Intro to bees and the TX/OK Pollinator Project

TEXAS A&M AGRILIFE EXTENSION AND OKLAHOMA COOPERATIVE EXTENSION

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Angiosperms emerged in the Cretaceous period, 120 million years ago

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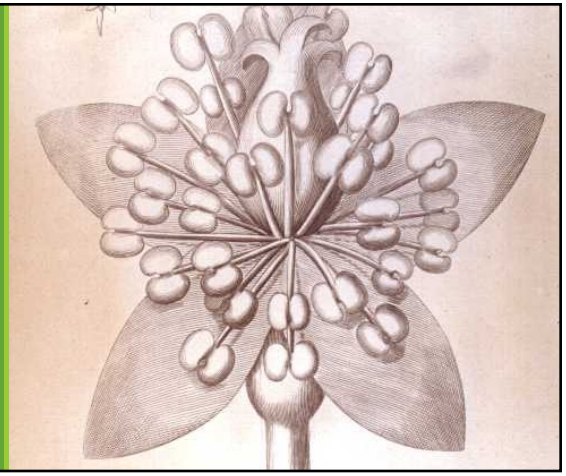
History of understanding of plant anatomy and sexuality

Nehemiah Grew *The Anatomy of Plants (1682)*



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Why flowers?

The Creator's gift to man

Sprengel (1793)* observed role of flowers in attracting insects in study of woods cranesbill

- the "nectar of these flowers is secreted for the sake of insects, and is protected from rain in order that the insects may get it pure and unspoiled."

Darwin showed the value of cross-fertilization in plants

*1793 Christian Conrad Sprengel, The Secret of Nature in the Form and Fertilization of Flowers Uncovered

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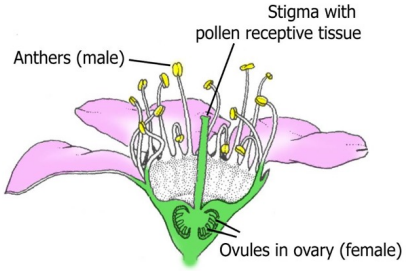

Sexual reproduction in flowers

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Common agents of pollination

wind	other insects
bees*	bats
flies	birds
butterflies	fig wasps (Agaonidae)
moths	mammals
beetles	
wasps	

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Importance of pollination

Most of the 275,000 known species of flowering plants are pollinated by insects

66% (80% worldwide) of crops in U.S. are insect pollinated

Pollination allows for plant diversity since even rare plants can be pollinated if they can attract insects

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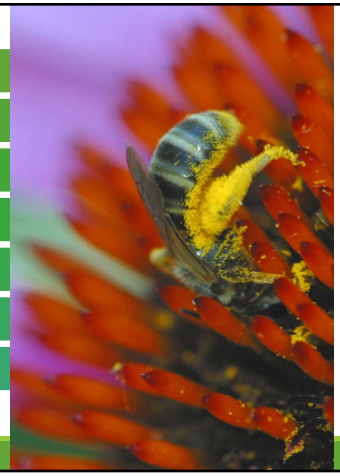
- nectar
- pollen
- lipid secretions
- food bodies
- scents
- resins
- nectar guides



Plants go to great lengths to attract insects

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Nectar guides

Guide pollinators to source of nectar

Often invisible except in UV spectrum

John R. Meyer, North Carolina State University

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Other nectar guide examples

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Fly pollination

usually attracted for nectar

Syrphid flies feed on pollen

flowers tend to be less showy, with strong smell, sometimes malodorous

not well-studied

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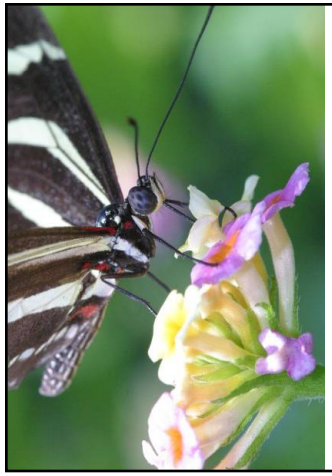

Lepidoptera (moth, butterfly) pollination

Most (advanced forms) feed with long proboscis

Flowers frequently tubular, sweet smelling

Moth pollinated plants generally open at night, white colored

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Hymenoptera (bees, wasps, ants) pollination

- Ant pollination rare
- Bees are most important group
- 20,000 species of bees worldwide-all anthophilous
- Plants that depend on bees often bright, with nectar guides

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Apoidea (bees)

- 4,000 species in North America
- All feed on nectar and pollen
- Most species are solitary
- Bodies covered with very fine, brushy hairs to trap pollen

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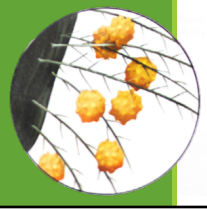
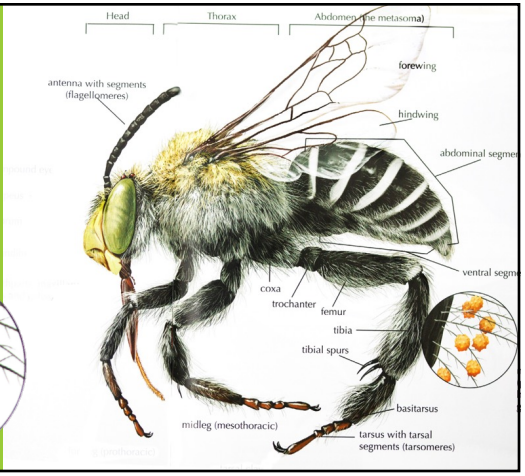
Bee anatomy





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Bees vs wasps

- Bees usually thicker bodied
- Bees hairy with pollen or pollen balls on hind legs
- Wasps long, thinner legs with spines
- Wasps *may* have wings longitudinally folded

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Paper wasp:
note folded wings

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Eumenid wasp:
folded wings

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Honey bee with pollen balls

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Pollen coating on bees

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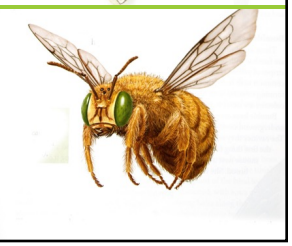
Bee vs. fly

Fly has two wings, bees four

Bee eyes oval-shaped on sides of head, fly eyes larger and often meeting at top of head

Bees have long, elbowed antennae, fly antennae short, hair-like



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Count the wings

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Oval-shaped eyes

Xylocopa vs *Perdita*

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Large eyes of fly

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Blow fly with aristate antennae

By JJ Harrison (https://www.jjharrison.com.au/)

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More flies

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Which is the bee?

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Interesting bee-haviors

DIADASIA – MINING BEES

PROVISION UNDERGROUND TUNNELS WITH POLLEN

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Hole nesters
Carpenter bees

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Carpenter bee with shiny abdomen

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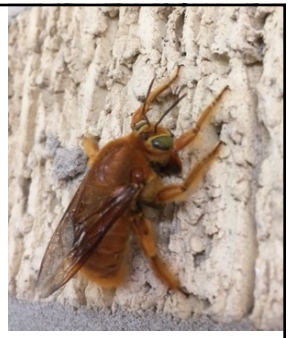

More carpenter bees

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Carpenter bees can be pests in structures

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Xylocopa micans

Nectar thief

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Leaf cutter bees

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Leaf cutter bee nests

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Mason bees

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Bee hotels

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Social bees

Bumble bees buzz pollinating tomato

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Honey bee

- Medium sized bee
- Slow flying
- Legs hang below as they fly
- Light orange to black base-color with dark brown bands

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Not a native bee: *Apis mellifera*

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Africanized honey bee

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Bee nests and swarming

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Why you don't want honey bees to nest in your home

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Bumble bees, *Bombus* species

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Like honey bees bumble bees carry pollen mixed with nectar in a corbicula on hind tibia

Photo by Tony Wills, Wikipedia

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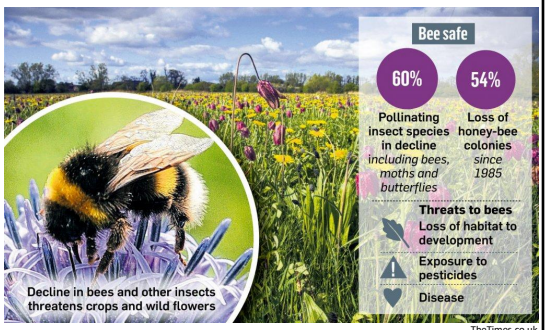
Decline of Pollinators

Causes for Decline:

- Destruction of habitats
- Parasites and pathogens
- Changing climate
- Overuse of pesticides

How to help pollinators:

- Learn more about bees and pollinators
- Use pollinator friendly plants in landscapes
- Give bees nesting places
- Avoid pesticides
- Spread the word, promote efforts



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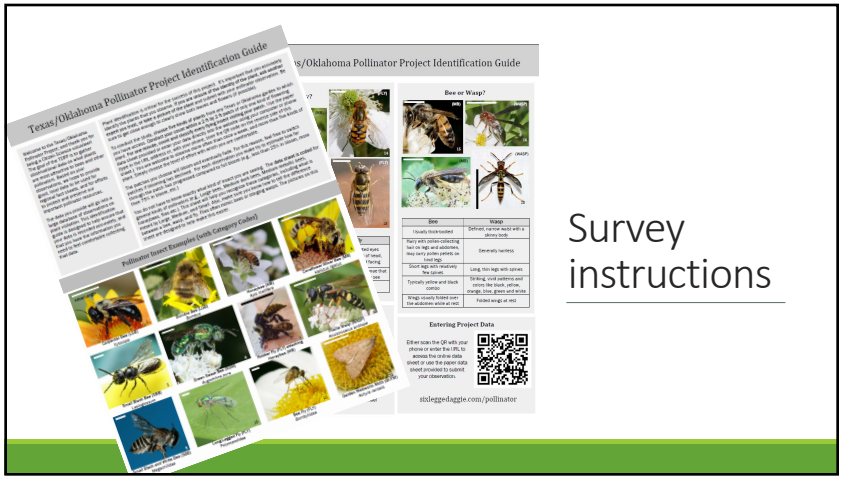

Survey instructions

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You do not need to be a bee expert to participate in this study!

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You will be classifying insects into these categories.

HunB (honey bee)

BumB (bumble bees)

OthB (other bees)

Wasp (any wasp)

Fly (all flies)

Lep (Lepidoptera: Butterflies and moths)

Beet (beetles)

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Honey bee with pollinia

Honey bees (HunB)

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Bumble bees (BumB) – larger bees with hair on top of abdomen

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Carpenter bees (OthB) large bees with hairless top of abdomen

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Other native bees (OthB) – pollen covered undersides, hind legs

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Small native bees (OthB)

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Differences between flies and bees

Bees	Flies
Eyes more oval, positioned more on sides of head	Eyes may surround head, sometimes meeting near top of head
Hairy on thorax and (sometimes) on abdomen	Usually less hairy
Often pollen covered, especially on hind legs, under abdomen	Pollen usually light, no accumulations on hind legs.
Hind legs with wide segments for pollen transport	Hind legs slender
Longer elbowed antennae	Usually short stubby antennae

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Syrphid flies (Fly) – may resemble OthB

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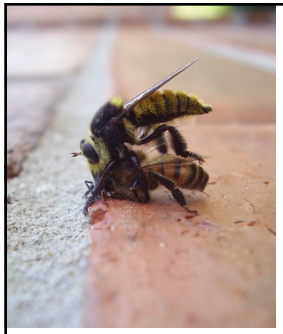

other flies (Fly)

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Differences between wasps and bees

Bees	Wasps
Usually hairy and thick-bodied with bluntly constricted "waist"	Few body hairs. More slender. Abdomen somes borne on slender stalk
Legs (especially hind) with broad, hairy segments; sometimes with balls or accumulations of pollen. Few spines	Legs longer, thinner, often with spines. Not usually hairy and not carrying masses of pollen on hind legs.
Wings fold flat over abdomen at rest	Wings often rest in V-position. May be folded length-wise at rest.

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Wasps & non-bees: paper wasp, *Polistes* spp. (Wasp)

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Wasps & non-bees: Mason wasps (Wasp)

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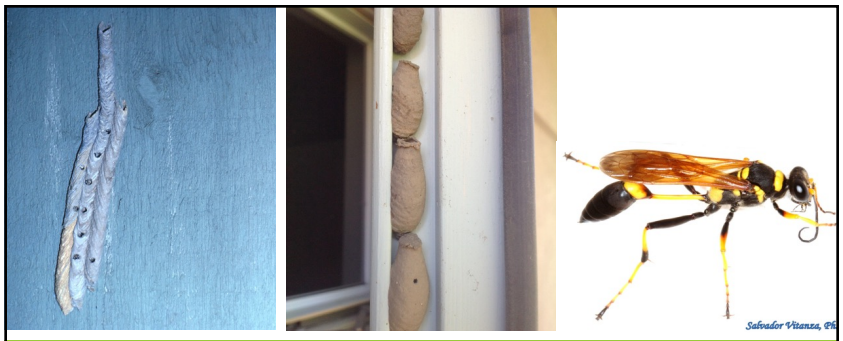

Wasps & non-bees: mud daubers (Wasp)

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Butterflies and moths (Lep)

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Pick your patch (2 x 2 ft)

- Doesn't have to have bees
- Should be readily available on market
- Can switch patches during the summer

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3 = Above 76% 2= Between 51% and 75% 1 = Between 25% and 50 % 0 = Less than 25%

Bloom % Examples on Gregg's Mistflower, *Conoclinium greggii*

Bloom % rated on 0 to 3 scale. 0 = Less than 25% of plant in bloom, 1 = Between 25% and 50%, 2 = Between 51% and 75%, 3 = Above 76%.

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3 = Above 76% 2= Between 51% and 75% 1 = Between 25% and 50 % 0 = Less than 25%

Bloom % Examples on Texas Sage, *Leucophyllum frutenscens*

Bloom % rated on 0 to 3 scale. 0 = Less than 25% of plant in bloom, 1 = Between 25% and 50%, 2 = Between 51% and 75%, 3 = Above 76%.

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SCAN ME

To go to data app take out your phone and open camera app

Or go to https://sixleggedaggie.com/pollinator

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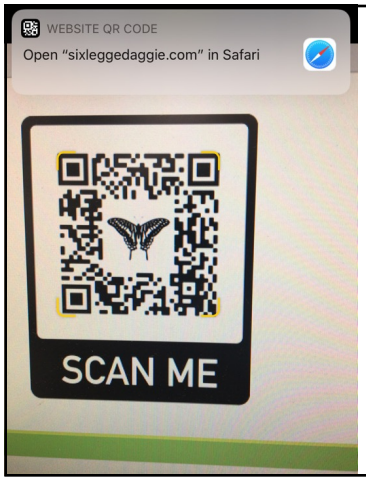

Click on the pop-up link

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