

# Phylum Arthropoda

“The Life of Creepy Crawlies”

# Arthropod: General Characteristics

- 1) Jointed appendages
- (arthro = joint; poda = foot)
- They can have lots of legs such as the millipede, centipedes, lobsters or shrimp
- 4 pairs (8 legs) such as spiders, scorpions
- 3 pairs (6 legs) such as insects, ants, bees, etc.

# Arthropod: General Characteristics

- 2) Segmented bodies
- Sections include a **head**, **thorax** and **abdomen**

- Sometimes the head and thorax are fused together into a structure called the **cephalothorax**

# Arthropod: General Characteristics

## ■ 3) Exoskeleton

- This is the hard outer covering that protects the inner soft body parts
- It is composed of a protein called **chitin**
- Some arthropods also have chitin and **calcium carbonate** in their exoskeleton which makes it very tough and hard (ex. crab and lobster shells).

# Arthropod: General Characteristics

- 4) Molting
- The exoskeleton does not grow as the animal gets larger. Thus they also have to molt or shed their old exoskeleton and replace it with a new larger exoskeleton.

# Blue crab molting



- **Having reached the "buster" molt stage, a Maryland blue crab, *Callinectes sapidus*, sheds its shell. During its lifetime a crab may molt 20 to 25 times, increasing its size as much as 1/4 to 1/3 each time.** Photos Courtesy of Mary Hollinger, NODC biologist, NOAA - America's Coastlines Collection
- [www.dnr.state.md.us/baygame/bbc\\_molting.asp](http://www.dnr.state.md.us/baygame/bbc_molting.asp)
- <http://vimeo.com/37438364>
- <http://shapeoflife.org/video/behavior/arthropods-blue-crab-molting>

# Arthropod: General Characteristics

- 5) Metamorphosis
- Many animals go through developmental stages
- egg → larva → juvenile → adult
- This change between stages is referred to as metamorphosis



# Arthropod: General Characteristics

- Sometimes the larval stage looks very similar to the adult stage.
- An example of this is found in Grasshoppers

- This is known as  
**incomplete**  
**metamorphosis**

# Arthropod: General Characteristics

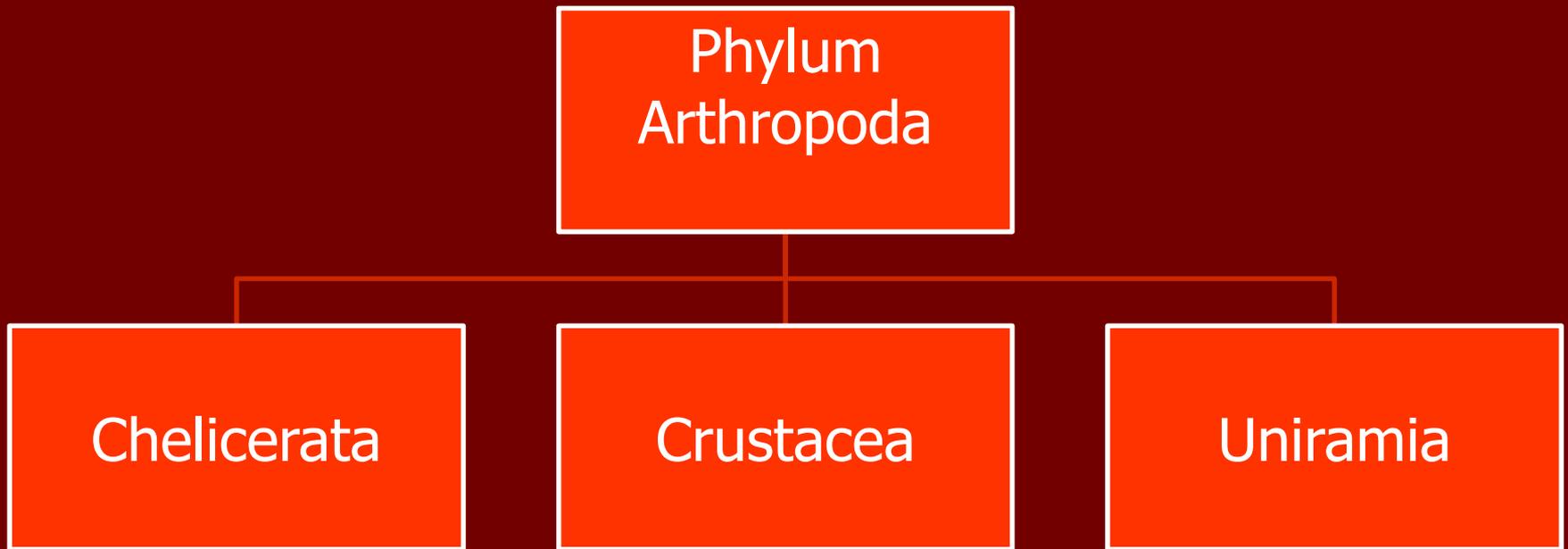
- Other times the larval stage appears completely different and also has a different lifestyle.
- This is known as  
**complete metamorphosis.**
- Examples include:
  - caterpillars → butterflies
  - Mosquito larva live in water while the adult form flies in the air

# Arthropod: General Characteristics

- In Summary, all Arthropods display:
  - 1) Jointed appendages
  - 2) Segmented bodies
  - 3) Exoskeletons
  - 4) Molting / Moulting
  - 5) Exhibit metamorphosis
    - (incomplete or complete metamorphosis)

- Within the Phylum Arthropoda we will focus on only 3 classes
- Chelicerata (spiders, mites, scorpions)
- Crustacea (crabs, lobsters, shrimp)
- Uniramia (insects, flies, bees, butterflies, ants, moths)

# Overview of 3 classes in phylum Arthropoda



# Chelicerata

- Examples: spiders, mites, scorpions, horseshoe crabs

# Chelicerata

- Some are so tiny they are microscopic like these dust mites that live in our homes on mattresses, pillows cushions, carpets.
- They feed on our dead skin cells and scales.
- They're waste droppings sometimes cause health problems like asthma and allergic reactions.

- Horseshoe crabs were thought to be extinct and then were discovered to be very much alive on earth!

# Chelicerata characteristics

- Has 2 body segments:  
a cephalothorax and  
abdomen
- Has 4 pairs of walking  
legs
- Anterior appendages  
are specialized for  
feeding called  
**chelicera (pincers  
or fangs)**

- Respiration: uses book lungs
- Internal Transport: has an open circulatory system
- Excretion: Malpighian tubules
- Response: brain & ventral nerve cord
- Movement: 4 pairs of legs

- Reproduction for arthropods in general:
- internal fertilization
- female parent lays lots of eggs, but there may be very limited parental care for them

# Crustacea

- Examples: crabs, lobsters, shrimp, krill, crayfish,

# Crustacea characteristics

- Mostly marine animals
- Crayfish, lobster, crabs, prawns, shrimp, krill
- Have many appendages
- Has 2 body segments: a cephalothorax and abdomen

- Feeding – Claws, mandibles maxillae, and maxilipeds
- Respiration – gills
- Internal Transport: open circulatory system
- Excretion – green glands
- Response: brain and ventral nerve cord
- Movement: walking legs & swimmerets
- Reproduction:

# Uniramia

- Examples: Insects such as flies, bees, butterflies, ants, moths

# Class Uniramia (Insects)

- Has 3 distinct body parts:
- Head, thorax, abdomen (may have wings)
- 3 pairs of walking legs
- 1 pair of antennae

■ <http://www.extension.umn.edu/distribution/housingandclothing/m1166.html>

- Feeding: has mandibles
- Respiration: spiracles (openings in the abdomen) and tracheal tubes
- Respiration is accomplished by a branched, chitin-lined **tracheal system** that carries O<sub>2</sub> from the spiracles directly to the cells.

**Internal Transport is an open circulatory system;**

□ **The dorsal artery and heart** are long the top of the abdomen and help to move blood in an **open circulatory system**

- Excretion removal of nitrogenous wastes
- Metabolic wastes are removed from the hemolymph by **Malpighian tubules**, outpockets of the digestive tract.

- Response: has brain and ventral nerve cord; antennae
- Movement: legs for crawling and wing for flying

# Harmful Insects

- Locusts eat plant crops
- Mosquitoes spread disease when they suck blood from animals (malaria, yellow fever)
- Lice, fleas,
- Termites destroy wooden structures

# Beneficial Insects

- Bees produce honey
- Bees, moths, butterflies, pollinate flowers which is important for the reproduction of flowering plant species and production of fruit harvest
- Silkworms produce silk
- Food source: grasshoppers, ants, termites

# Social Insects

- Insects that live in a special form of colony known as a society. Individuals are dependent on one another for survival.
- Examples: ants, termites, bees, wasps.
- Colonies or hives that have a queen and millions of other individuals with specific functions (workers, warriors, drones, etc.)

# Insect communication

- By producing noises (chirping, buzzing)
- Fireflies produce light from chemical reactions
- Pheromones – females chemicals released to attract males during mating season
- Honeybees communicate using sound and movement (honeybee dancing)

# Arthropoda Success

- Consider how the following characteristics may have helped arthropods be successful and huge diversity in the phylum
- Exoskeleton
- Movement by walking legs
- Movement by wings
- Communication
- Evolution of social insects