Notable Animals from the Southwest

Insects and other arthropods

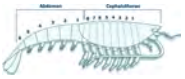
Kingdom Animalia

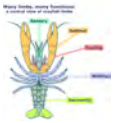
## Phylum Arthropoda

- Most abundant group of animals.
- Ancient group of organisms. Some fossils date from the Cambrian period (500 Million Years old).
- Bilaterally symmetrical.

Bilateral *vs* radial symmetry

- Arthropods have a segmented body.
- Many limbs.
- Bodies covered with a though exoskeleton (no backbone)
- Jointed legs





## Exoskeleton

- Consists of layers of chitin (a polysaccharide) and proteins.
- It is a hard covering that protects the animal and provides points ot attachment to muscles.
- Requires molting

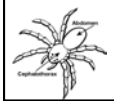
## Arthropoda: Crustaceans

- Most species are aquatic.

## Arthopoda: Arachnids

- Body divided into two sections.
- Four pairs of legs.
- Most of them are carnivorous

pedipalps



## Arthropoda: Diplopods

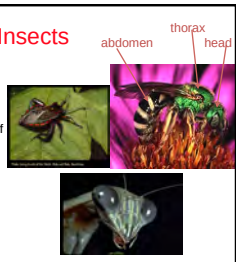
- Millipedes
- Body divided in many segments, each one bearing 2 pairs of legs.



## Arthopoda: Chilopods

- Centipedes
- Body divided in segments, each with 1 pair of legs.
- Head with long antennae
- First pairs of legs modified as poison fangs

## Arthropoda: Insects

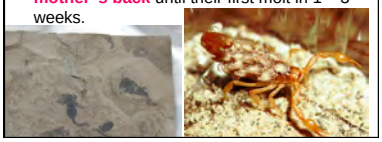



- Body with three main sections
- Head with 1 pair of antennae and 1 pair of eyes.
- Thorax with 3 pairs of legs.
- Many of them with wings.
- The most diverse and abundant group of organisms on Earth.

## Sonoran Desert Arthropods

- **Scorpions –** Three species are common in the Arizona Upland (30 species are known from Arizona).
- Bark scorpion
- Stripe tailed scorpion
- Giant hairy scorpion.

- Scorpions are ancient, climbing out of the sea 400 million years ago.
- Scorpions are eaten by elf owls, lizards, some snakes, grasshopper mice, desert shrews, and pallid bats.
- They have **live young** which **ride on their mother's back** until their first molt in 1 – 3 weeks.



- Scorpions tend to sit still in the same place night after night waiting for prey.
- They can be very athletic during an attack.
- They use their pinchers to hold the prey while they sting it to paralyze it.
- They are easy to find using a black light on a warm moonless summer night in undisturbed Arizona Upland.

- **Bark scorpion (*Centruroides exilicauda*)**
- **Most poisonous** of the 30 in AZ.
- Not likely to kill a human, but it sure hurts.
- Likes to climb trees and rocks.
- **Orients upside down** (people get stung picking up rocks).
- Often **found in houses,** especially on the edge of town (get trapped in sinks and bathtubs, found on walls and ceilings).
- Outdoors in wood or brick piles.
- Sometimes found in groups especially when hibernating.

- **Stripe tailed scorpion (*Vaejovis spinigerus*)**
- Widespread and common (outdoors).
- Texas, New Mexico, Arizona, southern California,Sonora, Northeastern Baja.
- About 2 inches long.
- Sturdy

- **Giant Hairy Scorpion (*Hadrurus arizonensis*)**
- Biggest in the USA: 6 inches!
- Uncommon; only out a few weeks in summer.
- Eats other scorpion

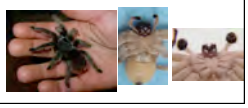
- **Giant desert centipede – *Scolopendra heros***
- A true giant at 6-8 inches.
- **Warning coloration –** short fangs under head **inject venom into prey.**
- Bite is painful but not dangerous for humans.
- Won' up.

- The **tail mimics the head** to confuse predators.
- They run around at night eating insects, lizards, small rodents.
- Strictly nocturnal.
- Moth few days

## Arizona blond tarantula

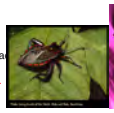
- About 3-4 inches; females tan, males black with redish hairs in abdomen.
- Typically found in saguaro-dominated plant communities.
- Females are bigger than males and live longer.

- Because they are predators male has to be careful not to become the female's dinner.
- Males do not survive much after mating.
- They make quiet pets.



## Arthropoda: Insects


- Body with three main sections
- Head with 1 pair of antennae and 1 pair of eyes.
- Thorax with 3 pairs of legs.
- Many of them with wings.
- The most diverse and abundant group of organisms on Earth.



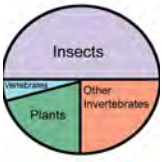
## History of insects

- Oldest fossil record of insects appear in the Devonian about 400 mya.
- They developed wings about 350 mya (the first organisms to evolve active flight).
- Soon after that many of the major orders appeared.

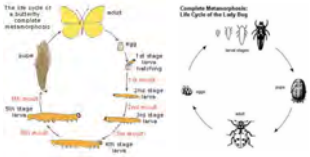
Pterosaur, a flying reptile, 220myo

## The most diverse and abundant group of organisms on Earth (after the microbes).

- Small size.
- Wings
- They are very specialized.
- They have low rates of extinction.
- Many of them feed on plants.

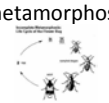



## Insect development: Complete metamorphosis



- Immature and adult stages are very different and often live in different habitats.
- There is a quiescent or pupal stage preceding the last molt.
- Wings develop internally.

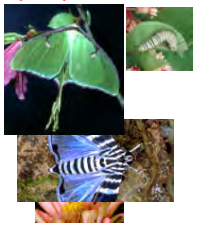
## Insect development: simple metamorphosis



- Little change in form. Young and adults are very similar except for size.
- Wings develop externally during the immature stages.
- No quiescent stage preceding last molt.

## Insects: Lepidoptera

- Butterflies and moths
- Big wings
- Body and wings covered with scales
- Proboscis often coiled.
- Long, antennae.
- Some have auditory organs (tympana).



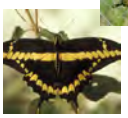
## Hawkmoths (Manduca spp)

- Large moths (size of hummingbirds.
- They have long proboscis.
- Pollinate nocturnal blossoms of *Datura* plants.


- Larvae have very bad reputation among gardeners.
- They are voracious and feed on *Datura* and wild tobacco leaves but they also love to eat your tomato plants.
- In a few hours they can defoliate a whole plant.

## Giant swallowtail

- The largest butterfly in the urban areas in the Southwest.
- Wingspan of about four inches.
- Caterpillars feed on citrus consuming young leaves with great gusto.
- Caterpillar looks like fresh bird dropping.
- If poked, it shoots out an orange "forked tongue"



## Homoptera (aphids, whiteflies, cicadas, etc)

- Form is highly variable
- Piercing-sucking mouthparts
- Feed on plants

Cactus dodger (*Cacama sp*)

- The only insects known to cool themselves by the evaporation of sweat.

- It is a cicada and emerges by May.
- Males sing to attract females by means of some abdominal membranous structures called tymbals.
- They sing loudly during the heat of the day.

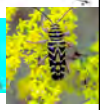
- They are able to do it because they sweat!
- They extract water from their blood and transport it through large ducts to the surface of the thorax, where it evaporates.
- They loose 20-35 % of their body water every hour.
- They can do it because they feed directly on the xylem fluid of plants.

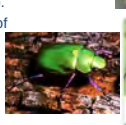
## Mantodea (mantids)

- Predators
- Forelegs designed for grasping and holding prey
- Elongated body
- Wings are leathery and cover abdomen

## Insects: Coleoptera

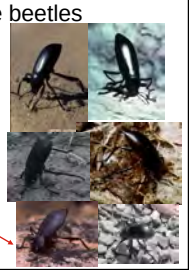
- Beetles
- Two pairs of wings.
- Forewings toughened to form elytra (wing cases).
- The most diverse of the insects.





## Pinacate beetles

- **Characteristic of the desert.**
- **Spend much time on their heads to display defensive glands in the tip of abdomen.**
- **Many species, you can choose color as long as you want black.**
- **False Pinacate beetles do not have defensive glands but they will mimic Pinacate beetles' defensive display.**



## Insects: Heteroptera

Simple metamorphosis

- True Bugs
- Most species hold their wings flat.
- Triangular structure (scutellum), creating an x-shaped pattern.
- Mouth parts form a slender tube under head.
- Many feed on plant juices and some are predaceous. Some like to feed on you.

- **Kissing bugs –** our local nightmare.
- They are about an inch long.
- **Bloodsucking** bugs that normally live in wood rat nests ("pack rats").
- They become adults in May and June and fly around looking for mates and new packrat nests.
- If they get in your house, they feed on the nearest mammal, you or the dog.



- They feed only at night.
- First they inject an **anesthetic** and an **anticoagulant**, so you won't be disturbed.
- Most people wake up with a large hard itching welt.
- Some people get sensitized and go into shock.
- The trypanosome, **Chagas' disease** is carried by kissing bugs.
- Chagas' is not known here yet.
- Buy good screens and don't live near pack rats.

## Giant Mesquite Bug

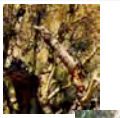
- One of the flashiest insects of the Southwest.
- Nymphs are banded with red and white.
- Males have very enlarged, toothed hind femora
- At the end of antenna they have sensory spots.
- They feed on mesquites and nothing else.

## Insects: Blattodea

- Termites
- Pale body
- Feed on dead wood
- Related to cockroaches
- Form colonies and their societies are the oldest.
- King, queen, soldiers, workers (males and females).

- They recycle cellulose (from dead plant material and dung).
- Some contain protozoans in their guts that have bacteria that produce cellulase.
- Some cultivate fungi.
- Without termites cow pies would cover 20% of the surface in 50 years!

- In the Sonoran Desert region some termites are highly specialized.
- *Marginitermes hubbardi* - the saguaro skeleton termite.
- *Pterotermes occidentis*, specialist on Palo verde wood.
- Termite rain!



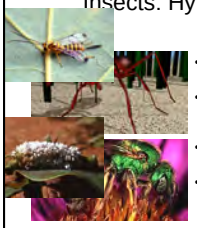
## Insects: Diptera

- Flies
- 1 pair of wings.
- Mouthparts highly variable
- Most species feed on nectar, but many species feed on sap and blood.

## Cactus fly (*Odontoloxozus longicornis*)

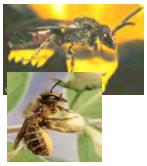
- Feeds on rotting saguaros and other cacti. But you can also find them in your glass of French wine!
- The conical heads and raptorial forelegs mimic heteropteran predators.
- Males keep territories and pose to females.

## Insects: Hymenoptera



- Bees, wasps and ants.
- Winged members have four membranous wings.
- Many are social and live in colonies.
- The most beneficial to humans.

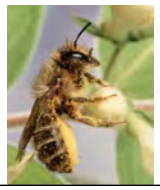
- **Bees -**
- The region around Tucson has **more species of bees than anywhere else in the world.**
- Sonoran Desert bees – 1,000 species.
- Bees are more diverse in deserts and grasslands than in rainforests.
- Bees are the pollinators of most desert plants.



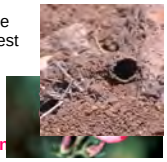


- The **smallest bee** is *Perdita minima*, 2 mm long.
- The **largest bee** is carpenter bees, *Xylocopa* (1.5 in).

- Female bees gather **pollen** and **nectar** to feed their offspring and for their own energy needs.
- Pollen has protein and vitamins, nectar has mostly sugar.



- Most are **solitary** (one female does all the nest building and provisioning).
- Most bees in the Sonoran Desert dig **burrows in the groun** for their brood.



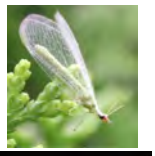
- **Tarantula hawk –** more than 12 species of *Pepsis* in the desert.
- **Huge,** 2 inches.
- **Painful sting –** many times than a honey bee.

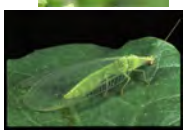
- Often seen around blossoms in summer.
- Female tarantula hawk feeds a paralyzed tarantula to it's young.
- Female is diurnal and tarantula is nocturnal.
- Female runs around on the ground trying to smell a tarantula burrow.
- When she finds one she ha t by vibrating its silk.

- Once she gets it out she captures and **paralyzes it** with her sting.
- Then she must drag it to her nest, deposit one egg and close the nest.
- The tarantula doesn't dry out because it is **alive.**
- The larva eats it starting with no s.
- The larva pupates in a silk coco spring.

## Insects: Neuroptera

- **Lacewings and antlions.**
- **Four membranous, veined wings of about the same size**
- **Fearsome predators. Larvae bear a pair of long, curved jaws.**





**antlions**

- **Larvae seek out fine dry soil to make a hole in a funnel shape.**
- **Larva lies in wait in the bottom of the funnel.**
- **Trying to get out pray cause mini-avalanches in the funnel, sliding further.**
- **When it hits the bottom it hits a trigger hair located between the jaws, causing them to snap shut.**


## Insects: Orthoptera

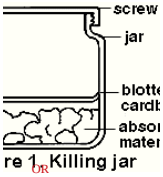
- Grasshoppers and crickets
- Tough, leathery forewings.
- Most of them are plant feeders and some are pests.
- Many species sing.


## Insects: Odonata

- Damselflies and dragonflies
- Long, cylindrical abdomen
- Wings of equal size
- Large eyes
- Predators that hunt by sight.



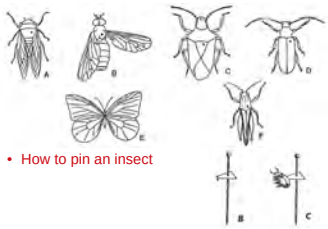
## How to prepare an insect collection


re 1. Killing jar

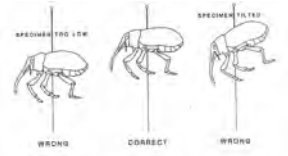
OR

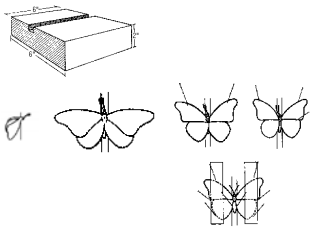
FREEZE!

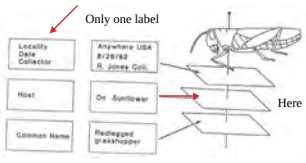


- How to pin an insect

If insects are small





- Group your insects by order (at least 5 orders).
- Put names of orders above your group of insects.
- Make sure it is neat.
- Finito!