

Chapter 10

Mollusks Arthropods Echinoderms



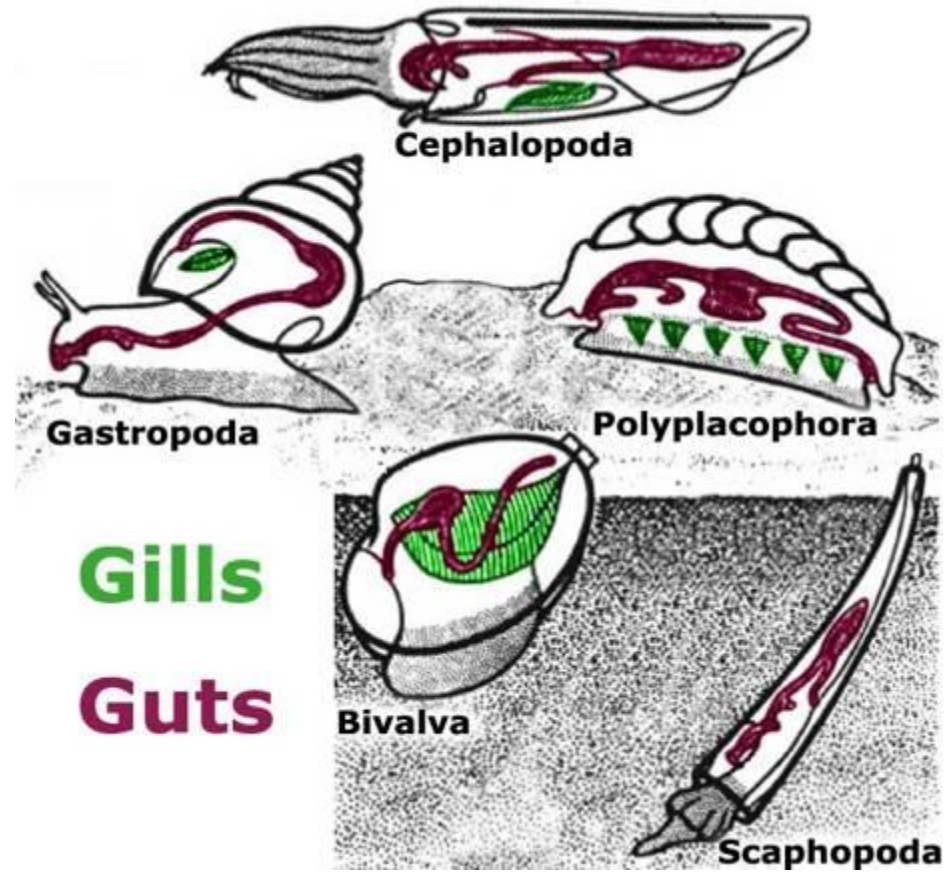
Section 1: Mollusks

- Invertebrates with soft, un-segmented bodies
- Covered with a shell
- Contains a MANTLE
 - Thin layer of tissue that covers its organs
- Contains a FOOT that has different functions:
 - Crawling
 - Digging
 - Catching prey
- Bilaterally symmetrical with a two-opening digestive system
- Most have open Circulatory System



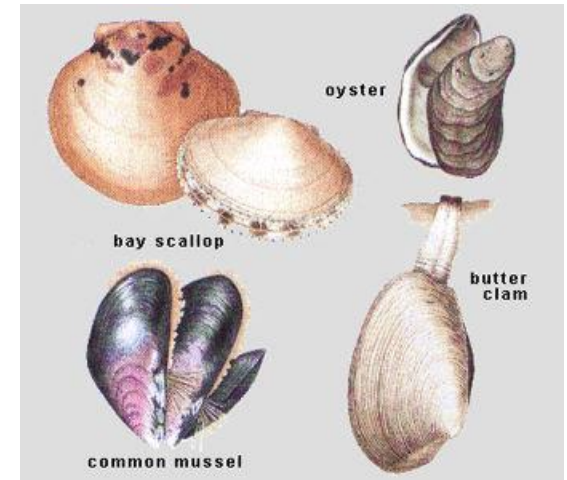
Obtaining Oxygen

- Aquatic mollusks have GILLS
 - Organs that remove oxygen from the water
 - Contain cilia to help water flow
 - Rich supply of blood vessels for gas exchange



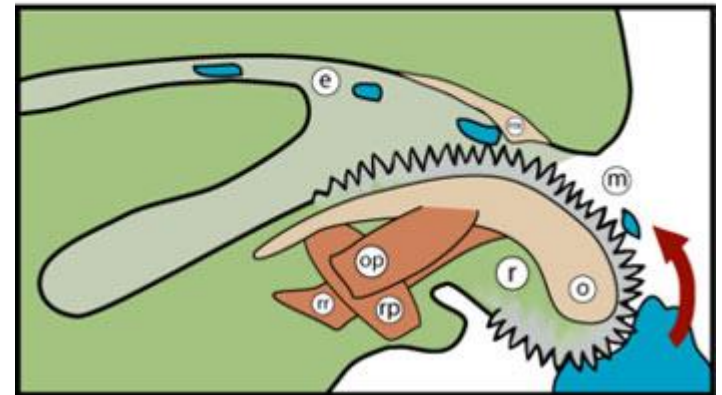
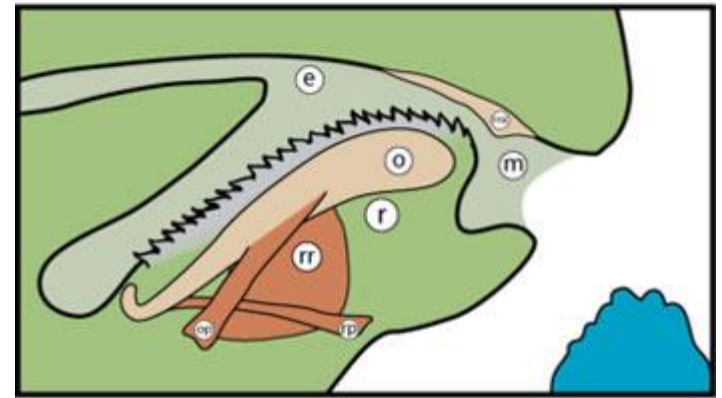
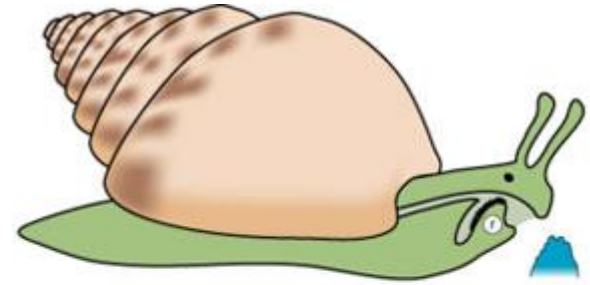
Classification of Mollusks

- 3 groups classified by:
 - Presence of a shell
 - Type of shell
 - Type of foot
 - Type of nervous system
- 3 groups
 - Gastropods
 - Bivalves
 - Cephalopods



Gastropods

- Largest of three groups
- Snails and slugs
- Can live anywhere
- Single external shell or no shell at all
- Obtaining food (different ways)
 - Herbivores- eat plants
 - Scavengers- eat decaying material
 - Carnivores- eat other animals
- All use RADULA
 - Flexible ribbon of tiny teeth for eating
- Move by creeping on broad foot
- Foot may ooze a carpet of mucus



Bivalves

- With 2 shells held together by hinges and strong muscles
- Oysters, clams, scallops, mussels
- Found in watery environments
- Obtaining food:
 - Omnivores- eat plants and animals
 - Filter feeders that strain organisms from water
 - Food sticks to mucus that covers gills
 - Cilia sweeps food into mouth



Movement and Protection

- Movement
 - Larvae float or swim in water
 - Oysters and mussels attach to rocks
 - Clams move VERY slowly or dig into mud
- Protection
 - If sand, or other irritant, lodges between mantle and shell, then the mantle produces a smooth pearly coat to cover the irritating object.
 - Sometimes a PEARL will form



Cephalopods

- Ocean-dwelling carnivores
- Foot is adapted to form tentacles around its mouth
- Some have no shell (octopus)
- Some have internal shell (squid and cuttlefish)
- Some have external shell (nautilus)
- Only mollusks with a closed circulatory system
- Large eyes and excellent vision
- Large brains and ability to remember
 - Captive ones know when it is feeding time and can escape their tanks



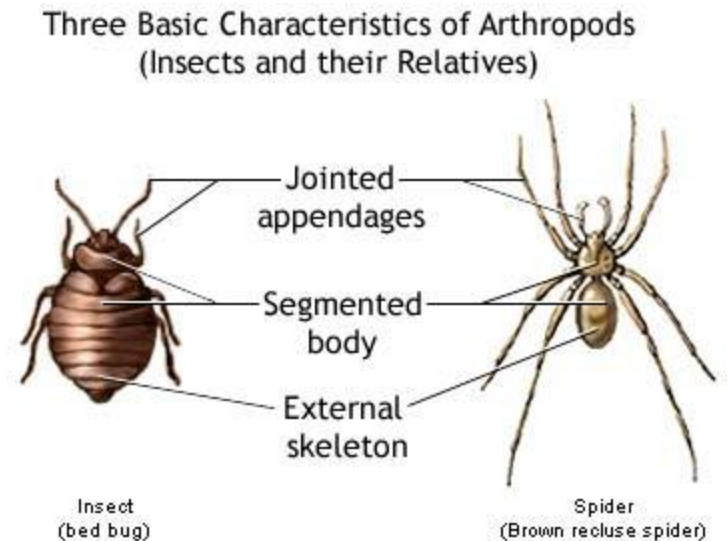
Obtaining Food and Movement

- Tentacles contain sensitive suckers that receive sensations of touch and taste
- Organism does not need to touch in order to taste
- Suckers respond to chemicals in water
- Catches prey using muscular tentacles
- Crushes prey in its beak and cuts flesh with radula
- MOVEMENT- swim by propulsion
 - Squeeze water out of mantle cavity through tube
 - Move in opposite direction like a rocket



Section 2: Arthropods

- Crabs, lobsters, centipedes, spiders, grasshoppers, scorpions
- Invertebrates with external skeletons and segmented bodies
- Have jointed attachments called APPENDAGES
 - Wings, mouthparts, and legs
- *Athros* (“joint”) + *Podos* (“foot” or “leg”)
- Bilateral symmetry
- Open circulatory system
- Digestive system with 2 openings
- Reproduce sexually



Body Structure

- Exoskeleton
 - Waterproof cover that acts as outer skeleton
 - Protection and prevents evaporation of water
 - Structure suggests that arthropods may be 1st animal on land
 - Shed outgrown exoskeleton by MOLTING
- Segmented body
- Jointed appendages
 - Flexibility and movement
 - Highly specialized tools for specific functions
 - Example: Antenna- contains sense organs

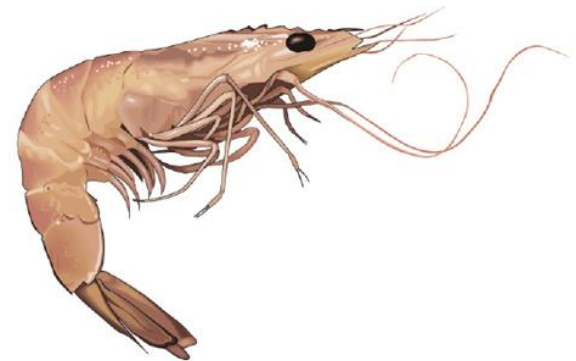
Classification of Arthropods

- Crustaceans (crawfish, lobster, shrimp, crabs)
- Arachnids (spiders, mites, ticks, scorpions)
- Centipedes
- Millipedes
- Insects (moths, caterpillars, cockroaches, bees)



CRUSTACEANS

- Crab, shrimp, lobster, crayfish
- Arthropod with:
 - 2-3 body sections
 - 5 or more pairs of legs
 - 2 pairs of antennae
- Have gills to obtain oxygen
 - Gills are located under the shell
- Can be predators, scavengers, or herbivores



deepwater shrimp

Life Cycle of Crustaceans

MICROSCOPIC,
SWIMMING
LARVAE
(bodies do not
resemble adult)



SOME LAY EGGS
AND OTHERS
RELEASE LARVAE

DEVELOP INTO
ADULTS BY
METAMORPHOSIS



© Richard Austin

ARACHNIDS

- Spiders, mites, ticks, scorpions
- Arthropods with:
 - 2 body sections
 - 4 pairs of legs
 - No antennae
- 2 body sections
 - Head and midsection
 - Hind end called the ABDOMEN
 - Contains reproductive organs and part of the digestive system



Spiders

- Predators that eat insects
 - Some hunt down prey
 - Others spin webs to trap prey
- Have hollow fangs used to inject venom into prey
- Venom turns prey's tissues into mush
- Use fangs as a drinking straw to eat
- Most spiders do not bite humans and those that do are mostly not poisonous except the brown recluse and black widow



Mites, Scorpions, Ticks

MITES	SCORPIONS	TICKS
<ul style="list-style-type: none">• Examples: Ear mites, Chiggers• Parasites• Ear mites give dogs and cats itchy ears• Dust allergies may actually be allergies to the exoskeletons of dust mites	<ul style="list-style-type: none">• Live in hot climates• Usually active @ nighttime• Spine-like stinger at the end of the abdomen• Uses stinger to inject venom into prey, usually a spider or insect	<ul style="list-style-type: none">• Parasites that live on outside of host's body• Nearly every land animal has a tick species that sucks its blood• Deer tick spreads Lyme Disease in humans

Centipedes and Millipedes

- Arthropods with:
 - 2 body sections
 - One with a head with 1 pair of antennae
 - Long abdomen with many segments
- Centipedes have 1 pair of legs for each segment
 - 80+ segments
 - Predators that inject venom in prey
- Millipedes have 2 pairs of legs for each segment
 - Scavengers that eat dying leaves
 - Curl into a ball when danger arises



Section 3: INSECTS

- Moths, caterpillars, dragonflies, cockroaches, bees
- Arthropods with:
 - 3 body sections (Head, Thorax, Abdomen)
 - 6 legs
 - 1 pair of antennae
 - Usually 1-2 pairs of wings
- Head- contain sense organs like antennae and eyes
- Thorax- midsection where legs/wings attach
- Abdomen- contain internal organs



Obtaining food

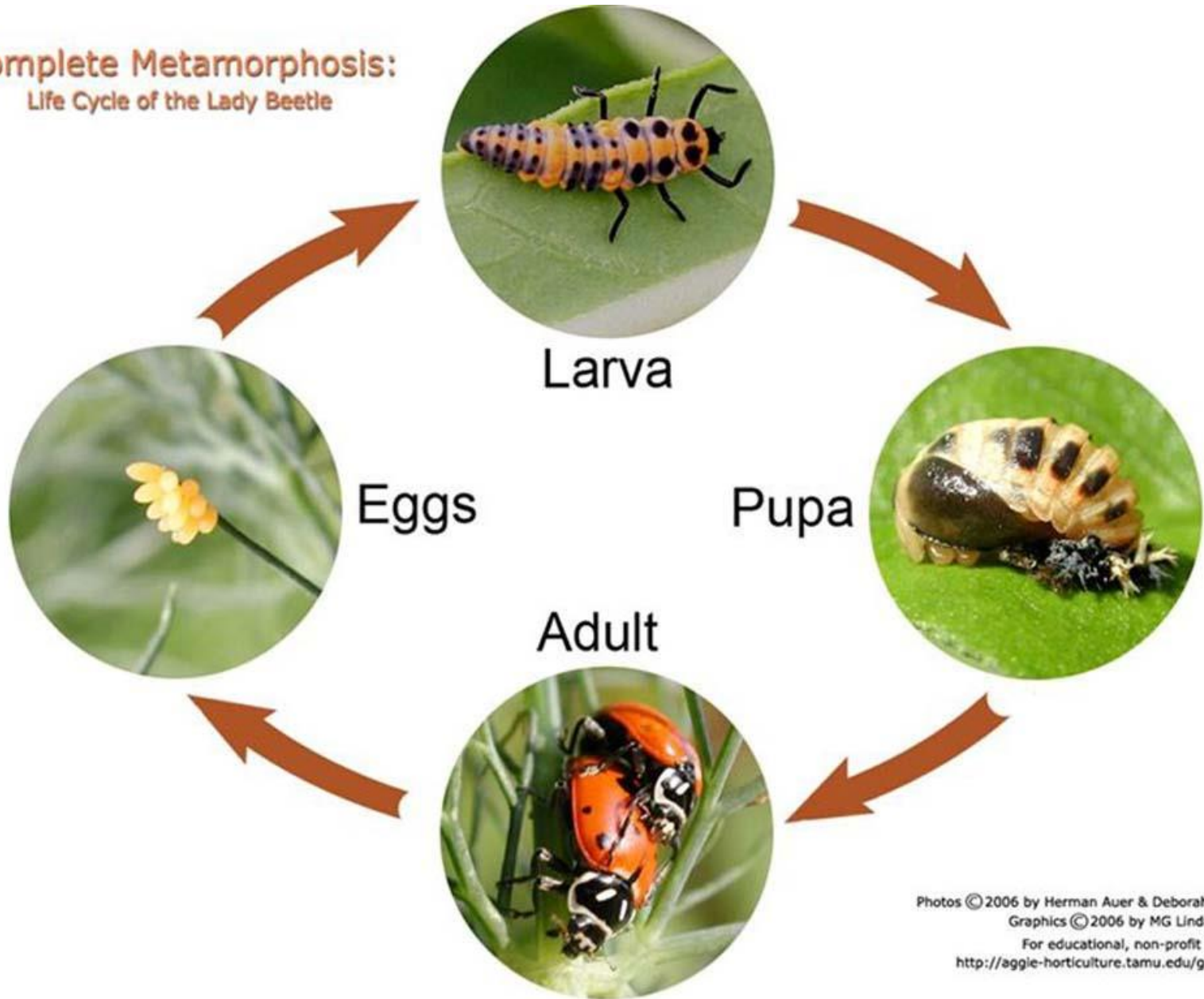
- Mouthparts are adapted for a highly specific way of getting food
 - Lapping mouthparts of a fly
 - Sucking mouthparts of a butterfly or cicada
 - Chewing mouthparts of an ant



Life cycle

- Begin as tiny, hard-shelled fertilized eggs
- Go through metamorphosis (2 types)
 - **Complete Metamorphosis**- 4 stages (butterflies, flies, ants)
 - **Eggs** hatch into larvae
 - **Larvae** usually look like worms and specialized for eating and growing
 - Larvae becomes **Pupa**- enclosed in protective covering
 - Major changes in structure occurring in this phase
 - Pupa becomes an **Adult**

Complete Metamorphosis:
Life Cycle of the Lady Beetle



Life Cycle continued...

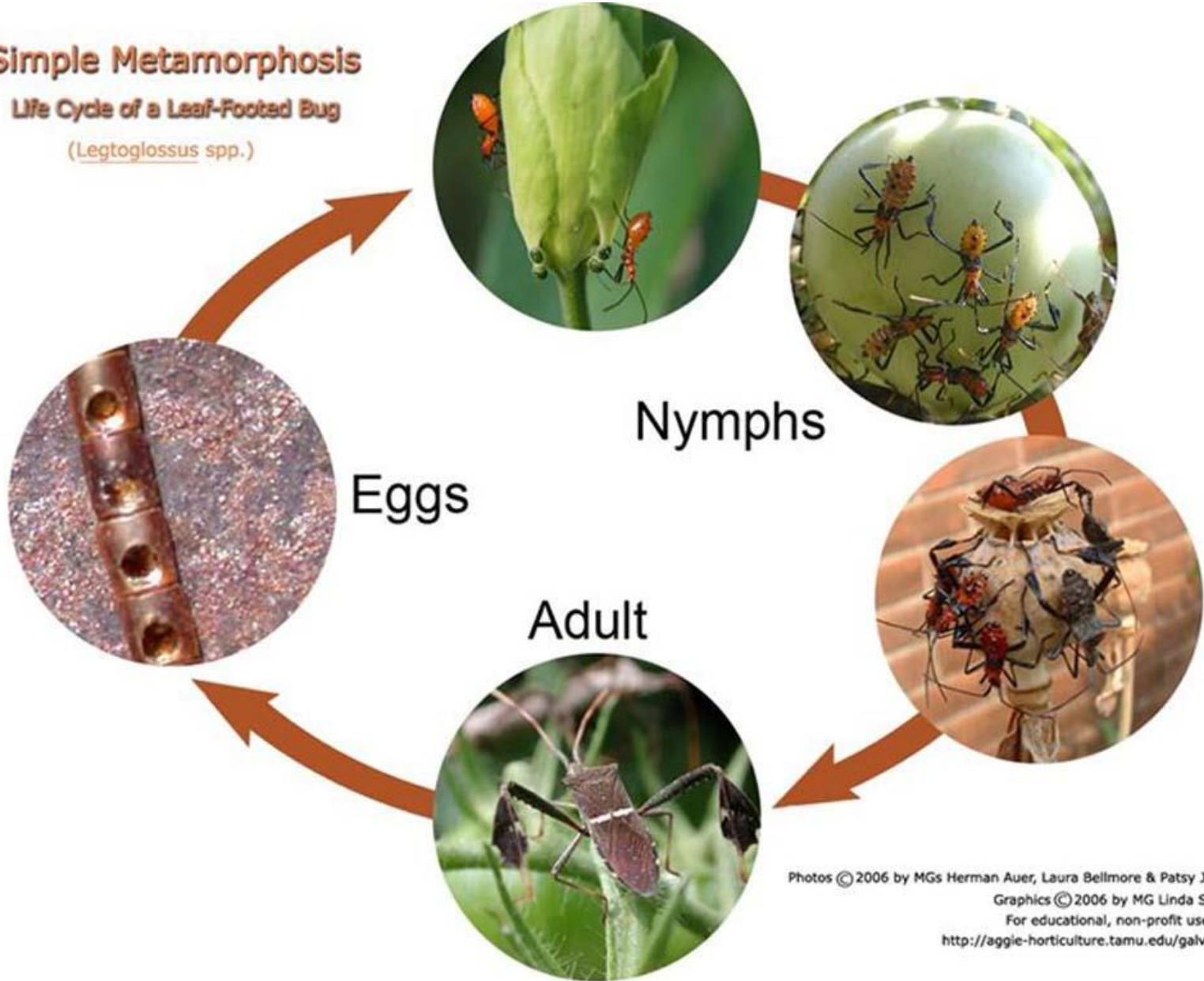
- **Gradual Metamorphosis**- grasshoppers, dragonflies
 - Egg hatches into Nymph
 - No distinct larval stage
 - Looks like adult but without wings
 - Nymph molts (sheds) several times before becoming an adult

Gradual Metamorphosis

Simple Metamorphosis

Life Cycle of a Leaf-Footed Bug

(*Leptoglossus* spp.)



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<http://aggie-horticulture.tamu.edu/galveston>

Name _____

Subject _____

Label the diagram of the cicada using the word bank below. Then view the parts of the insect under the dissecting scope. Use the article on NB pages 13-14 for questions below.

What type of metamorphosis does this insect have? _____.

What type of mouth parts do they have? _____.

Head

Thorax

Compound Eye

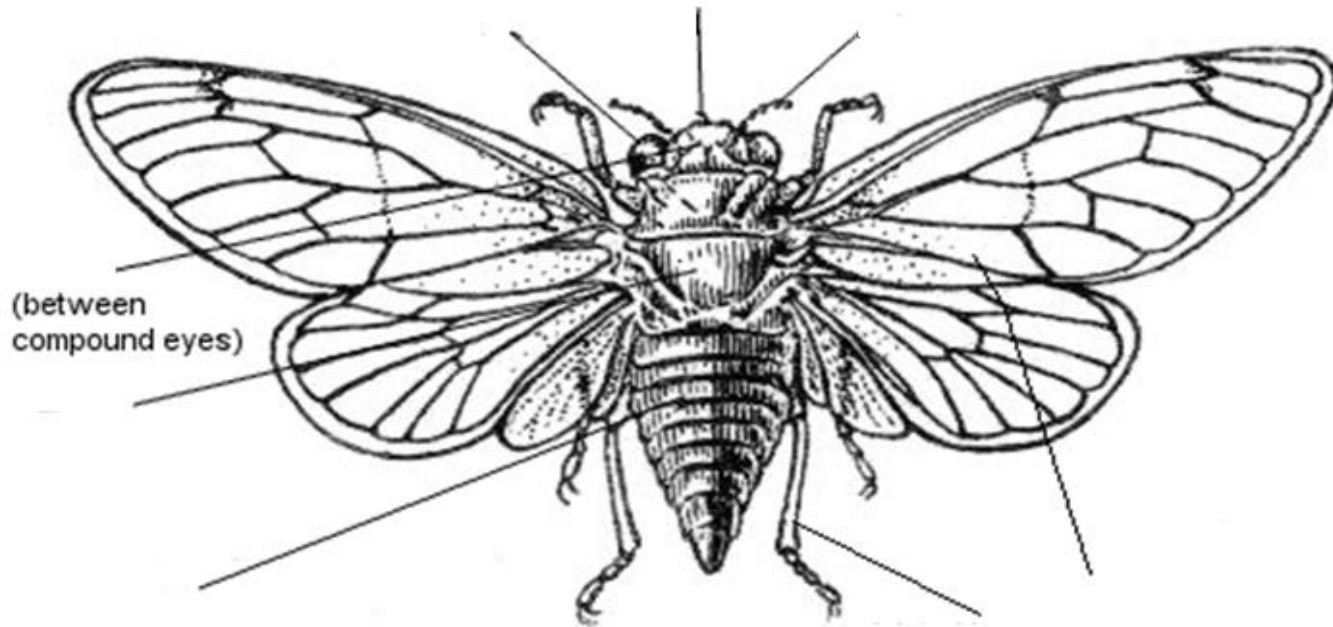
Abdomen

3 Ocelli

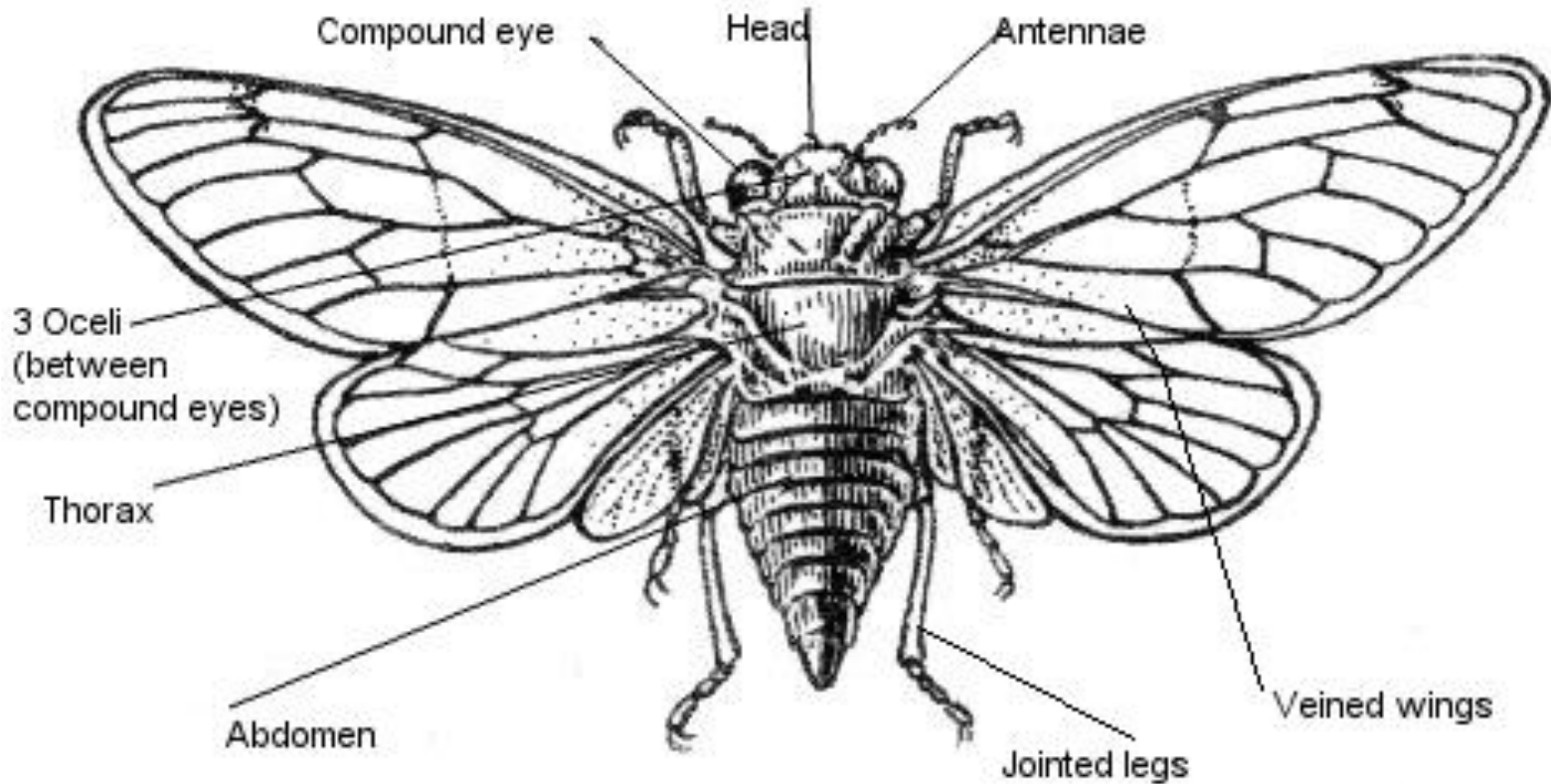
Wing

Antennae

Jointed Legs

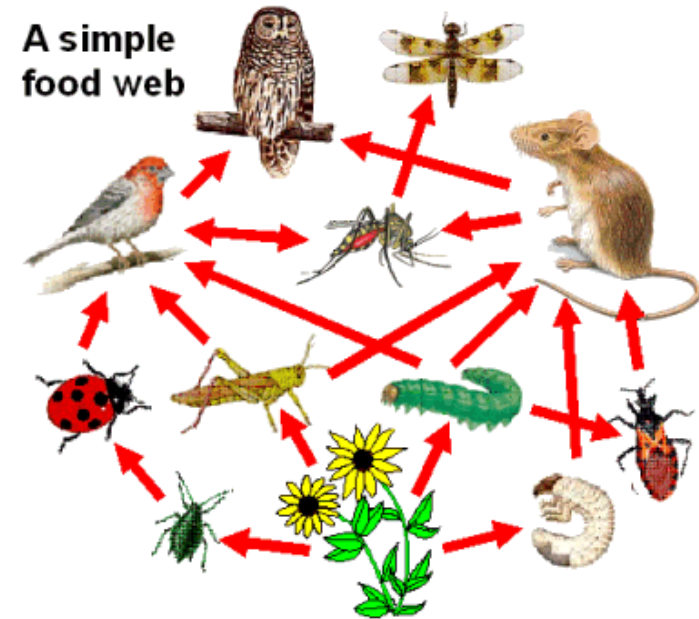


Label the diagram below and view under the dissecting scope.



Section 4: Insect Ecology

- Ecology- study of food chains and other ways organisms interact with their environment
- Food chain- series of events in which one organism eat another in order to obtain energy
- All food chains have producers and consumers (some have decomposers)
- Insects as:
 - Consumers of plants (caterpillars)
 - Prey to animals (birds eat insects)
 - Decomposers (termites and dung beetles)
 - Food for human (crickets and cicadas)



Other insect interactions

- Act as pollinators
 - Moving pollen among plants
- Spread disease-causing organisms
 - Malaria- spread by mosquitoes
- Controlling pests by using
 - Chemicals- pesticides
 - Traps
 - Other living things
 - Biological control- using a natural predator to kill harmful insects
 - Example: Lady bugs eat aphids that harm plants



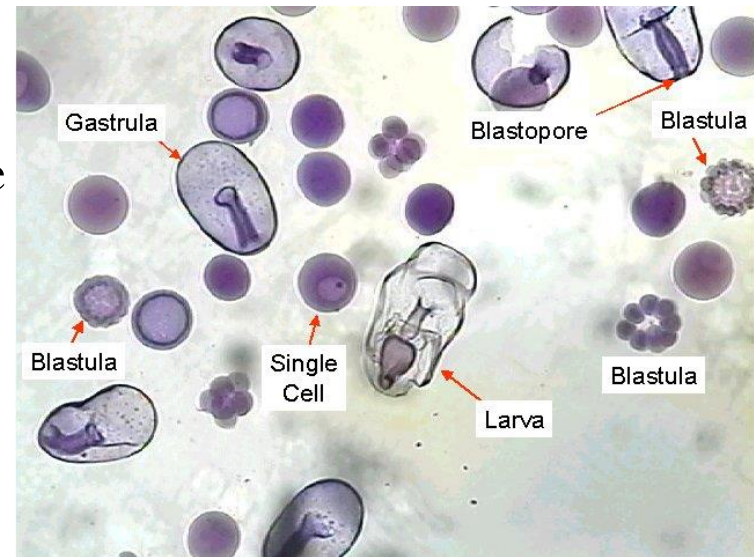
Section 5: Echinoderms

- Sea stars, sea urchins, sand dollars
- Invertebrates with internal skeleton
- Contain water vascular system
 - Fluid-filled tubes
- Have an Endoskeleton
 - Internal skeleton made of hardened plates
 - Give animal a bumpy texture
- Radial symmetry in multiples of 5 like spokes on a wheel



Movement and Reproduction

- Use tube feet for movement
 - Fill with water and act like tiny suction cups
- Reproduce sexually
 - Females release eggs into the water
 - Males release sperms into the water
 - Eggs are fertilized in the water
 - Fertilized eggs become swimming larvae
 - Larvae metamorphosis into adults



4 major groups

Sea Stars



- Predators that eat mollusks
- Capture prey with its tube feet
- Forces its stomach out through its mouth
- Forces itself inside the animal and eats its insides

Brittle Stars



- Arms are long and slender
- Tube feet have no suction cups, so only used for capturing food and not for movement
- Move by waving arms in a snake-like motion

Sea Urchins



- No arms
- Covered with moveable spines for protection
- Use band of tube feet that extend out from between spines for movement
- Scrape and cut food with 5 teeth-like structures

Sea Cucumbers



- Look like cucumbers
- Can be red, brown, blue or green
- Bodies are soft, flexible, and muscular
- Filter feeder that crawls with tube feet
- Mouth surrounded by tentacles