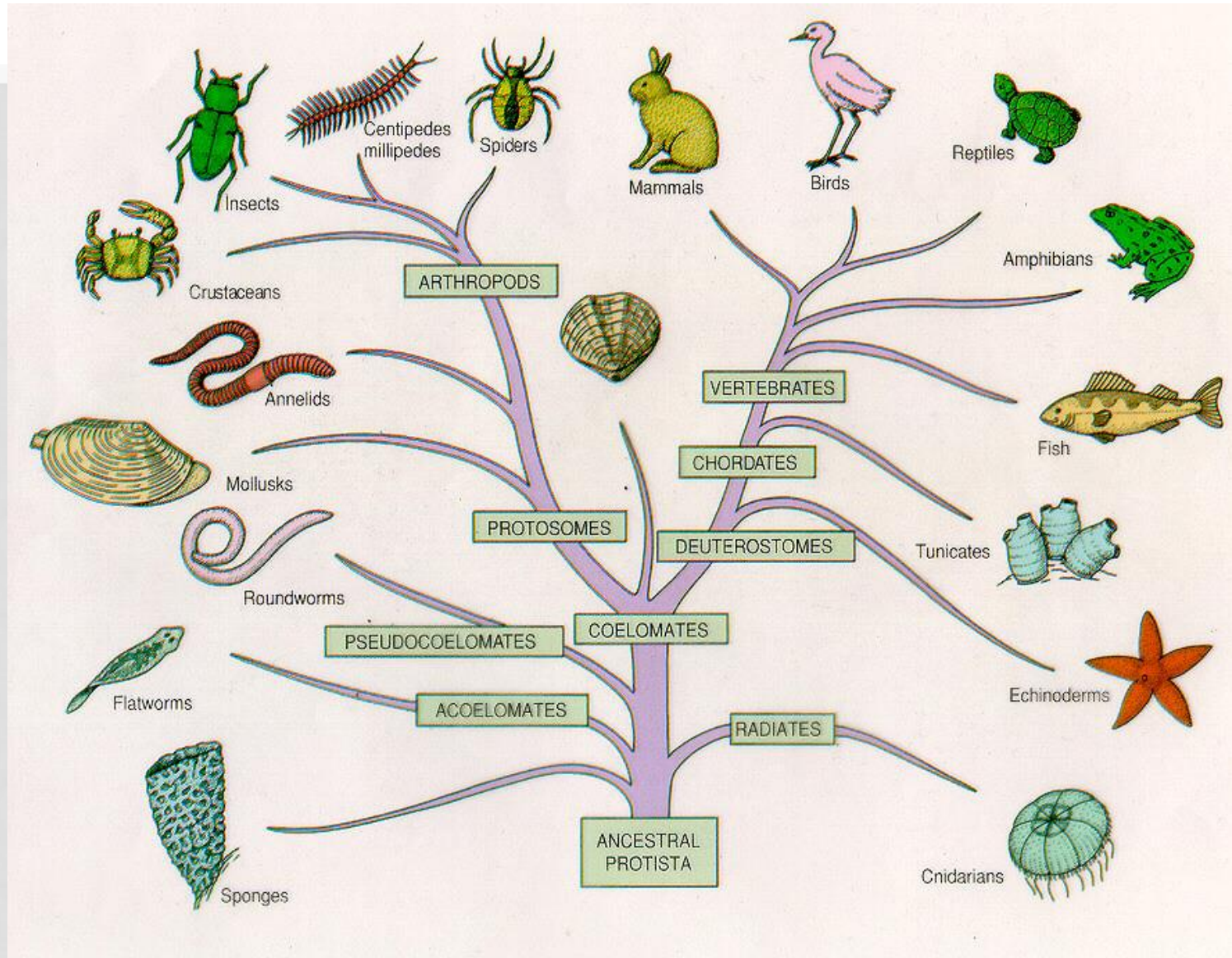


KINGDOM ANIMALIA



CHARACTERISTICS OF ANIMALS:

- HETEROTROPHIC (by ingestion)
- DIGEST FOOD TO GET NUTRIENTS
- MOVE AT SOME POINT IN LIFE
- EUKARYOTIC
- MULTICELLULAR
- NO CELL WALLS



ESSENTIAL FUNCTIONS OF ANIMALS

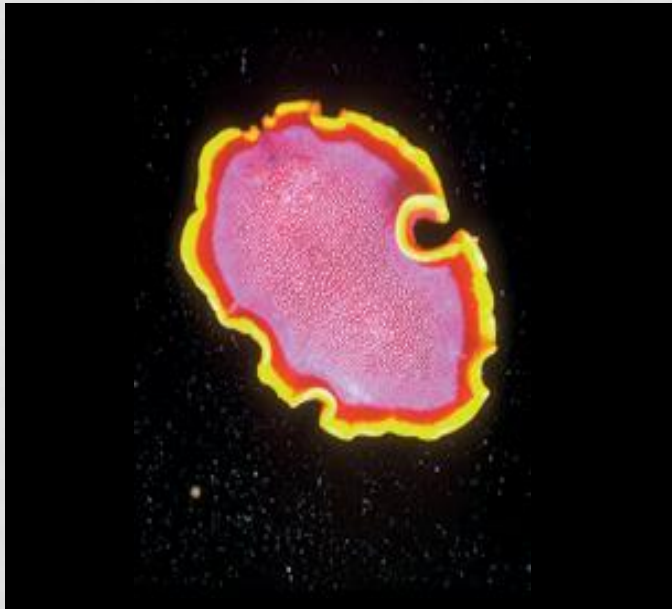
- FEEDING
- RESPIRATION
- CIRCULATION
- EXCRETION
- RESPONSE
- MOVEMENT
- REPRODUCTION



2 MAIN GROUPINGS OF ANIMALS

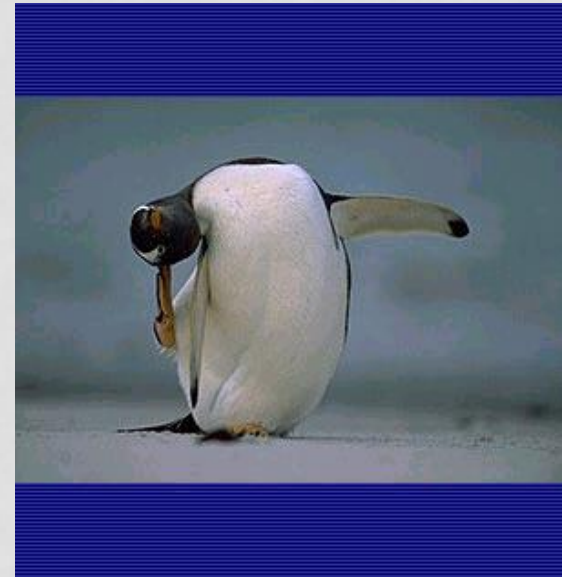
- INVERTEBRATES

- 95% of animal species
- No backbone



- VERTEBRATES

- 5% of animal species
- Contains backbone



~ BODY PLANS ~

- Animals that are **irregular** in shape are asymmetrical.

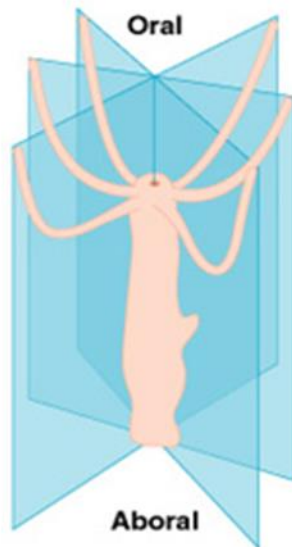


- Animals that are **regular** in shape are symmetrical.

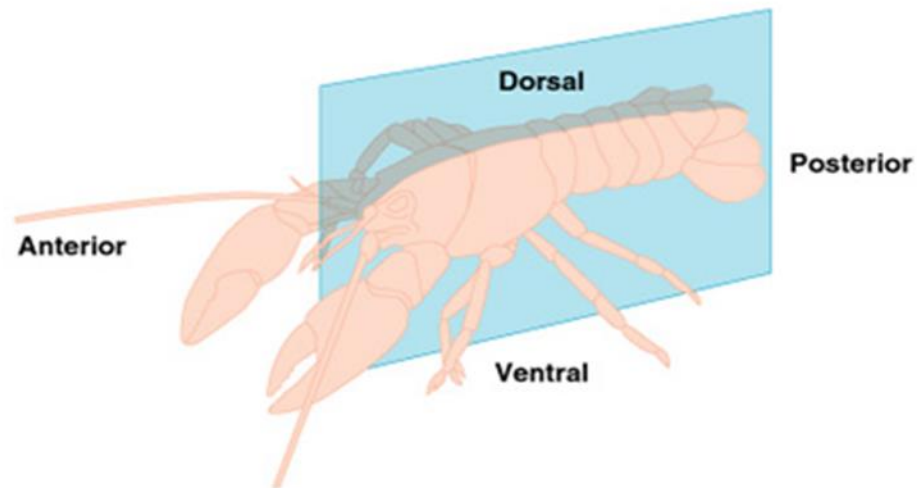


~ BODY PLANS ~

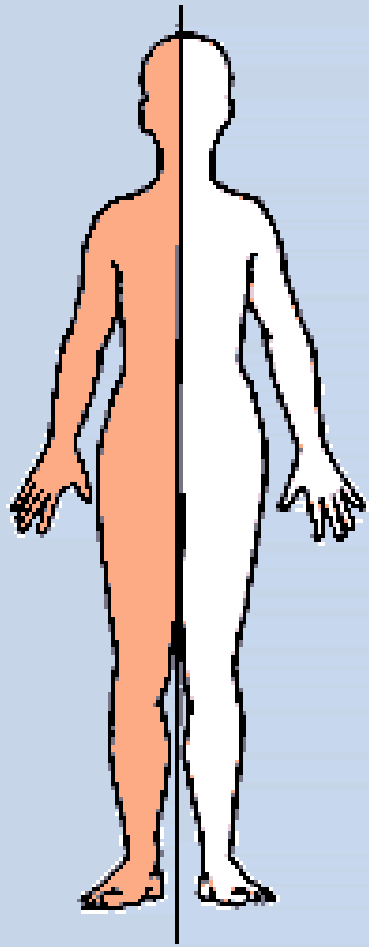
- An animal has **radial symmetry** if it can be divided along any plane using a central axis into equal halves.
- An animal has **bilateral symmetry** if it can be divided down its length into similar right and left halves forming mirror images of each other.



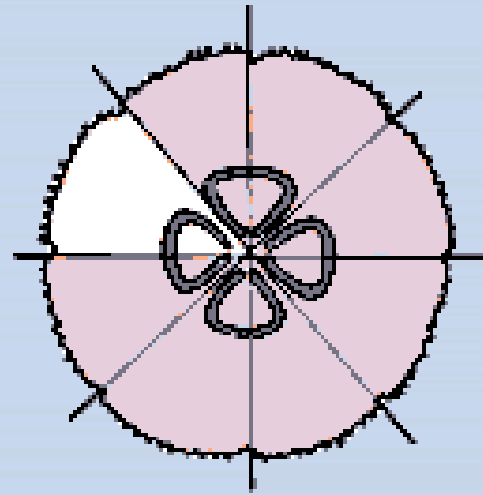
(a) Radial symmetry



(b) Bilateral symmetry



Vattenkikaren

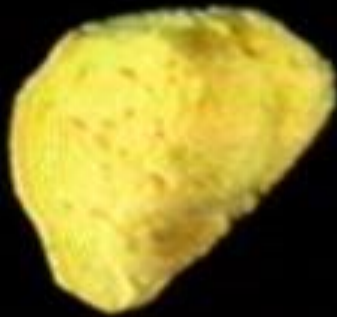


K A

WHICH FIGURE HAS BILATERAL
SYMMETRY?

WHICH HAS RADIAL SYMMETRY?

Phylum Porifera



Sponges-”Pore-bearing”

Shape of Life 14 minutes: <http://www.shapeoflife.org/video/sponges-origins>

PHYLUM PORIFERA

SPONGES-"PORE-BEARING"

Lots of species!
For Example....

- **Euspongia** - bath sponge
- **Glass sponges**
- **Tube sponges**
- **Finger sponges**
 - *Grantia*
 - *Spongilla*



Phylum Porifera

Sponges-”Pore-bearing”

GOOD SPORTSMANSHIP AWARD



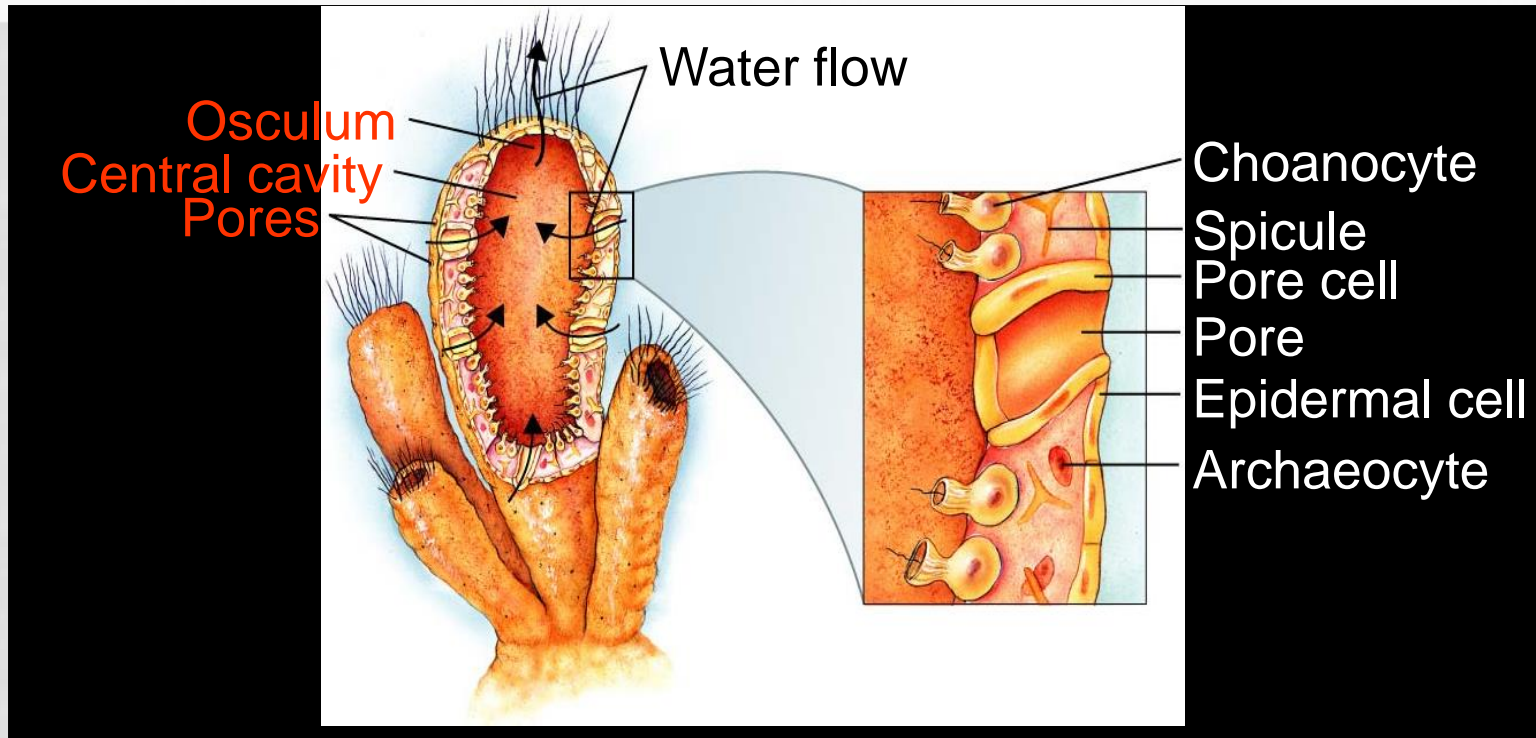
Basic Characteristics

- **Habitat:** aquatic environments (fresh or salt water)
- **Body Plan:** Asymmetric symmetry, osculum = main opening at top, pores for filtering food, choanocytes
- **Feeding:** filter feeder
- **Respiration, Circulation & Excretion** carried through water by diffusion
- **Response:** No nervous system
- **Movement:** Sessile-they can't move as adults
- **Reproduction:** Sexual (hermaphrodites) or Asexual (regeneration of cells)



PHYLUM PORIFERA

SPONGES-"PORE-BEARING"



Special Adaptations in Body Plan

- Water enters body through pores
- Choanocytes = "collar cells," have flagella to filter food from water
- Osculum = Large opening in top of sponge where water exits

PHYLUM PORIFERA
SPONGES-"PORE-BEARING"

Ecological Roles

- Make up base of many coral reefs
- Form symbiotic relationships with primary producers (algae)
- Protect land from waves
- Animal habitat
- Consumer products



| <u>Phylum:</u> | <u>Porifera: “many pores”</u> | <u>Cnidaria</u> |
|--|---|-----------------|
| Examples/habitat | <i>Spongilla, Grantia</i> all live in water | |
| Body Plan (symmetry, special cells) | Asymmetrical, no cephalization Osculum is the center body cavity Spicules: made of silica (glass) provide structure and protection | |
| Feeding | <u>Choanocytes:</u> collar cells (filter food from water) | |
| Respiration | Simple diffusion | |
| Circulation | Filter materials, absorb through diffusion | |
| Excretion | Diffusion | |
| Movement and Response | Adults= sessile (don't move) Only move in larval stage No nervous system | |
| Reproduction | Hermaphroditic , internal fert., (sperm + egg) larva break off and colonize new area | |
| Human Concerns | Provide habitat for marine animals and form symbiotic relationships with algae | |

The image shows four jellyfish of various sizes and colors (orange, yellow, and purple) swimming in the dark blue ocean at night. The jellyfish are illuminated from below, creating a glowing effect. The background is a deep, dark blue, suggesting a night-time underwater scene.

Phylum Cnidaria

“stinging cells”

Mental Floss: <https://www.youtube.com/watch?v=pzAZVWPOwyA>

Shape of Life 15 minutes: <http://shapeoflife.org/video/cnidarians-life-move>

PHYLUM CNIDARIA

“STINGING CELLS”

For Example....

- Hydra
- Jellyfish
- Sea Anemone
- Coral reefs



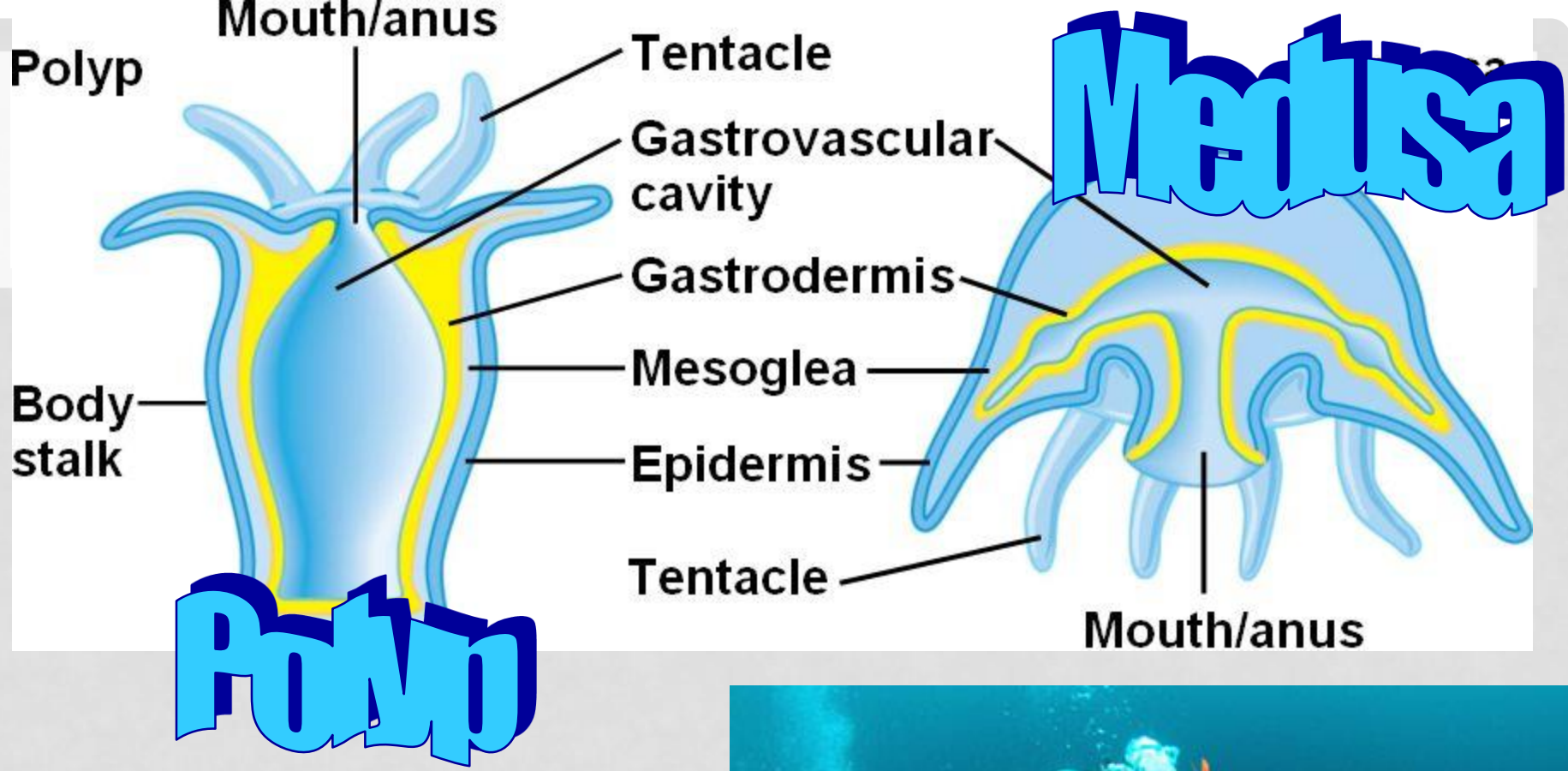
PHYLUM CNIDARIA

“STINGING CELLS”



Basic Characteristics

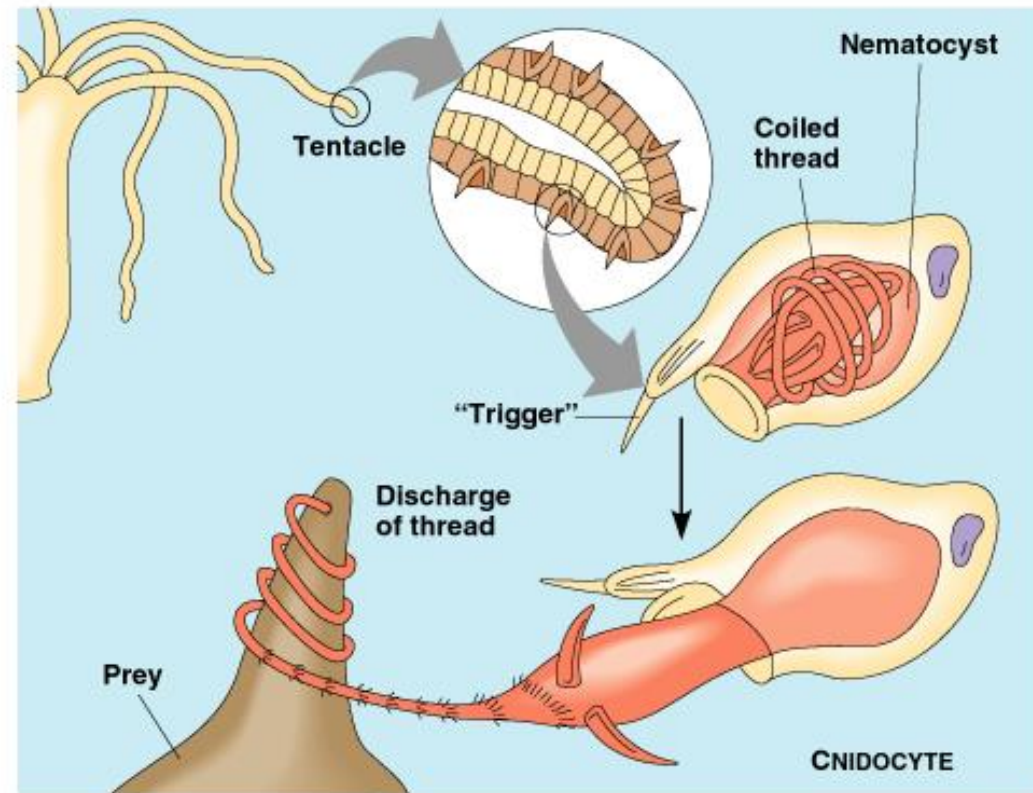
- **Habitat:** Marine or freshwater
- **Body Plan:** Radial Symmetry
- **Feeding:** sting and capture food using nematocysts, have a sac-gut (gastrovascular cavity) with one opening (mouth and anus)
- **Respiration and Circulation:** diffusion through the water
- **Excretion:** wastes exit through mouth opening
- **Movement:** Polyp= sessile, Medusa= free-swimming



Phylum Cnidaria

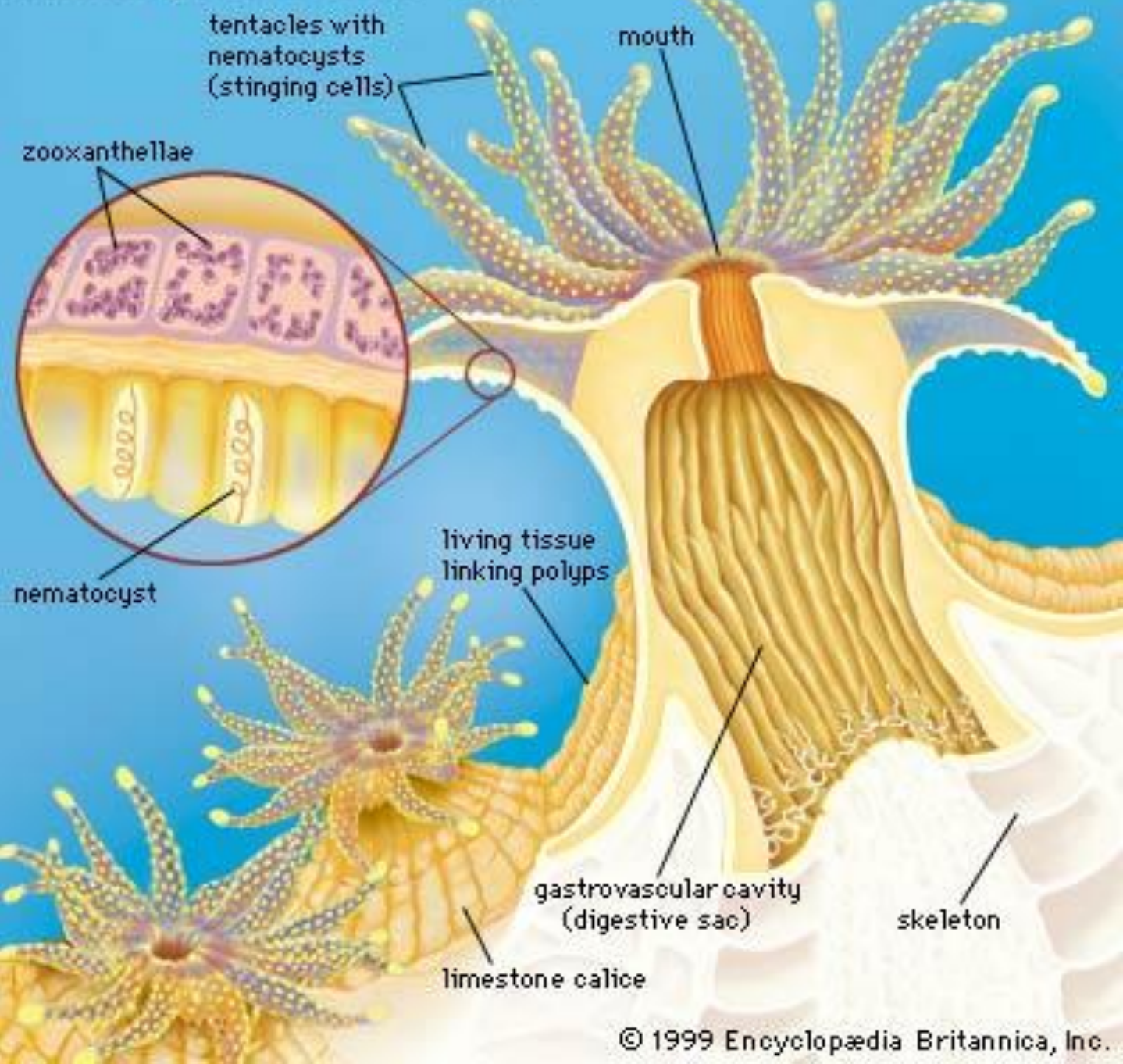
“stinging cells”

- Response: **Nerve nets**
= network of nerve cells that can detect stimuli
NEMATOCYSTS “stinging cells”
- **Reproduction**:
Asexual (budding) and sexual reproduction (external fertilization)
- Coral = colonial, each hole holds a single polyp



© 1999 Addison Wesley Longman, Inc.

Anatomy of a Coral Polyp

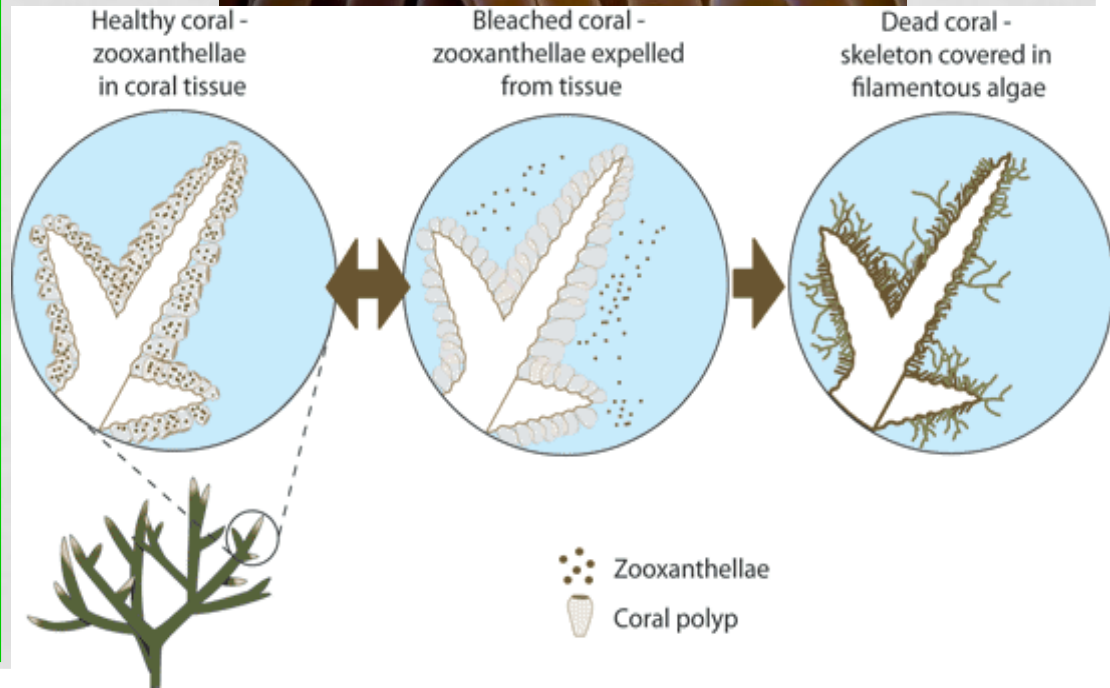


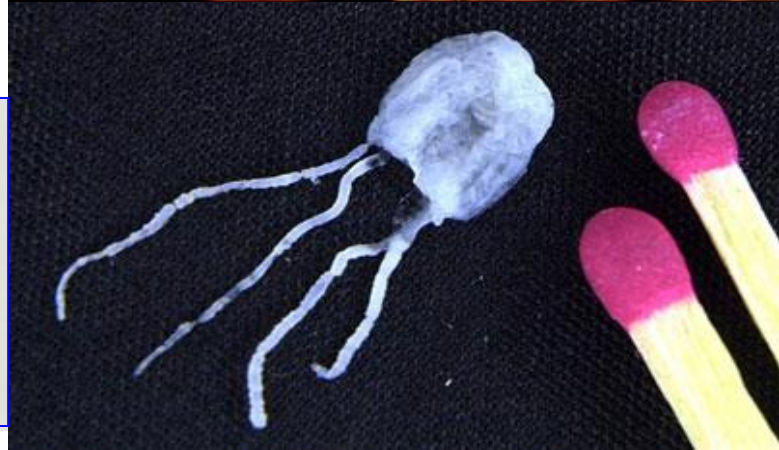
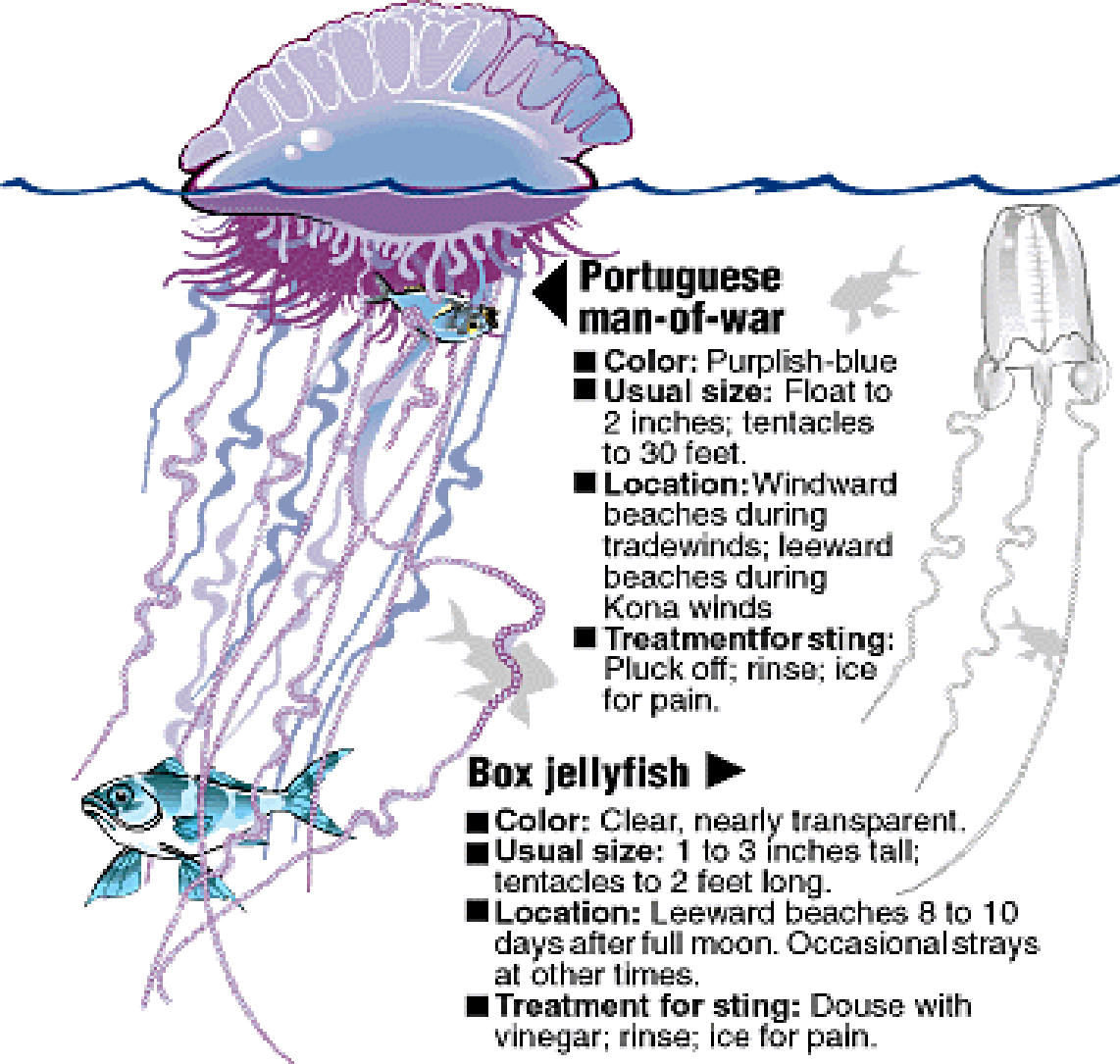
PHYLUM CNIDARIA

“STINGING CELLS”

The Good . . .

- Symbiotic relationships
- Coral reefs = aquatic habitats (nurseries)
- Problem: Coral Bleaching



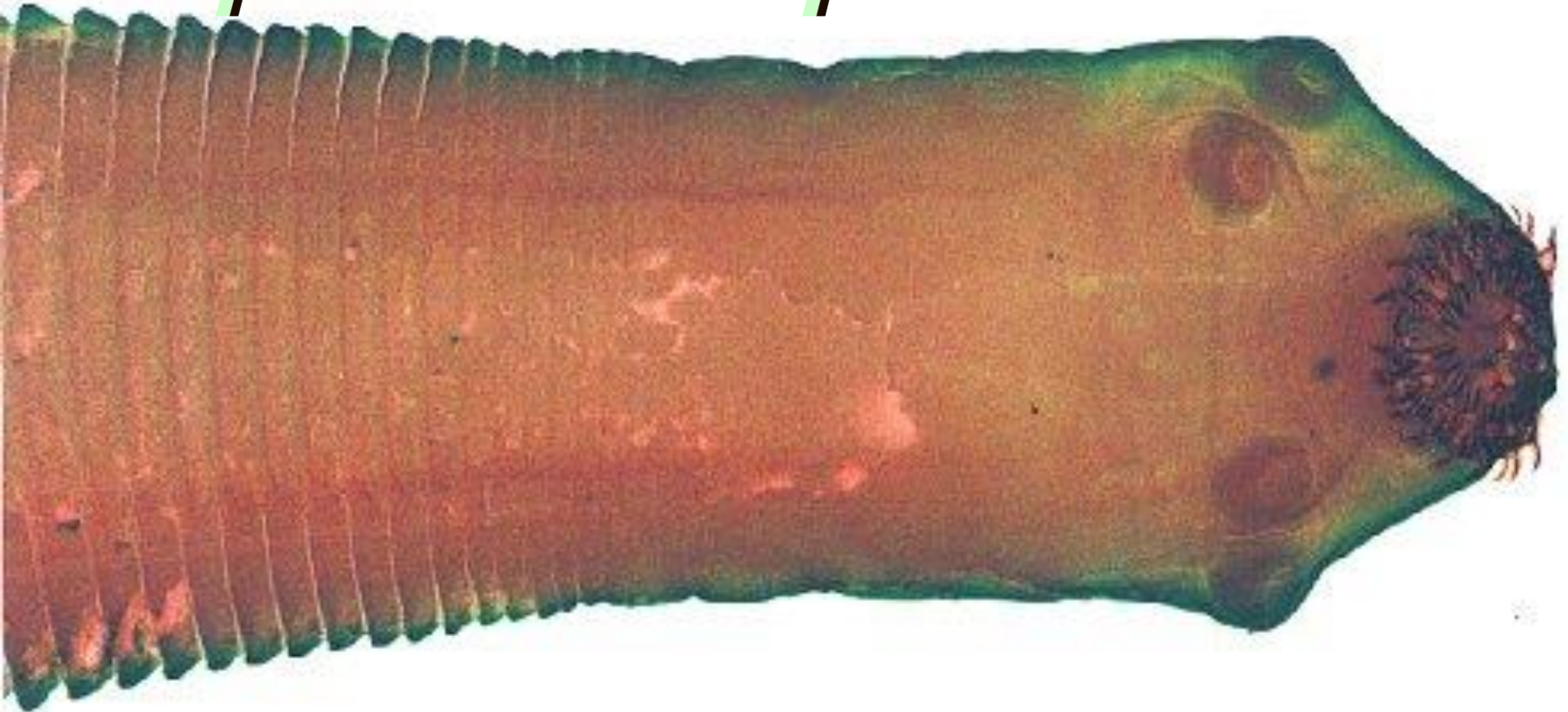


...and the Bad

- **Can be deadly to humans!**
(Portuguese Man-O'-War, Australian Irukandji, Box jellyfish)

| | |
|---|--|
| <u>Phylum:</u> | <u>Cnidaria</u> |
| Examples/Habitat | Jellies/Hydra, Coral, Anemones GB reef, Portuguese man o' war All live in water—some fresh, some salt |
| Body Plan (symmetry, special cells) | Radial (Medusa & Polyp form) No cephalization—mouth in medusa form, acoelomates Specialized tissues emerge |
| Feeding | Nematocysts, Sac-gut, enzymes |
| Respiration | Epithelial cells, diffusion |
| Circulation | Epithelial cells, diffusion |
| Excretion | Glandular cells, gastrodermis |
| Movement and Response | Mesoglea, hydrostatic skeleton Nerve cells, contractile cells |
| Reproduction | Polyp- Medusa (boy or girl) -zygote-planula-polyp-branching polyp. DRAW! |
| Human Concerns | Toxic stinging cells, reef habitats |

Phylum Platyhelminthes



"flatworms"

Shape of Life 10 minutes: <http://shapeoflife.org/video/flatworms-first-hunter>

~ BODY PLANS ~

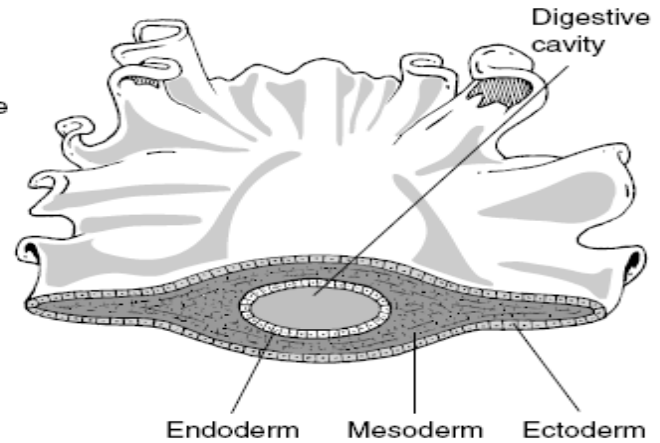
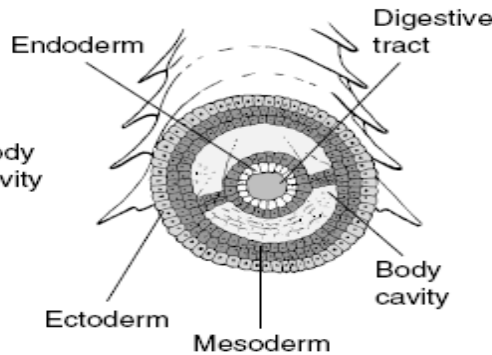
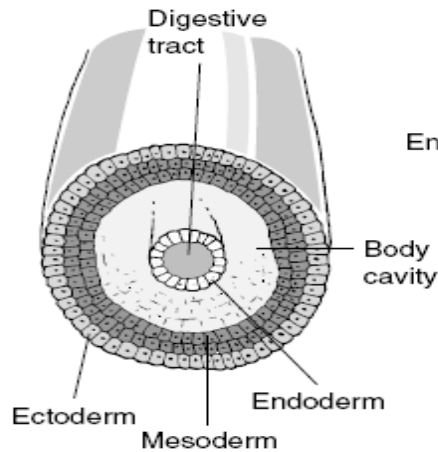
- **Acoelomates** – animals have three cell layers with a digestive tract but no body cavities.
- **Pseudocoelomates** – animals with a fluid-filled body cavity partly lined with mesoderm.
- **Coelomates** – animals with a body cavity completely surrounded by mesoderm.

GERM LAYERS

Roundworms

Segmented worms

Flatworms



Pseudocoelomate

Coelomate

Acoelomate

Ectoderm

Nervous system, epidermis of the skin, pituitary, lens of eye

Mesoderm

Muscles, skeleton, notochord, circulatory system, kidney, reproductive system

Endoderm

Lining of **digestive tract**, liver, pancreas, epithelial lining of lungs, many endocrine glands

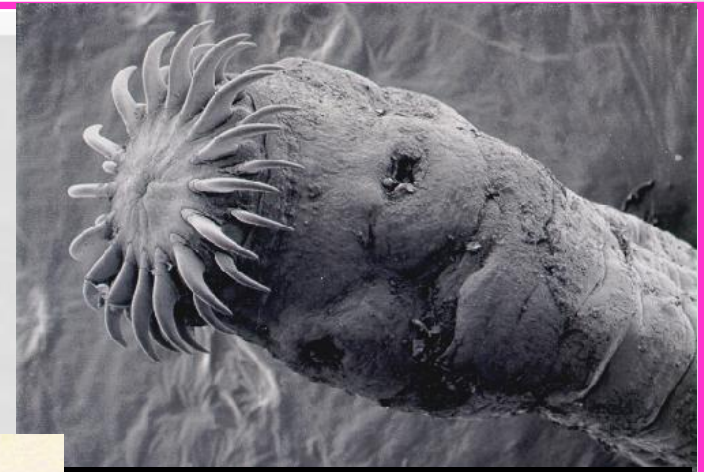
PHYLUM PLATYHELMINTHES

FLATWORMS

For Example....



**Turbellarians:
Non-parasitic
planaria**



BIODIDAC, © Houseman, Univ of Ottawa

**Trematoda:
Parasitic Liver flukes**

**Cestoda: Parasitic
Tapeworms**



PHYLUM PLATYHELMINTHES

FLATWORMS

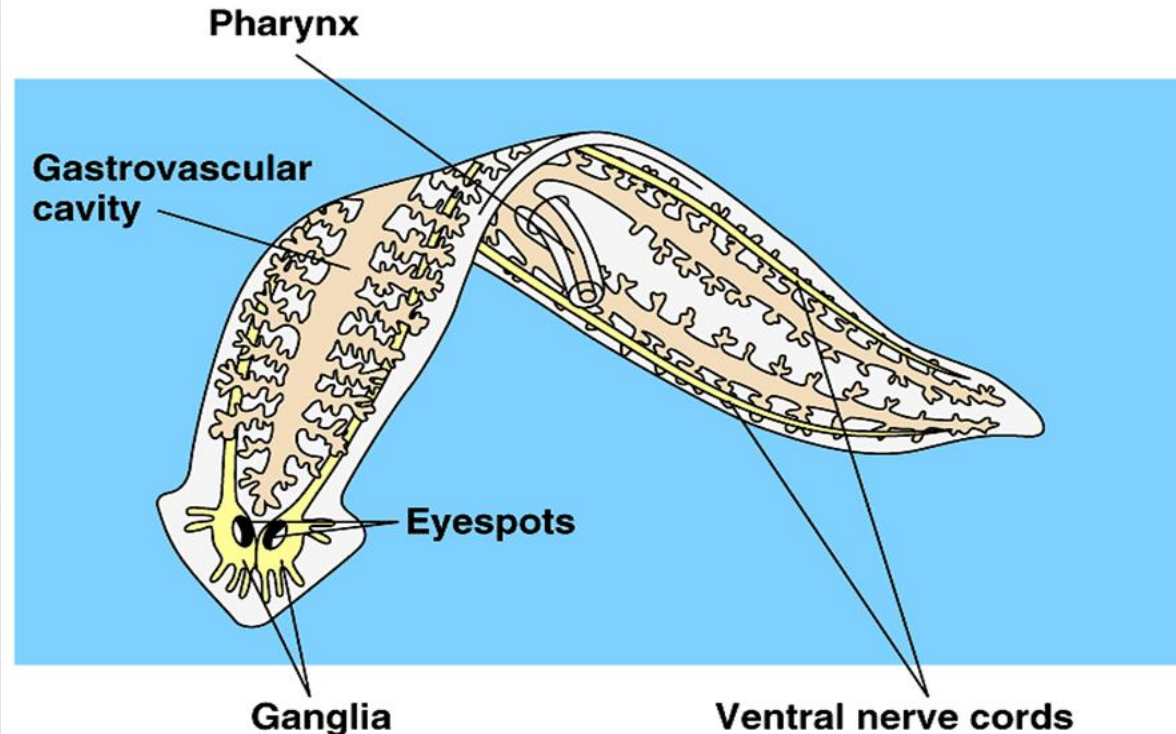
Basic Characteristics

- **Habitat:** Aquatic (fresh & salt), Terrestrial, or within a host
- **Body Plan:** Bilateral symmetry, **Acoelomates** (no body cavity), **CEPHALIZATION** = true "head" with **ganglia** (small brain)

Feeding: Parasites (absorb), carnivores, scavengers,

have a **pharynx** (tube for sucking up food) and a **gastrovascular cavity** (gut),

only one opening to digestive system, **mouth & anus**



PHYLUM PLATYHELMINTHES

FLATWORMS



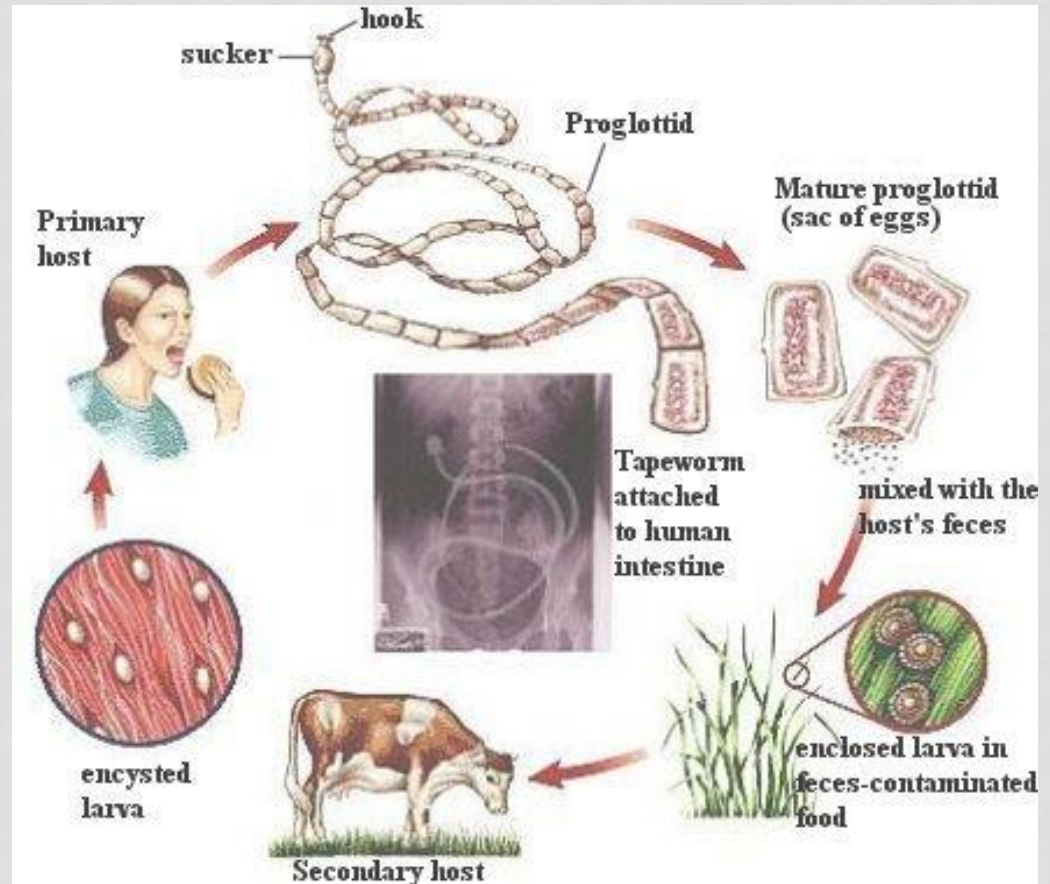
- **Respiration and Circulation:** Diffusion
- **Excretion:** **Protonephridia** act as kidneys
- **Response:** **eyespots** detect light and ganglia act as a brain, nervous system
- **Movement:** use cilia and body muscle
- **Reproduction:** asexually by fission & regeneration and sexually (hermaphrodites fight to see who will have to carry the babies)

PHYLUM PLATYHELMINTHES

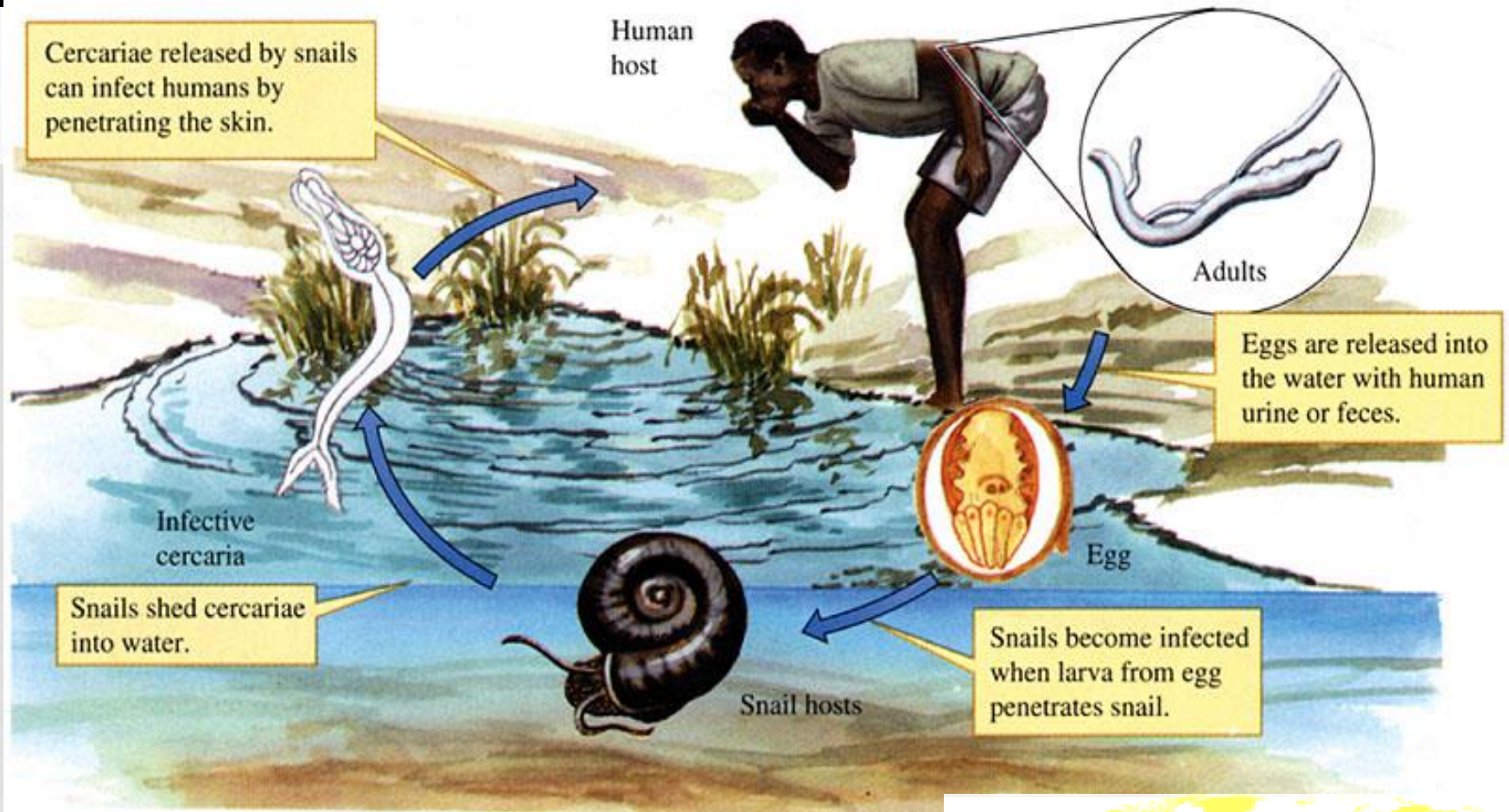
FLATWORMS

The Good And the Bad

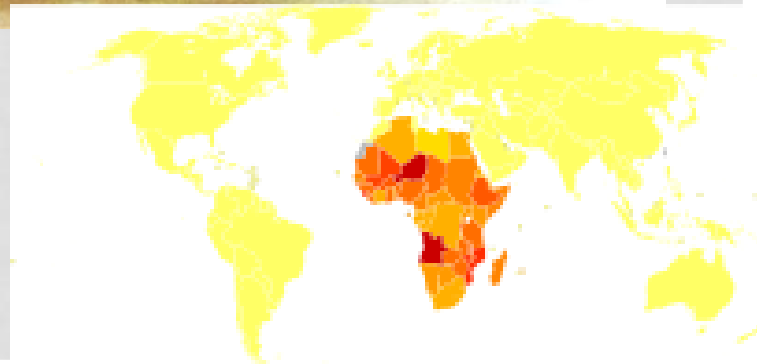
- Free living flatworms often eat dead matter
- Flukes are parasitic flat worms
- Tapeworms eat your digested food.



Schistosoma mansoni (Parasitic Blood Fluke)



- Humans ingest larvae or swim in water with larvae
- Causes fever, chills, bloody urine; chronic infection
- Yellow areas have 0-50 people affected per 100,000, dark red = >500 affected per 100,000



| | |
|---|---|
| <u>Phylum:</u> | <u>Platyhelminthes</u> “flat worms” |
| Examples/Habitat | <i>Turbellarians, flukes, tapeworms</i> , live in water or in a host |
| Body Plan (symmetry, special cells) | Bilateral symmetry, one opening serves as mouth and anus, <u>pharynx</u> and gut for digestion, <u>acoelomates</u> (no protective layer around digestive tract) |
| Feeding | Can be free-living, parasites, predators or decomposers |
| Respiration | <u>skin</u> used for breathing |
| Circulation | Closed system, aortic arches, dorsal and ventral vessels |
| Excretion | Digestive waste excreted through anus Protonephridia for excreting waste (act like kidneys) |
| Movement/ Response | Small brain with nerve cord running the length of the body, has muscles for movement, eyespot s for sensing light and dark |
| Reproduction | Most are hermaphrodites , each worm has a penis and ovaries for producing eggs |
| Human Concerns | Human parasites like the <i>Schistosoma</i> worm and tapeworm are problems in developing countries. |

PHYLUM NEMATODA



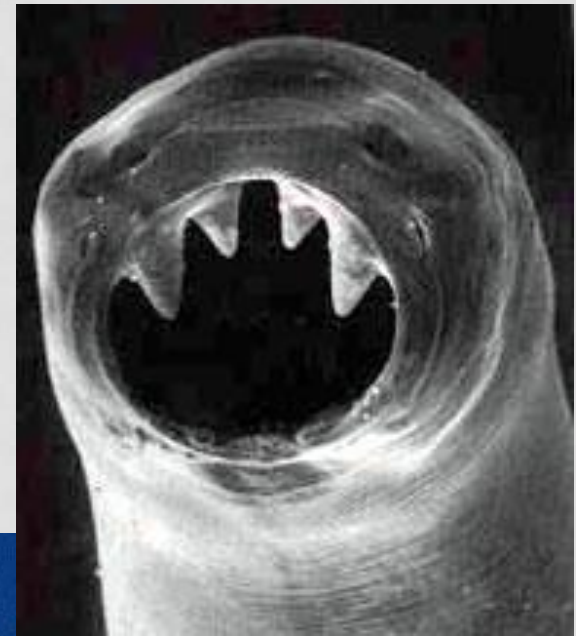
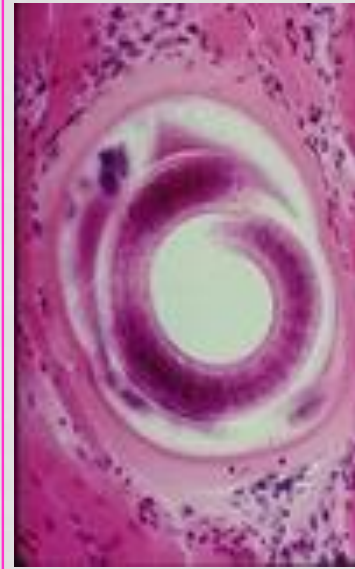
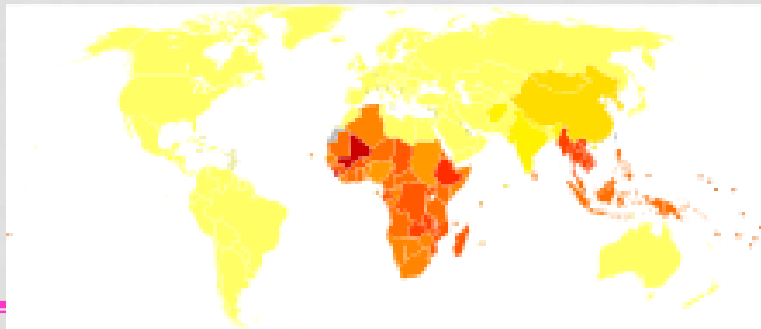
“roundworms”

PHYLUM NEMATODA

ROUNDWORMS

For Example....

- *Trichina* worm (in meat)
- *Ascaris* (giant intestinal worms)
- *C. Elegans* (free-living)
- And. . .Hook worms!-- infect more than 600 million people worldwide (red regions)

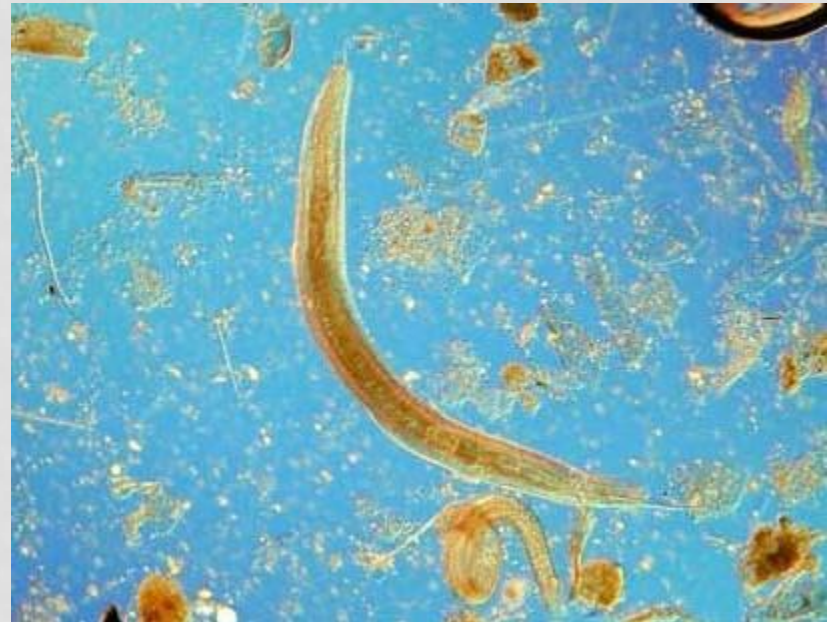


PHYLUM NEMATODA

ROUNDWORMS

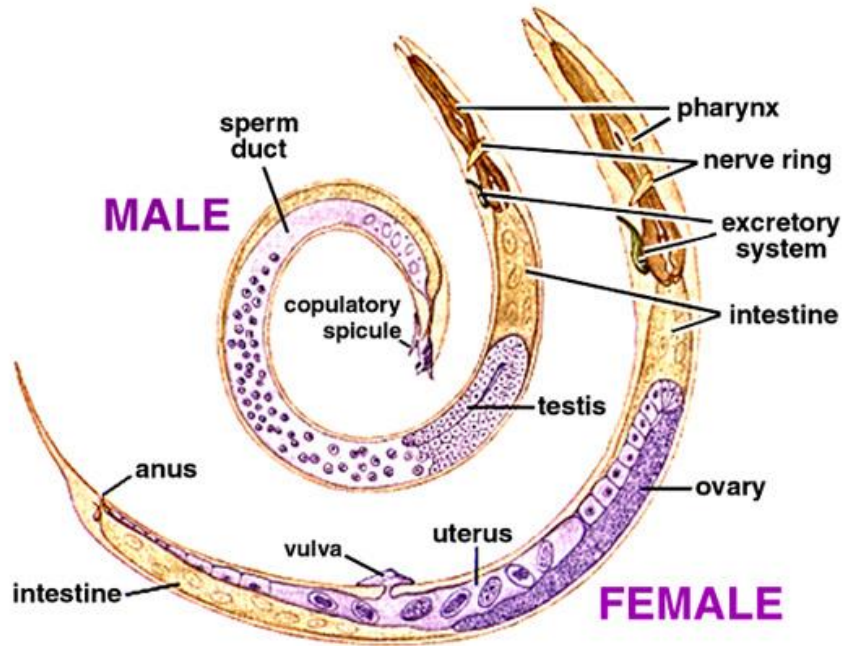
Basic Characteristics

- **Habitat:** Aquatic, terrestrial, within a host, very diverse
- **Body Plan:** Bilateral symmetry, complete digestive tract (mouth and anus) Pseudocoelom-false body cavity
- **Feeding:** Carnivores, Parasites, Scavengers
- **Circulation:** Closed system

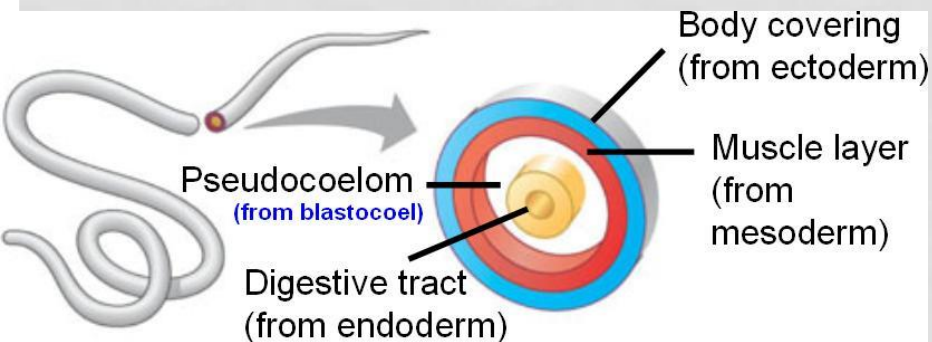


PHYLUM NEMATODA

ROUNDWORMS



- **Respiration:** Diffusion through skin
- **Excretion:** complete digestive tract with anus for wastes
- **Response:** Nerve ring near mouth
- **Movement:** no muscles, waxy cuticle acts as an outer protective layer
- **Reproduction:** Sexual (internal fertilization)

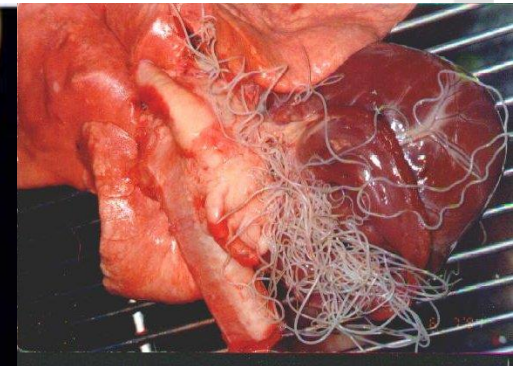


PHYLUM NEMATODA

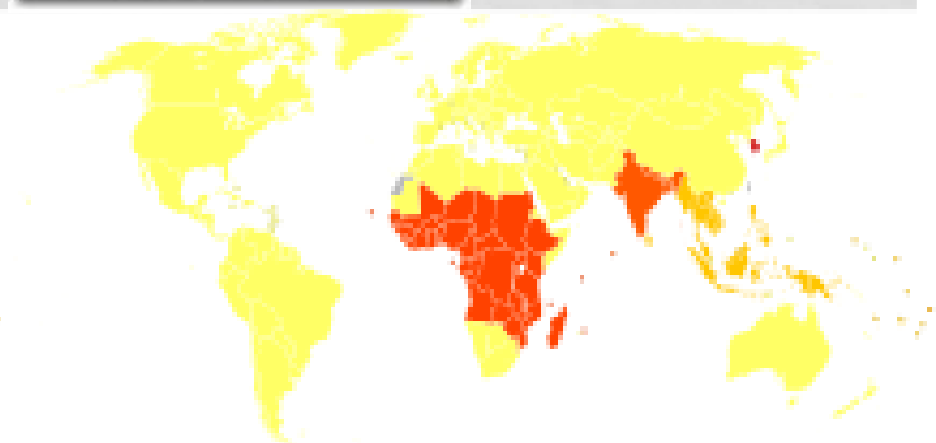
ROUNDWORMS

The Good and the Bad

- Many parasite species
- Filarial worms and heart worms clog blood vessels; passed on by mosquito host
- Other worms eat host's digested food (*Ascaris*)
- *C. elegans* is used in scientific research
 - Fast reproductive cycle
 - Clear = easy to locate organs
 - Cheap to breed



Top: Heart Worm
Left: Filarial worms causing elephantitis of the legs
Bottom: Map of world filarial worm outbreaks



| | |
|---|--|
| <u>Phylum:</u> | <u>Nematoda</u> “round worms” 20,000 known species! |
| Examples/Habitat | <i>Ascaris, Hookworm, filarial worms</i> , live in water or in hosts |
| Body Plan (symmetry, special cells) | Bilateral symmetry, full cephalization, true digestive tract with mouth and anus, protective cuticle layer over body, <u>psuedocoelom</u> (thin fluid-filled sac around digestive tract) |
| Feeding | Free-living, parasites, predators and decomposers |
| Respiration | <u>skin</u> used for breathing |
| Circulation | Closed system |
| Excretion | Digestive waste excreted through anus Cellular waste diffuses through skin |
| Movement/ Response | Ring of nerves near mouth No muscles—need water for movement |
| Reproduction | Most have male and female sexual reproduction |
| Human Concerns | Human parasites cause dangerous diseases like elephantitis. |

PHYLUM ANNELIDA

“little rings” or “segmented worms”

Shape of Life 10 minutes: <http://shapeoflife.org/video/annelids-powerful-and-capable-worms>

PHYLUM ANNELIDA

“SEGMENTED WORMS”

For Example....

- Oligochaetes: earthworms
- Hirudinea: leeches
- Polychaetes: marine annelids, blood worms and sandworms (DUNE!)



PHYLUM ANNELIDA--SEGMENTED WORMS

Basic Characteristics

- **Habitat:** terrestrial or aquatic
- **Body Plan** = true coelom, first to have true body cavity around organs, mouth and anus
- **Feeding:** Carnivores, Scavengers, Parasites, very diverse
- **Circulatory system**= CLOSED, does not rely on diffusion, Aortic arches act as hearts, upper and lower blood vessels
- **Respiration** = gills and skin used for breathing

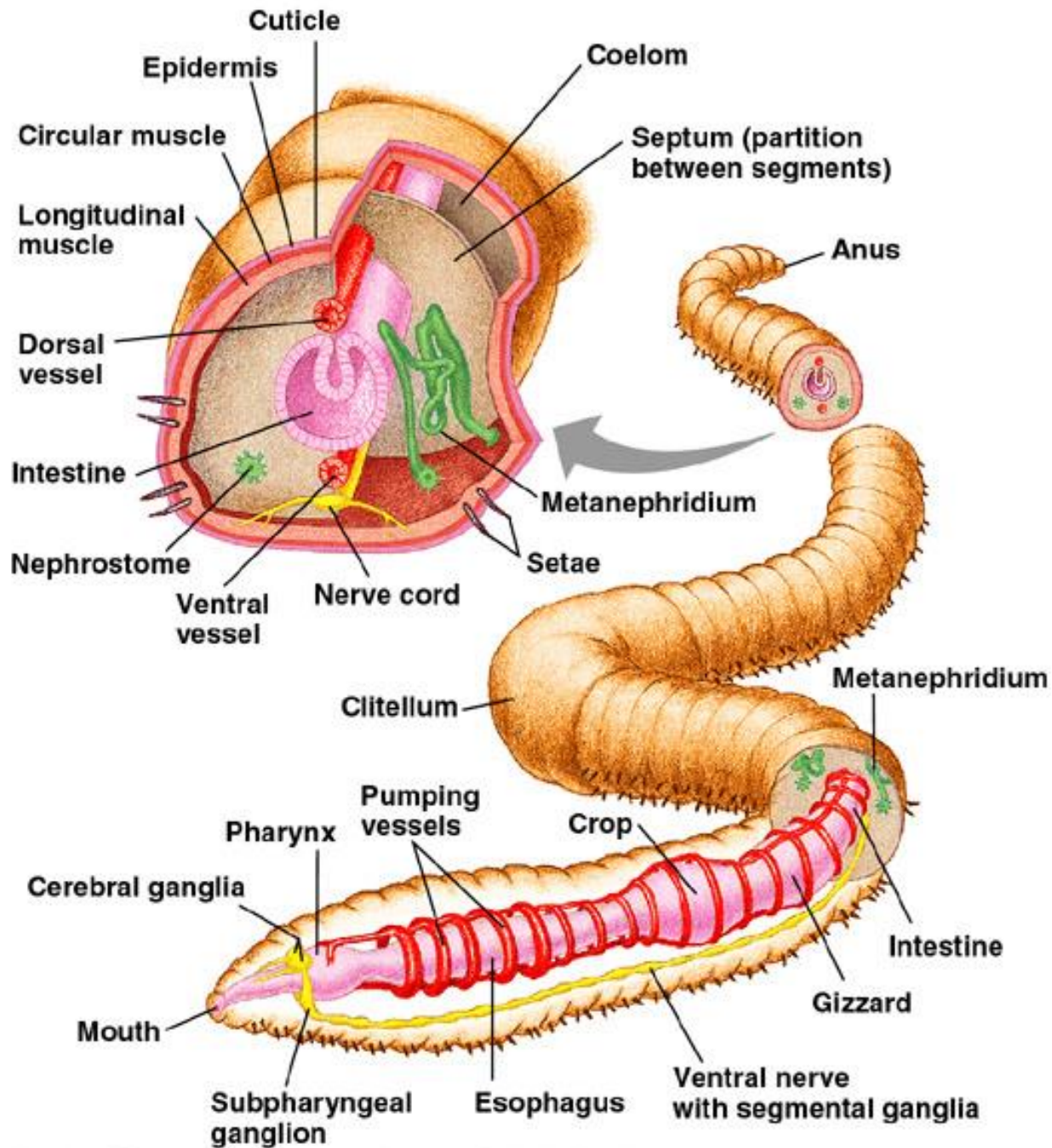


PHYLUM ANNELIDA

“SEGMENTED WORMS”

- **Excretion:** Nephridia excrete waste like kidneys
- **Response=** well-developed nervous system (brain and nerve cords) **Movement =** Hydrostatic Skeleton, longitudinal and circular muscles alternate to move in all directions, some have Parapodia for swimming
- **Reproduction:** Mostly sexual (external fertilization for separate sexes), some species are hermaphroditic, clitellum secretes mucus and eggs





PHYLUM ANNELIDA “SEGMENTED WORMS”

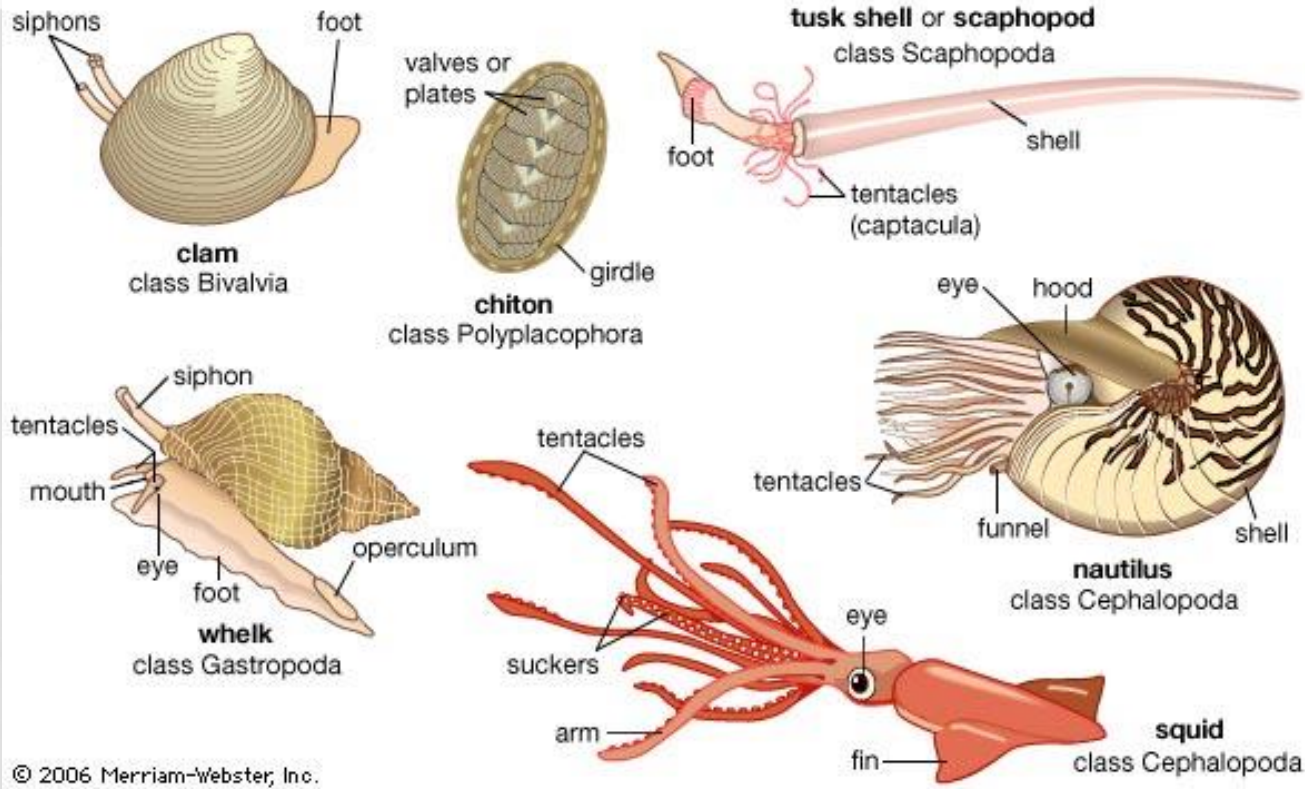
The Good And the Bad

- Decomposers, add nutrients to soil, aerate soil (earthworms)
- Historical & present medical uses of leeches, parasites
- Important part of food chain, terrestrial & aquatic



| | |
|---|--|
| <u>Phylum:</u> | <u>Annelida</u> “ <u>segmented worms</u> ” |
| Examples/Habitat | <i>Leeches, earthworms, polychaetes</i> , live in soil, water or inside hosts |
| Body Plan (symmetry, special cells) | Bilateral symmetry, clear cephalization, true <u>coelom</u> (fluid-filled body cavity surrounding digestive tract) |
| Feeding | Parasites, predators, filter feeders and decomposers |
| Respiration | <u>Gills</u> and skin used for breathing |
| Circulation | Closed system, aortic arches, dorsal and ventral vessels |
| Excretion | Digestive waste excreted through anus Cellular waste (nitrogen) is excreted through <u>nephridia</u> (kidneys) |
| Movement and Response | First true brain, nerve cords, some have simple eyes and chemical receptors Hydrostatic Skeleton made of Longitudinal and circular muscles allow directional movement |
| Reproduction | Most have male and female sexual reproduction, some are hermaphroditic, all use internal fert., <u>clitellum</u> produces mating mucus |
| Human Concerns | Add nutrients to soil, aerate soil, supply food chains |

PHYLUM MOLLUSCA



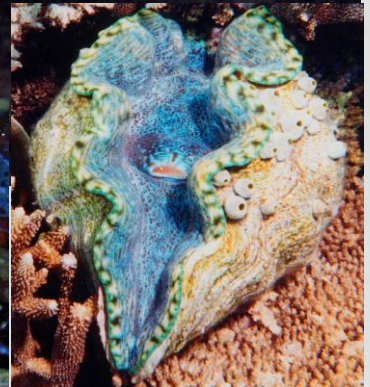
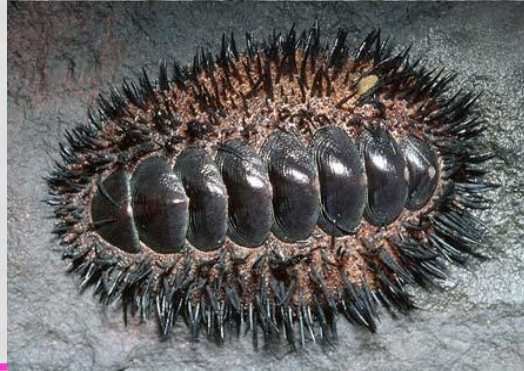
“soft bodied”

PHYLUM MOLLUSCA

“SOFT BODY”

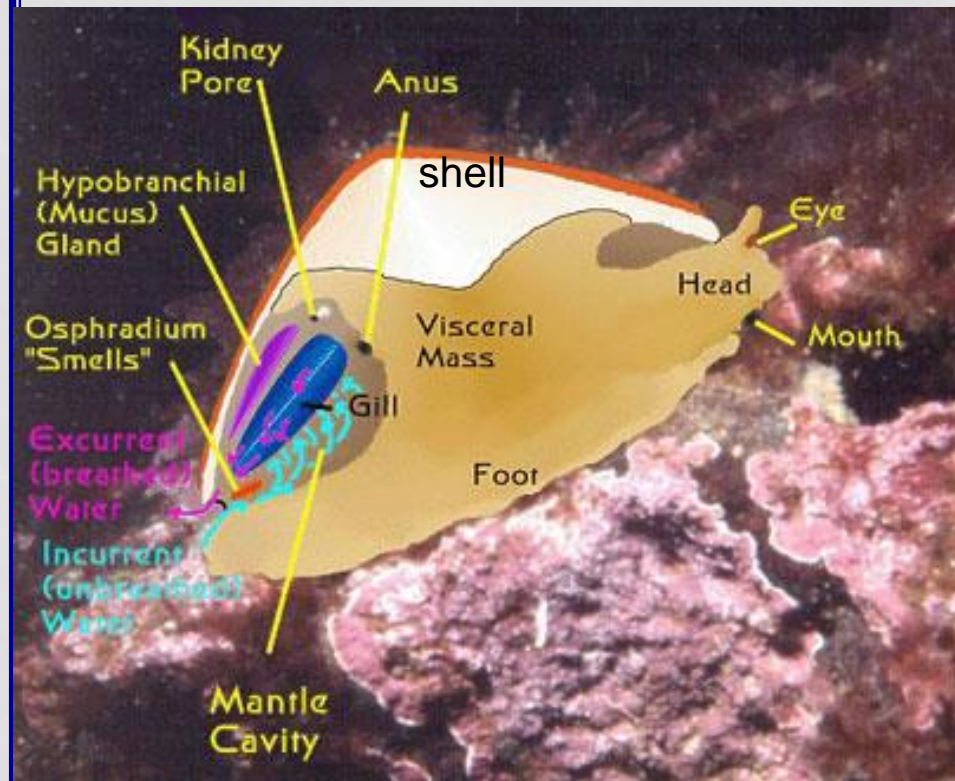
For Example...

- Chitons
- Nautilus
- Oysters
- Mussels
- Snails/slugs
- Octopus
- Squid



HABITAT AND BODY PLAN

- **Habitat:** Aquatic and Terrestrial
- **Body Plan:** All have bilateral Symmetry and four parts:
 - Foot (or tentacles/arms)
 - mantle (layer of muscle-like tissue covering the body)
 - shell (internal or external)
 - visceral mass (contains all organs)



Excrete digestive waste through the **anus**, circulatory waste through **nephridia or Kidney pore**

RESPIRATION

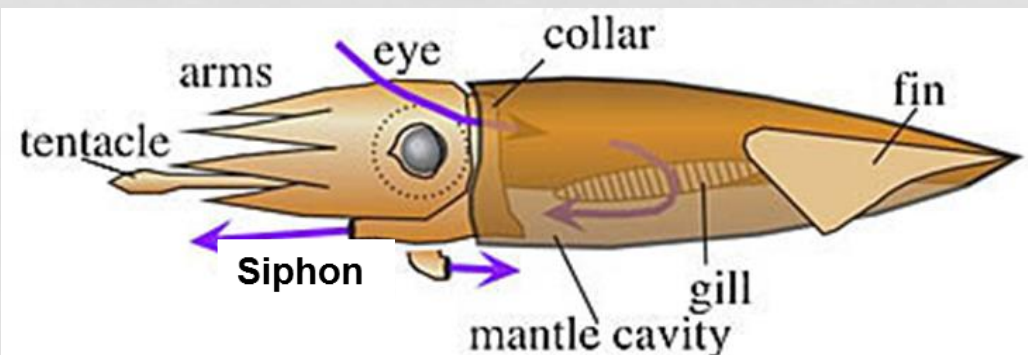


Classes of Mollusks

- **Gastropods**
 - ex: slugs, snails
 - shell-less or single-shelled mollusks, use muscular foot to move
 - Respire through diffusion
- **Bivalves:**
 - Have two shells held together by muscles
 - Ex: clams, oysters, mussels
 - Respire with gills
- **Cephalopods**
 - Ex: Squids, Octopi, and Chambered Nautiluses
 - Respire using gills

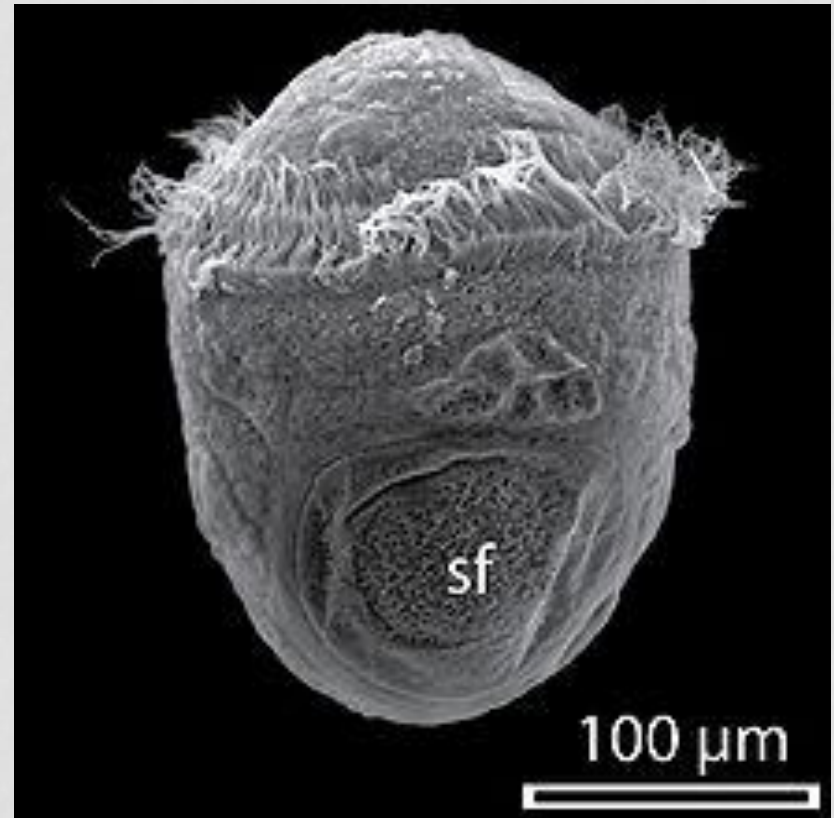
FEEDING, CIRCULATION, MOVEMENT AND RESPONSE

- **Feeding:** Herbivores, Carnivores, Filter-feeders, Scavengers, Parasites
 - **Radula** = rasping tongue for feeding
- **Movement:** Very motile, Jet propulsion in **siphon**
 - Mucus trail in crawling spp.
- **Circulation:** mostly open, some have hearts and blood vessels
- **Response:** Mollusks can learn behaviors, tasks
 - All have eyes
 - Most are highly cephalized
 - Have **ganglia** or protobrain

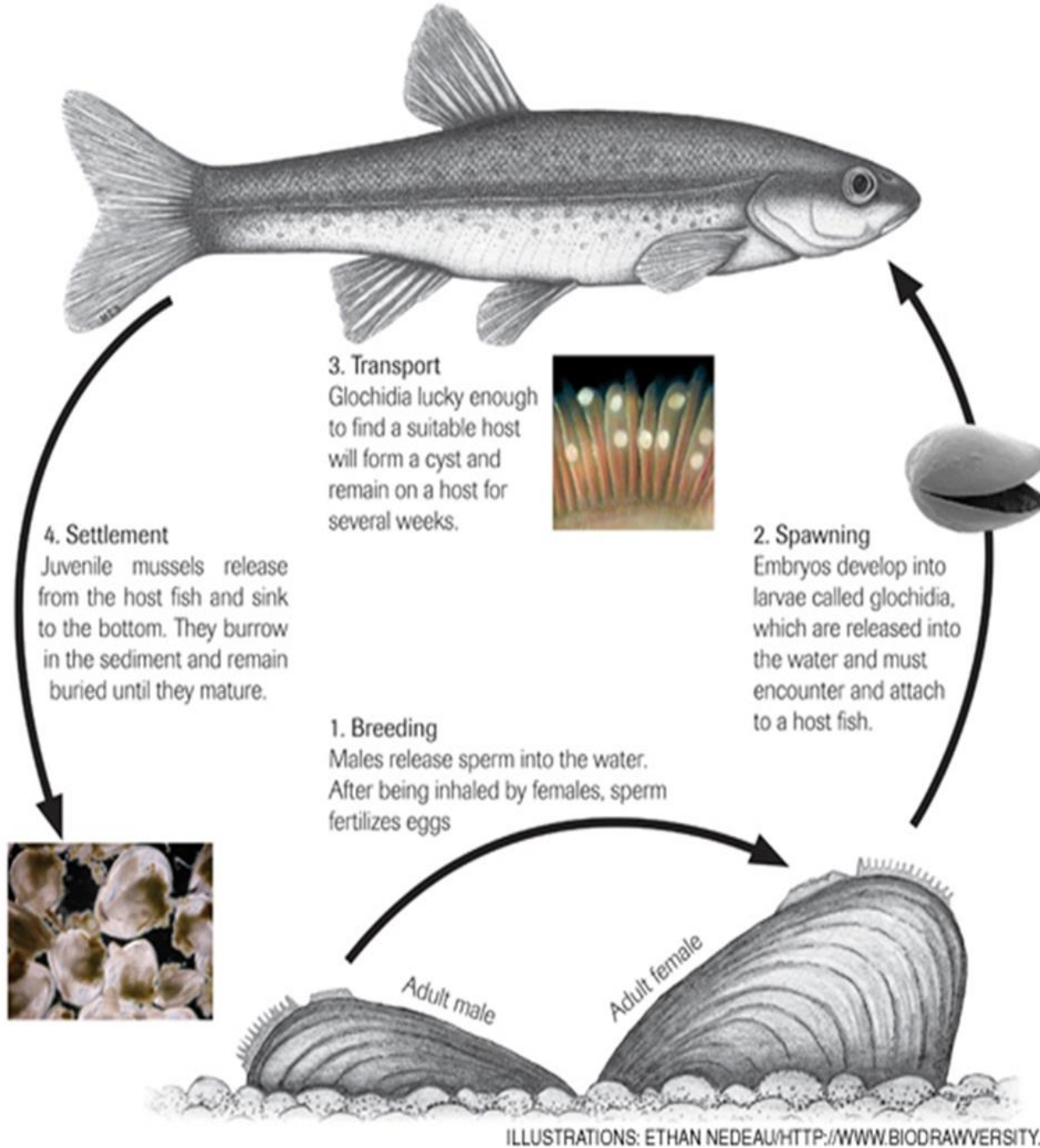


MOLLUSK REPRODUCTION

- Most aquatic species use external fertilization
- Young hatch from eggs as a **trochophore larva** which move using cillia and filter feed on plankton
- Some land mollusks are hermaphrodites and/or rely on internal fertilization



Quagga and Zebra Mussels



STOP AQUATIC HITCHHIKERS!™

Prevent the transport of nuisance species.
Clean all recreational equipment.

www.ProtectYourWaters.net

Life cycle of a typical freshwater mussel.

HUMAN CONCERNS

The Good and the Bad

- Large food source for humans and other animals
- Live symbiotically with other organisms; some are invasive species
- Some are filter feeders, decomposers
- Used in scientific research, especially in monitoring water pollution



| | |
|-------------------------------|--|
| <u>Phylum:</u> | <u>Molluska</u> “soft bodied” |
| Examples/Habitat | <i>Gastropods, Bivalves, Cephalopods</i> live in water or soil, forest duff |
| Body Plan | 4 body parts: foot, mantle, shell and visceral mass All have bilateral symmetry |
| Feeding | Herbivores, carnivores, filter feeders, detritivores or parasites <u>Radula</u> = rasping tongue |
| Respiration | Gills inside mantle cavity, land mollusks use skin, must stay moist |
| Circulation | Can be <u>open or closed</u> , simple heart and blood vessels, some use <u>sinuses</u> to mix blood and oxygen in an open cavity |
| Excretion | Digestive waste excreted through anus. Cellular N waste is excreted through <u>nephridia</u> (kidney-like tubes) |
| Movement/ Response | <u>Ganglia</u> , nerve cords, eyes, chemical receptors, large brain in Octopi and squid = good memory, can learn tasks Jet propulsion (<u>siphon</u>) or mucus trail for crawling on land |
| Reproduction | All sexual reproduction, some fertilization is internal (tentacled mollusks, some snails), some external (snails, bivalves). Swimming larvae is called a <u>trochopore</u> . |
| Human Concerns | Filter & clean water, important food and \$ source for humans, <u>invasive species</u> threaten freshwater streams and lakes |

Shape

PHYLUM ARTHROPODA

“jointed appendages”

Shape of Life 10 min: <http://shapeoflife.org/video/marine-arthropods-successful-design>



PHYLUM **ARTHROPODA**

“JOINTED APPENDAGES”

For Example....

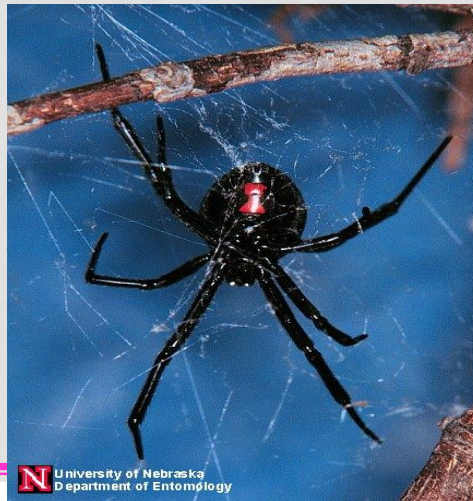


Crustaceans

- Crabs
- Lobsters
- Shrimp
- Crayfish
- Barnacles

Chelicerata

- Horseshoe crabs
- Tarantulas
- Ticks, spiders
- Scorpions



“Insects”

- Myriapoda: Centipedes, Millipedes
- Hexapoda: Beetles, Flies, Wasps, bees, butterflies, grasshoppers, etc.

PHYLUM ARTHROPODA

“JOINTED LEGS”

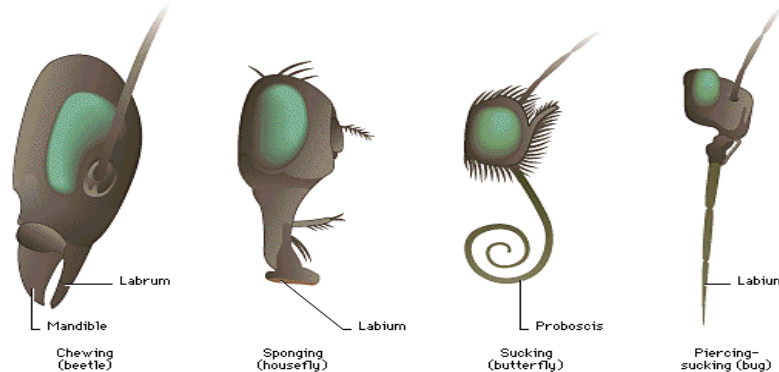
Basic Characteristics

- **Habitat:** Aquatic and Terrestrial, VERY diverse habitats
- **Body Plan:** Bilateral
- **Feeding:** Herbivores, carnivores, and omnivores
- **Movement:** Motile, use well-developed groups of muscles and specialized appendages
- **Reproduction:** Sexual (internal and external fertilization)
- **Circulation:** Open Circulatory System, spiracles



PHYLUM ARTHROPODA

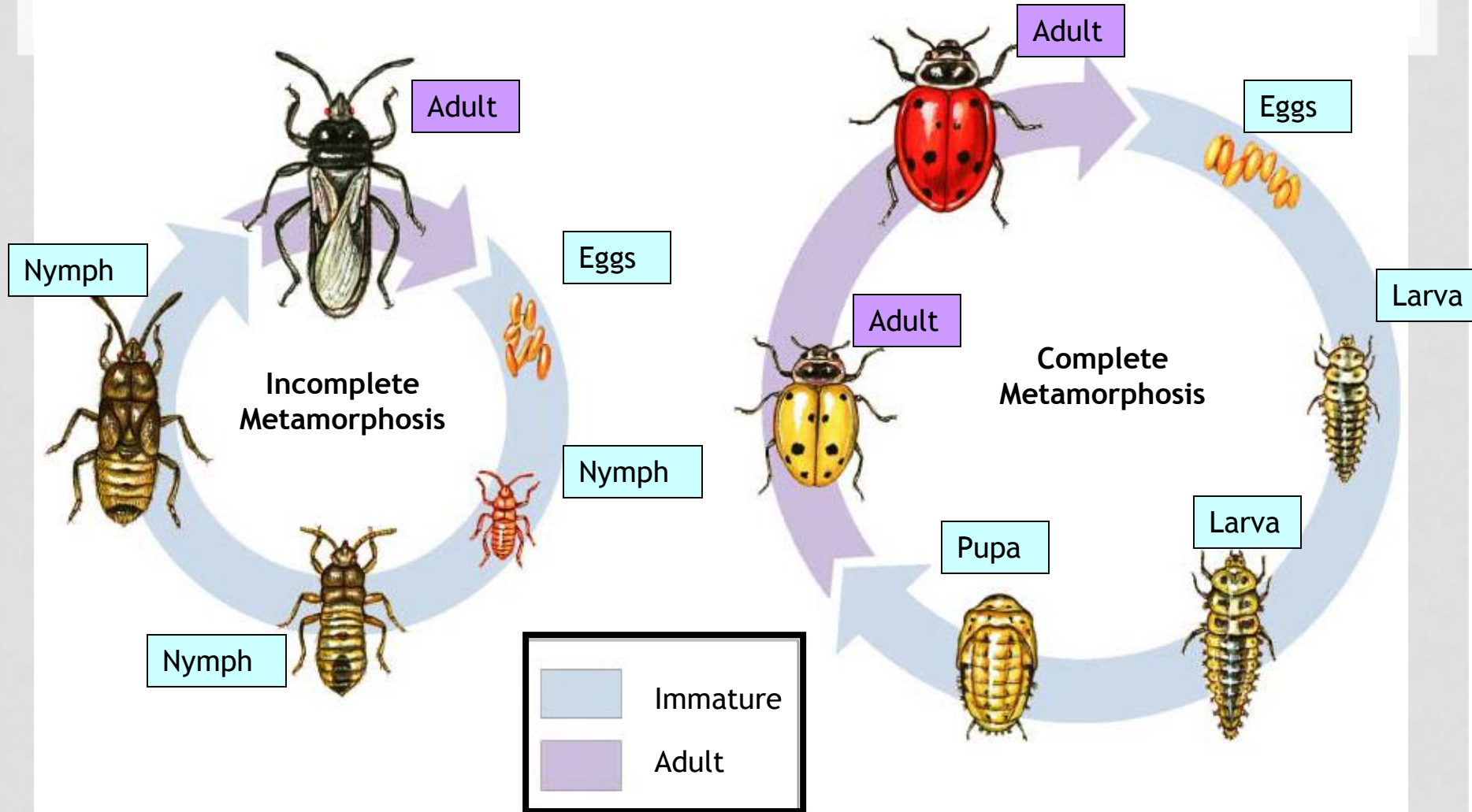
“JOINTED APPENDAGES”



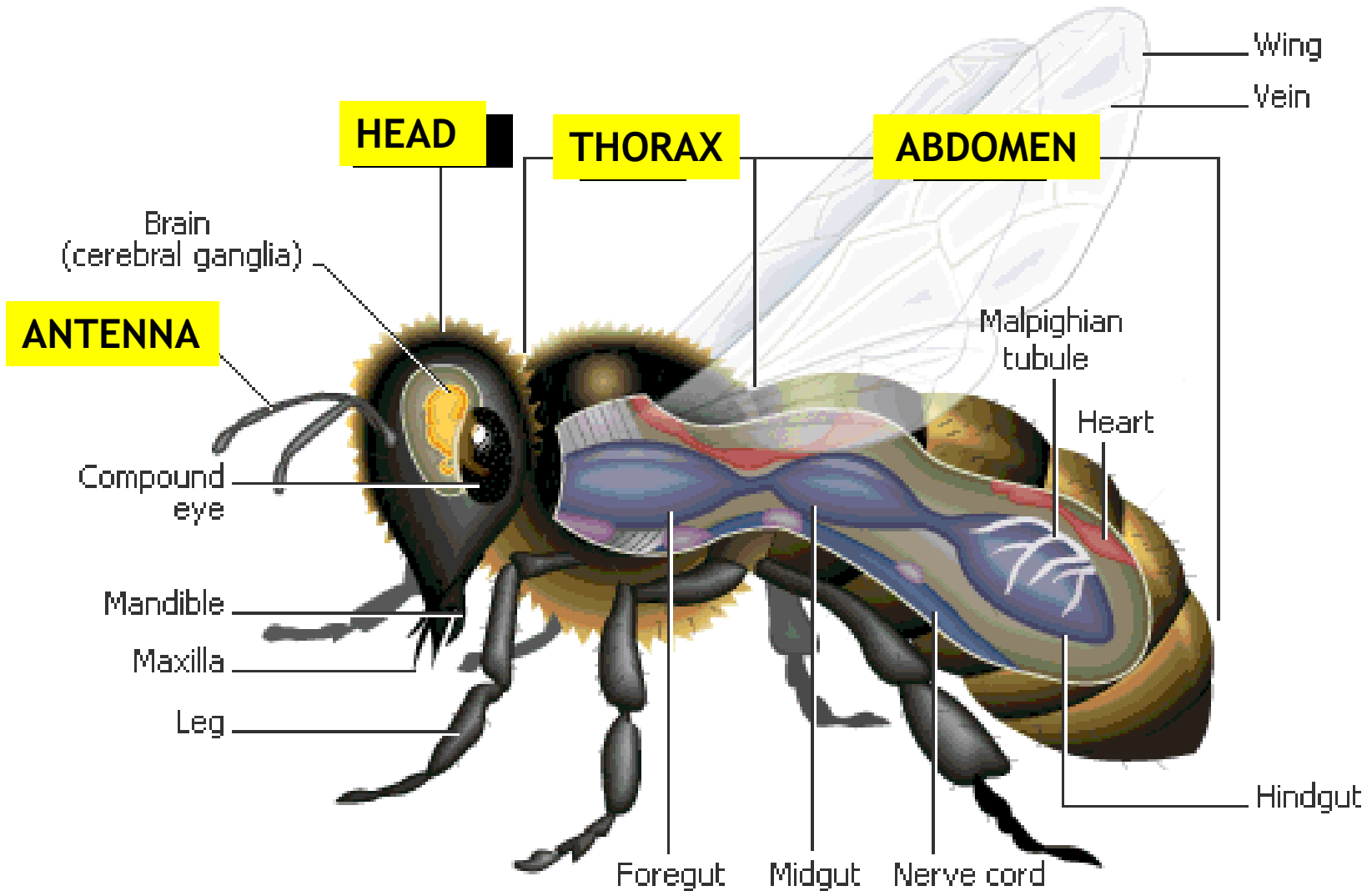
Special Adaptations

- **Body Plan:** exoskeleton made of **chitin**, molting occurs
- **Feeding:** Specialized mouthparts for eating almost anything
- **Respiration:** tracheal tubes, spiracles, book lungs
- **Circulation:** open system—blood pumps through arteries into tissues
- **Excretion:** **Malpighian tubules** = tubes that extract waste from blood
- **Response:** taste and smell with mouthparts, antennae & legs
 - Heightened sense of hearing and detecting movement
- **Movement:** DIVERSE! Many can fly, now spread worldwide

METAMORPHOSIS



Basic insect internal structure



***Legs are always attached to thorax**

PHYLUM **ARTHROPODA**

“JOINTED APPENDAGES”



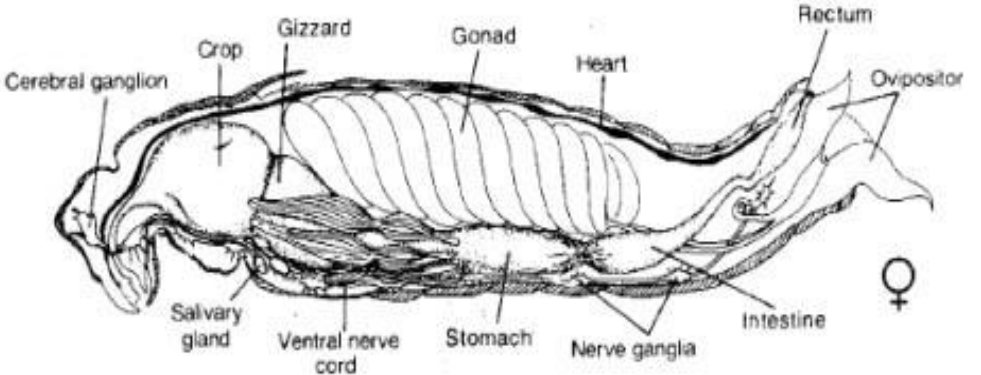
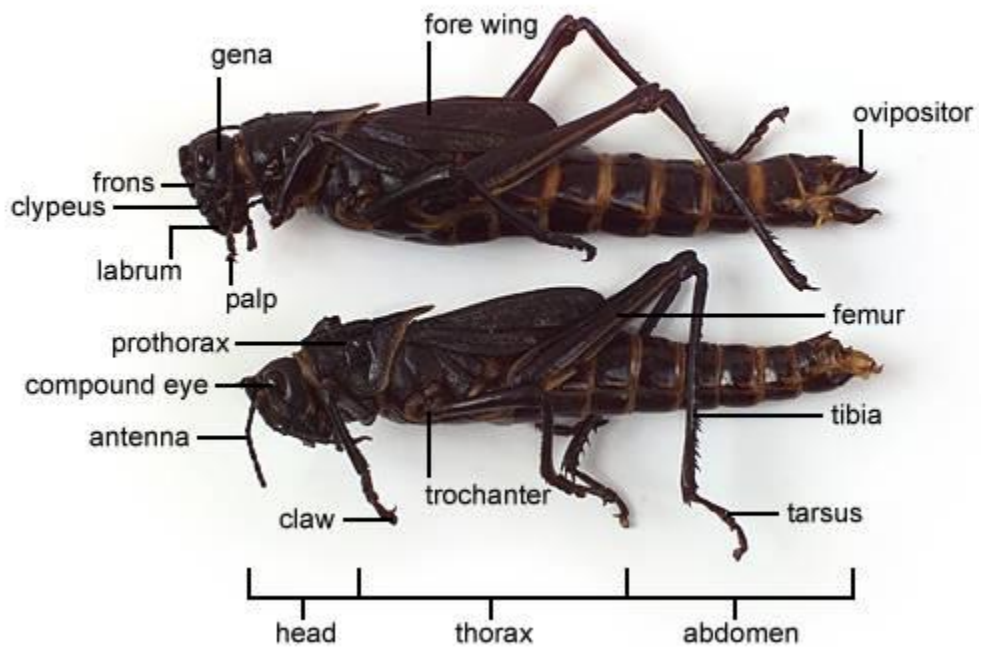
The Good And the Bad

- **Many insects cause damage**
 - Termites, Lice
 - Mosquitos (spread disease, malaria)
 - Locusts
- **Many Insects contribute to life**
 - Pollinate plants
 - Produce honey, wax, silk
 - Sometimes we eat them!



GRASSHOPPERS!

Grasshopper - External Features (Female and Male)

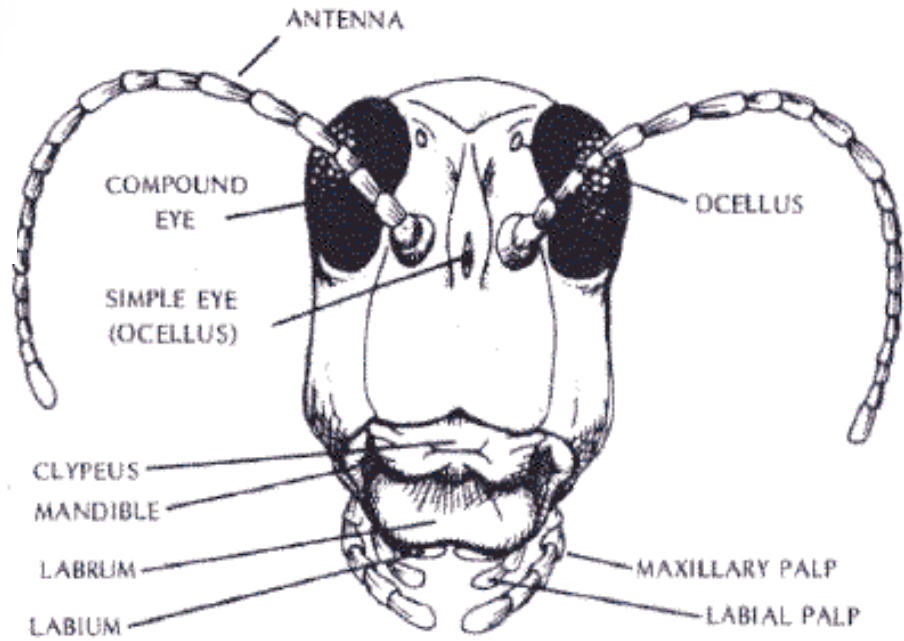


Parts Of The Head

Use the diagram below to identify the parts of the head on your grasshopper.



The grasshopper has 5 eyes, two compound eyes and three simple eyes. The antenna are sensory organs located on the head.



| | |
|---|---|
| <u>Phylum:</u> | <u>Arthropoda</u> “jointed appendages” |
| Examples/Habitat | All habitats! <i>Crustaceans (crabs, lobsters), Chelicerates (spiders, scorpions, ticks, mites, daddy long-legs, horseshoe crabs) and Uniramians (insects, centipedes, millipedes)</i> |
| Body Plan (symmetry, special cells) | <u>Jointed Appendages:</u> legs, antennae, wings, claws, etc. Exoskeletons made of chitin which they shed or “molt” as they grow. Body segments: head, thorax and abdomen in insects! |
| Feeding | Diverse with many specialized appendages. Chelicerae, claws, fangs, etc. |
| Respiration | Terrestrial species have tracheal tubes, spiracles, or book lungs Aquatic species have gills or book gills |
| Circulation | Open system with heart and arteries. |
| Excretion | <u>Malpighian tubes</u> or simple diffusion into water |
| Movement and Response | Muscles attached to jointed exoskeleton. Well-developed nervous system with a brain, eyes, antennae, chemical receptors |
| Reproduction | Mostly sexual. Many go through <u>metamorphosis</u> from a larvae to an adult form. |
| Human Concerns | Parasites, helpful pollinators, food (mostly crustaceans), hobbies |

Phylum Echinodermata

“spiny skin”

BBC https://www.youtube.com/watch?v=HG17TsqV_ql

Shape of Life 14 minutes: <http://shapeoflife.org/video/marine-arthropods-successful-design>

PHYLUM ECHINODERMATA

“SPINY SKIN”



For Example....

- Sea Cucumbers
- Sea Urchins
- Brittle Star
- Sea Stars

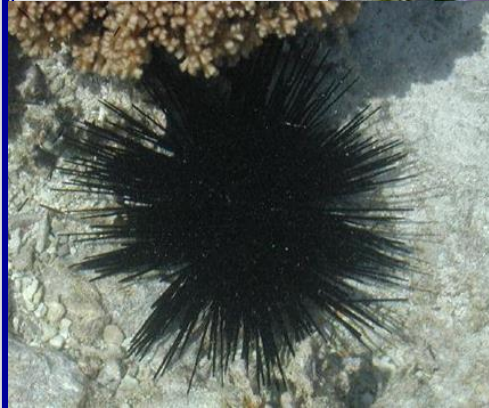


PHYLUM ECHINODERMATA

“SPINY SKIN”

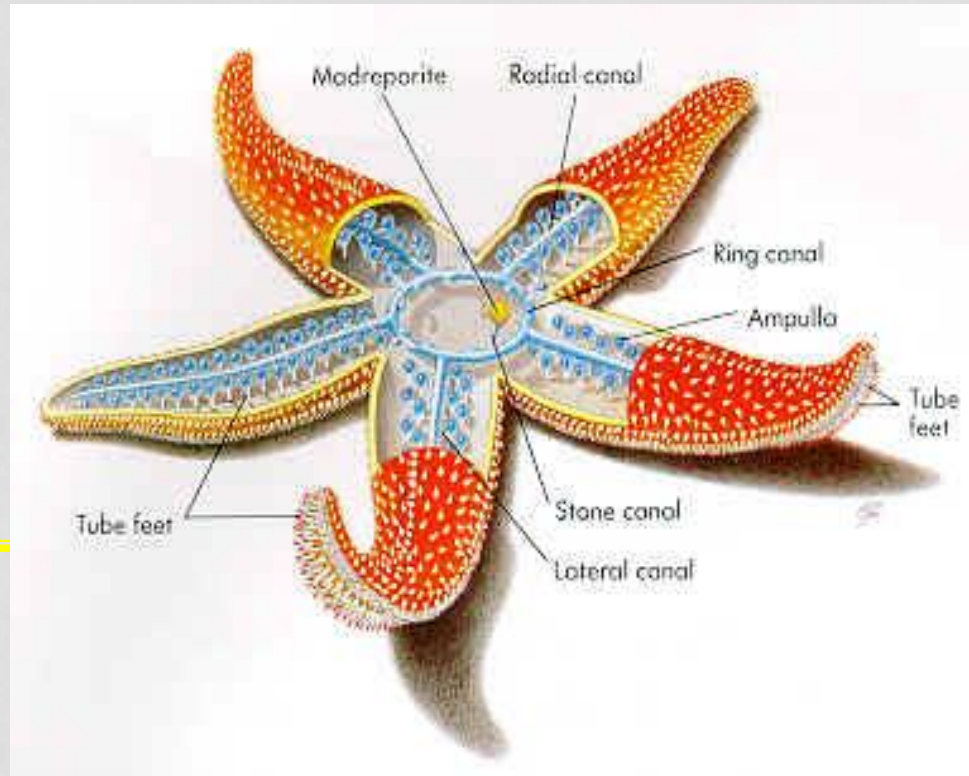
Basic Characteristics

- **Habitat:** Marine
- **Body Plan:** Radial
- **Feeding:** Carnivores and scavengers
- **Movement:** Motile, most use tube feet
- **Reproduction:** Sexual (external fertilization)



PHYLUM ECHINODERMATA

“SPINY SKIN”



Special Adaptations

- **Body Plan:** Spiny skin
Internal skeleton
Tube feet (suction), used to pry open shells
- **Circulation, Respiration and Excretion** carried out through water vascular system

PHYLUM ECHINODERMATA

“SPINY SKIN”



ARKive



© Paul Kay / www.osf.uk.com



The Good And the Bad

- Important predator of urchins, clams
- Bio-indicators of marine life, some are edible
- Invasive Crown-of-thorns has destroyed extensive areas of coral, especially the Great Barrier Reef

| | |
|---|---|
| <u>Phylum:</u> | <u>Echinodermata</u> “spiny skin” |
| Examples/Habitat | <i>Crinoids, Sea stars, Sea cucumbers, Brittle stars, Sea urchins, Sand dollars, Sea biscuits</i> Only found in the sea! |
| Body Plan (symmetry, special cells) | <u>Radial Symmetry!</u> All have <u>spiny skin</u> , some are poisonous. Internal skeletons give them structure and support. |
| Feeding | Carnivores, <u>Scavengers</u> , inject their stomachs into their food to dissolve it. |
| Respiration | <u>Water vascular system</u> —water enters through the madreporite and moves through a canal system |
| Circulation | Water vascular system |
| Excretion | Water vascular system |
| Movement and Response | Very <u>motile</u> , use <u>tube feet</u> to attach and move. Nerve net connects limbs to a central <u>nerve ring</u> . |
| Reproduction | All reproduce sexually with <u>external fertilization</u> . The zygote is a swimming larva, some can regenerate their limbs |
| Human Concerns | Ecological decomposers, scavengers. <u>Invasive species!</u> |