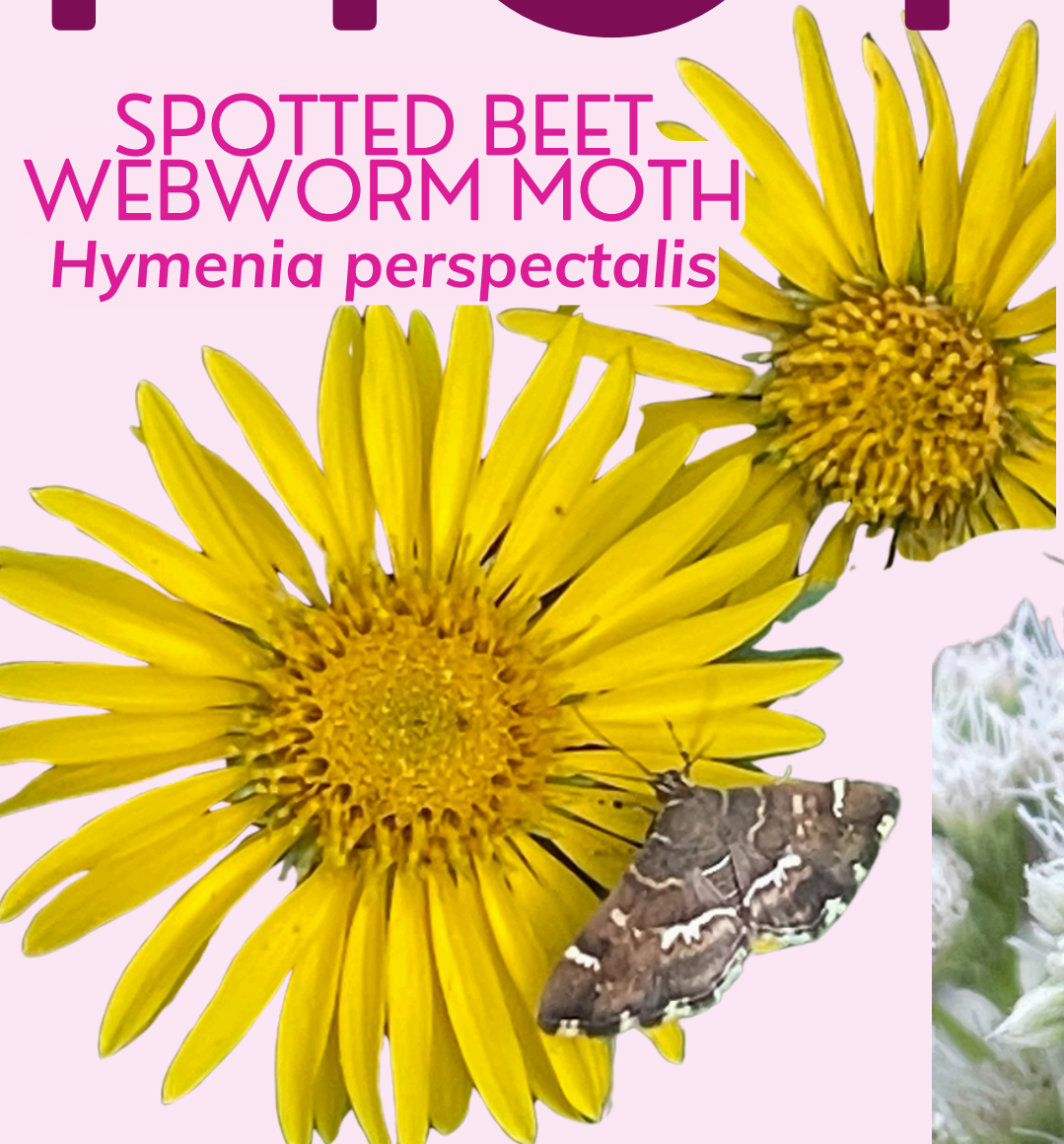
FLOWER PREFERENCE:

- night blooming flowers
- chemical compounds in odor important
- white, cream, pastel

MOTHS

SPOTTED BEET WEBWORM MOTH

Hymenia perspectalis



MOTHS

COMMON EVENING PRIMROSE

Oenethera biennis

MOTHS

=

FOOD WEB SUPPORT

BUTTERFLIES

FLOWER PREFERENCE:

- HIGHLY variable & species specific
- Yellow, white, orange, pink, red
- Multiple clusters of multiple flowers
- Small short tubes with wide, flat rims

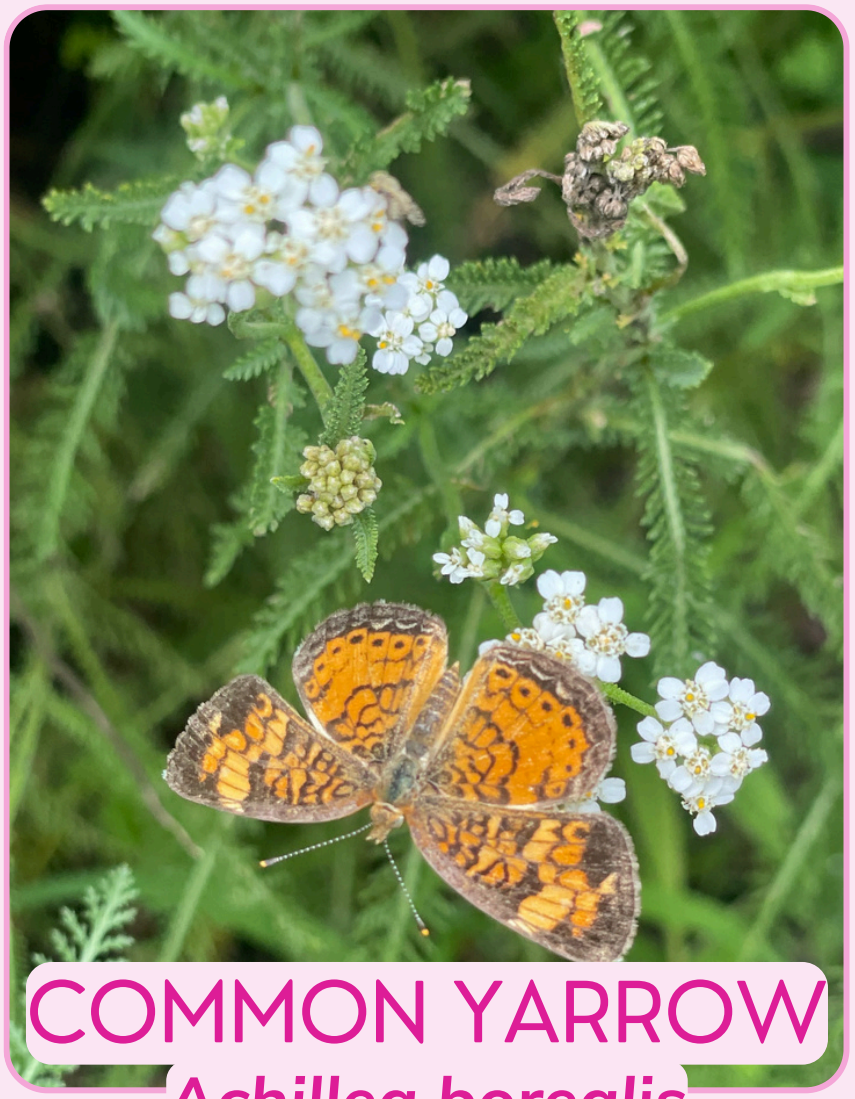
BACKGROUND:

- **Diurnal**
- **Color vision**
- **Visit large varieties of flower species**
- **Close relationship with plants**
- **Color & scent important**
- **Great memory**

BUTTERFLIES

SMALLS GOLDENROD

Solidago pinetorum



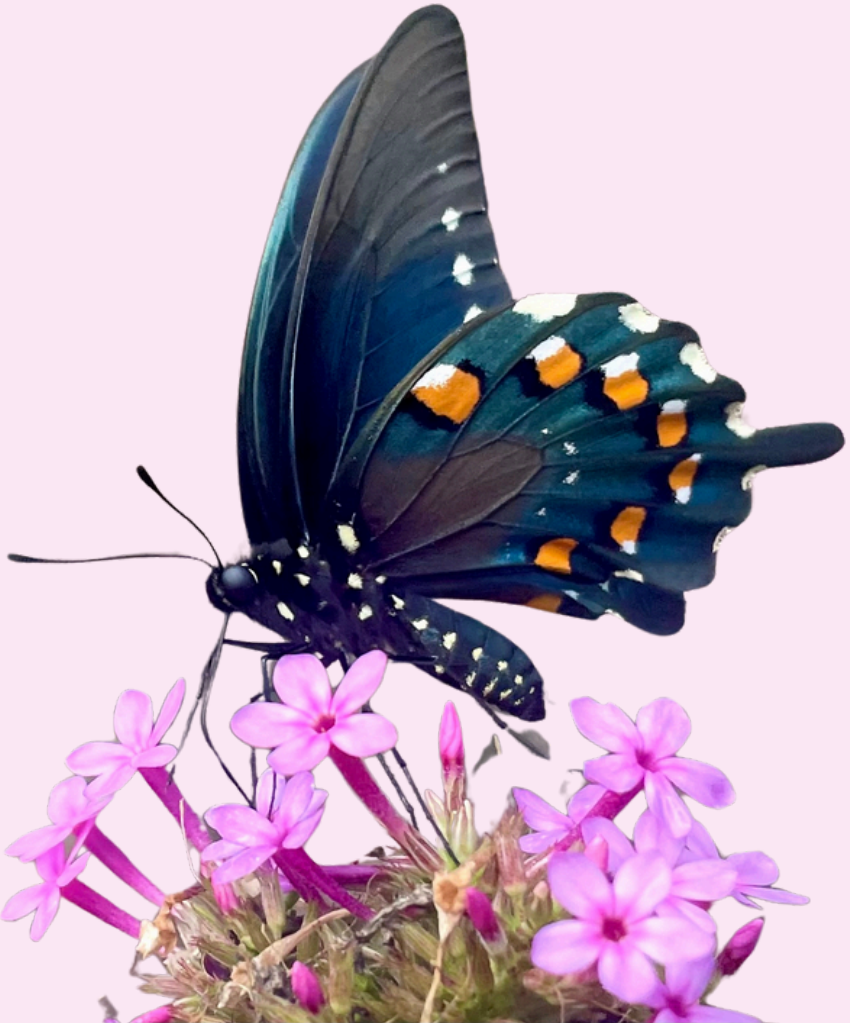
COMMON YARROW

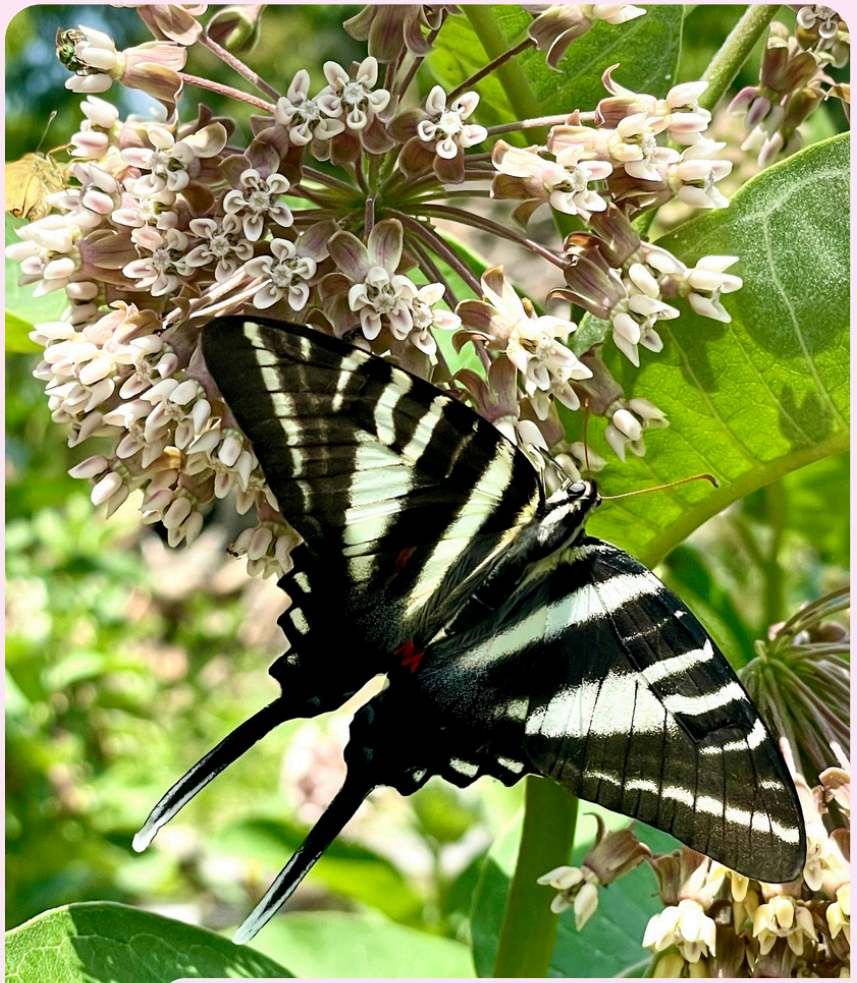
Achillea borealis

BUTTERFLIES

TALL PHLOX ‘JEANA’

Phlox paniculata

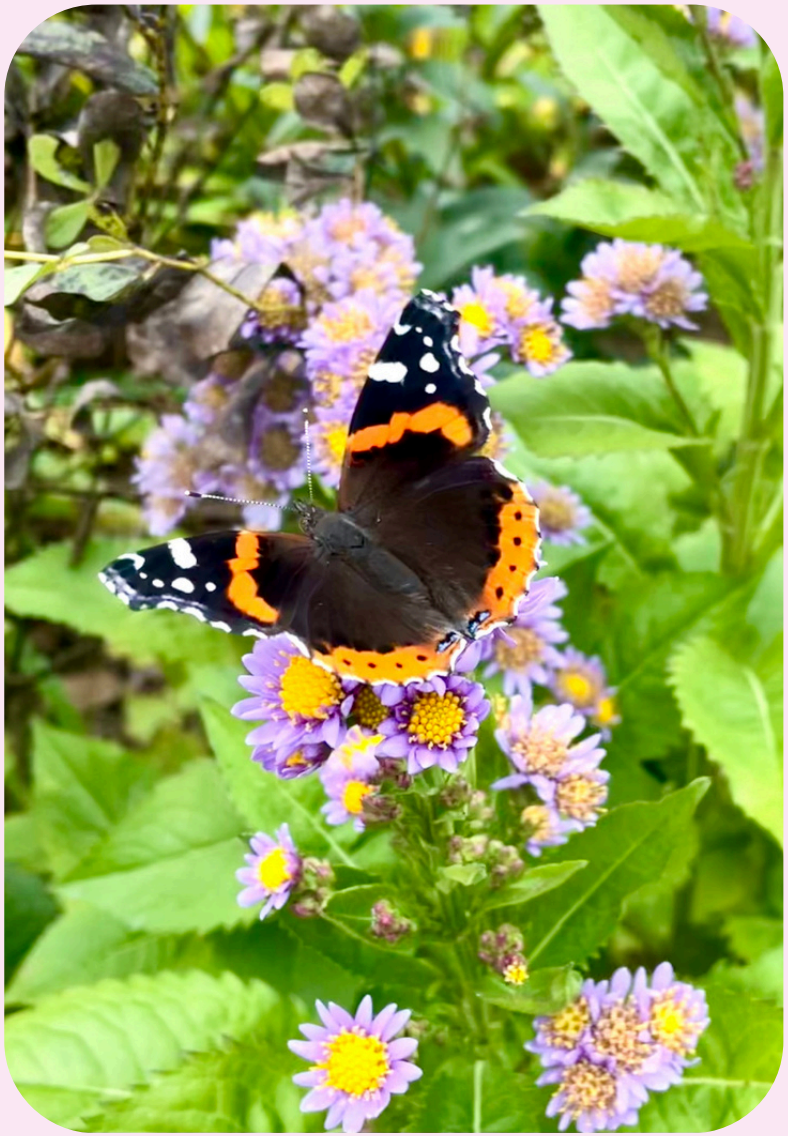




COMMON MILKWEED

Asclepias syriaca

BUTTERFLIES



EASTERN QUESTION MARK

Polygonia interrogationis

GOLDEN ALEXANDER

Zizia aurea

SLEEPY ORANGE

Eurema nicippe

BEETLES

BACKGROUND:

- Oldest known pollinators of gymnosperms
- Feed on pollen or other plant parts
- Often mate on flowers / reside / hide from predators / prey on aphids
- Heat production and magnolias
- Efficient but lack finesse, they are clumsy fliers
- Fly further, up to 60 ft to another plant

FLOWER PREFERENCE:

- Large solitary flowers ie. magnolia
- Clusters of small flowers ie. goldenrod
- Flat or bowl shaped
- Strong fragrance
- White / red brown / dark colors

BEETLES

MARGINED SOLDIER BEETLE

Chauliognathus marginatus

COMMON YARROW

Achillea borealis

RATTLESNAKE MASTER

Eryngium yuccifolium

GOLDEN RAGWORT

Packera aurea

BRONZE BEETLE

Chrysolina bankii

FLIES

BACKGROUND:

- 2 wings not 4
- Larvae often parasitic
- Setaceous antennae
- Diurnal or nocturnal
- Sponging mouthparts
- Present all year round
- Small size, lightweight
- Do not provide for young

FLOWER PREFERENCE:

- Small flowers
- Easily accessible nectar
- Clusters of many flowers
- Yellow or white

FLIES

BLOW FLIES
Calliphoridae

LATE BONESET
Eupatorium serotinum

FLIES

TRANSVERSE BANDED FLOWER FLY

Eristalis transversa

SWIFT FEATHER-LEGGED FLY

Trichopoda pennipes

HUMMINGBIRDS

BACKGROUND:

- **Omnivorous**
- **Territorial**
- **Great memory**
- **Flight & hover ability**
- **Positive associative conditioning**
- **Red hummingbird feeder?**

FLOWER PREFERENCE:

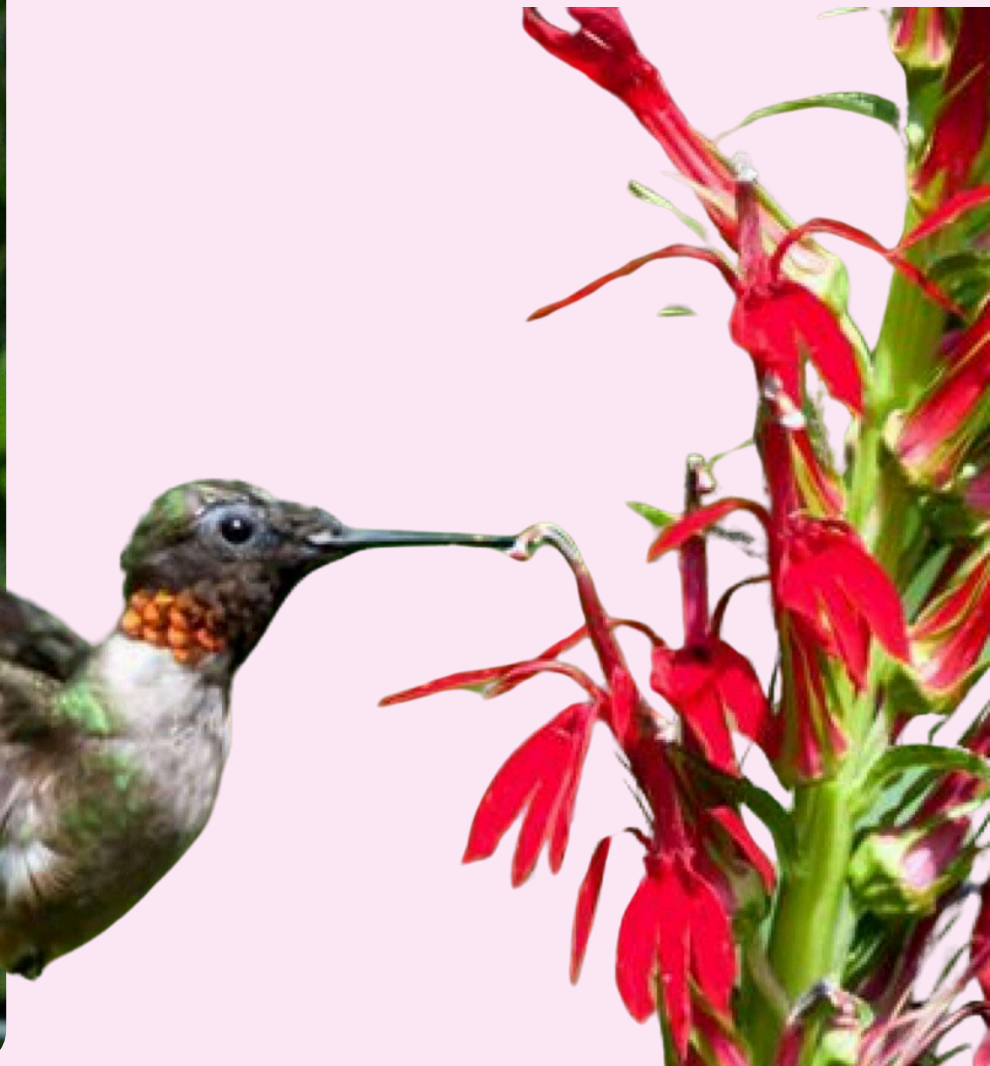
- red, orange, & white
- long tubular shape
- smell unimportant

RUBY THROATED HUMMINGBIRD

Archilochus colubrus

CARDINAL FLOWER

Lobelia cardinalis



COLUMBINE

Aguilegia canadensis

CORAL HONEYSUCKLE

Lonicera sempervirens

SCARLET BEEBALM

Monarda didyma

WHITE TURTLEHEAD

Chelone glabra

BUTTONBUSH

Cephalanthus occidentalis

"If we were to wipe out insects alone on this planet, the rest of life and humanity with it would mostly disappear from the land"

-E.O. Wilson

Contact Info

email: claraa@lewisginter.org

work phone: 804-262-9887 ext. 227

IG: @ClaraButterflyEducator

TikTok: @ClaraAus982

Facebook: Clara Aus, Lepidopterist

UPCOMING CLASSES:

THE POWER OF POLLINATORS

SUNDAY JUNE 29TH
1 PM - 2:30 PM

non-member $42
member $35

MOTH OBSERVATION NIGHT

Friday, July 25th

9:30-11:00 PM

member $28
non-member $34

QUESTIONS?