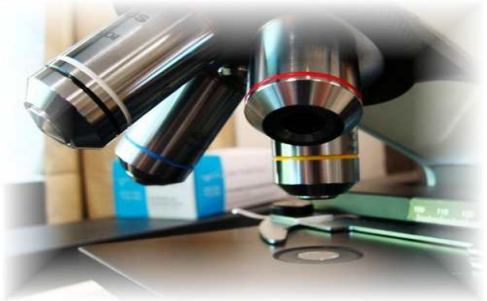

About Science Prof Online PowerPoint Resources

• Science Prof Online (SPO) is a free science education website that provides fully-developed Virtual Science Classrooms, science-related PowerPoints, articles and images. The site is designed to be a helpful resource for students, educators, and anyone interested in learning about science.

• The SPO Virtual Classrooms offer many educational resources, including practice test questions, review questions, lecture PowerPoints, video tutorials, sample assignments and course syllabi. New materials are continually being developed, so check back frequently, or follow us on Facebook (Science Prof Online) or Twitter (ScienceProfSPO) for updates.

• Many SPO PowerPoints are available in a variety of formats, such as fully editable PowerPoint files, as well as uneditable versions in smaller file sizes, such as PowerPoint Shows and Portable Document Format (.pdf), for ease of printing.

• Images used on this resource, and on the SPO website are, wherever possible, credited and linked to their source. Any words underlined and appearing in blue are links that can be clicked on for more information. PowerPoints must be viewed in *slide show mode* to use the hyperlinks directly.

• Several helpful links to fun and interactive learning tools are included throughout the PPT and on the Smart Links slide, near the end of each presentation. You must be in *slide show mode* to utilize hyperlinks and animations.

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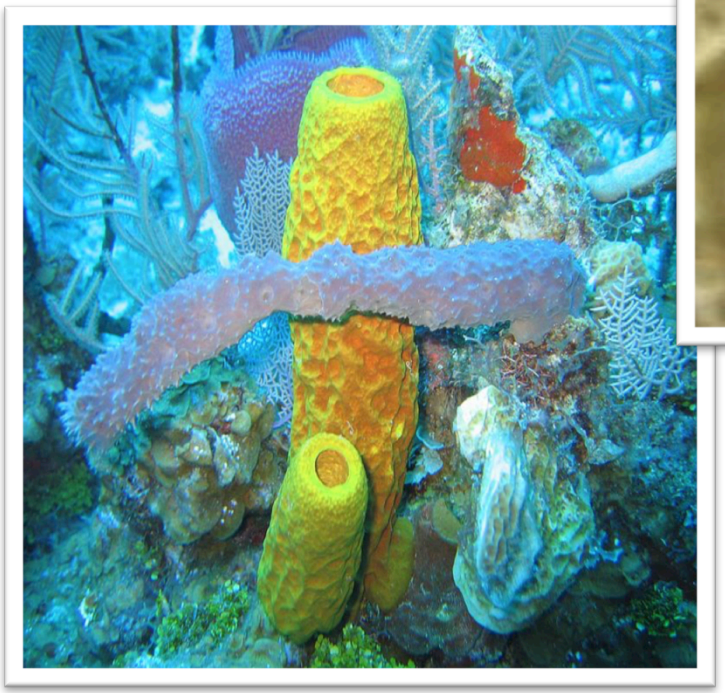
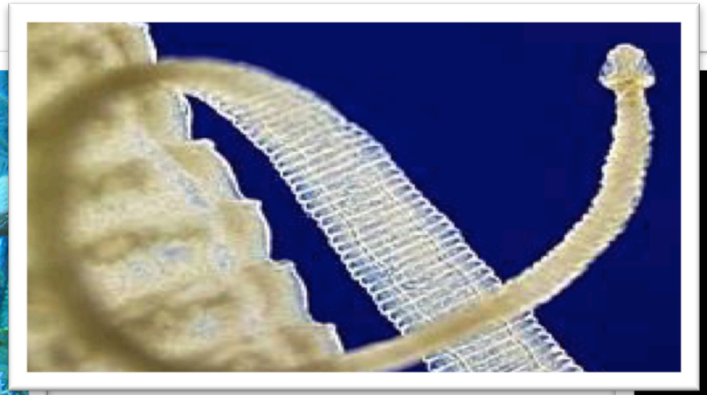
Image: Compound microscope objectives, T. Port

Animal Diversity





Images: Sponge biodiversity, Wiki.
Robin & Me, T. Port, Squid, Wikii.

VIDEO:
Eukaryopolis: The City of Animal Cells
from
Crash Course Biology

Animal Cell *(Eukaryote)*

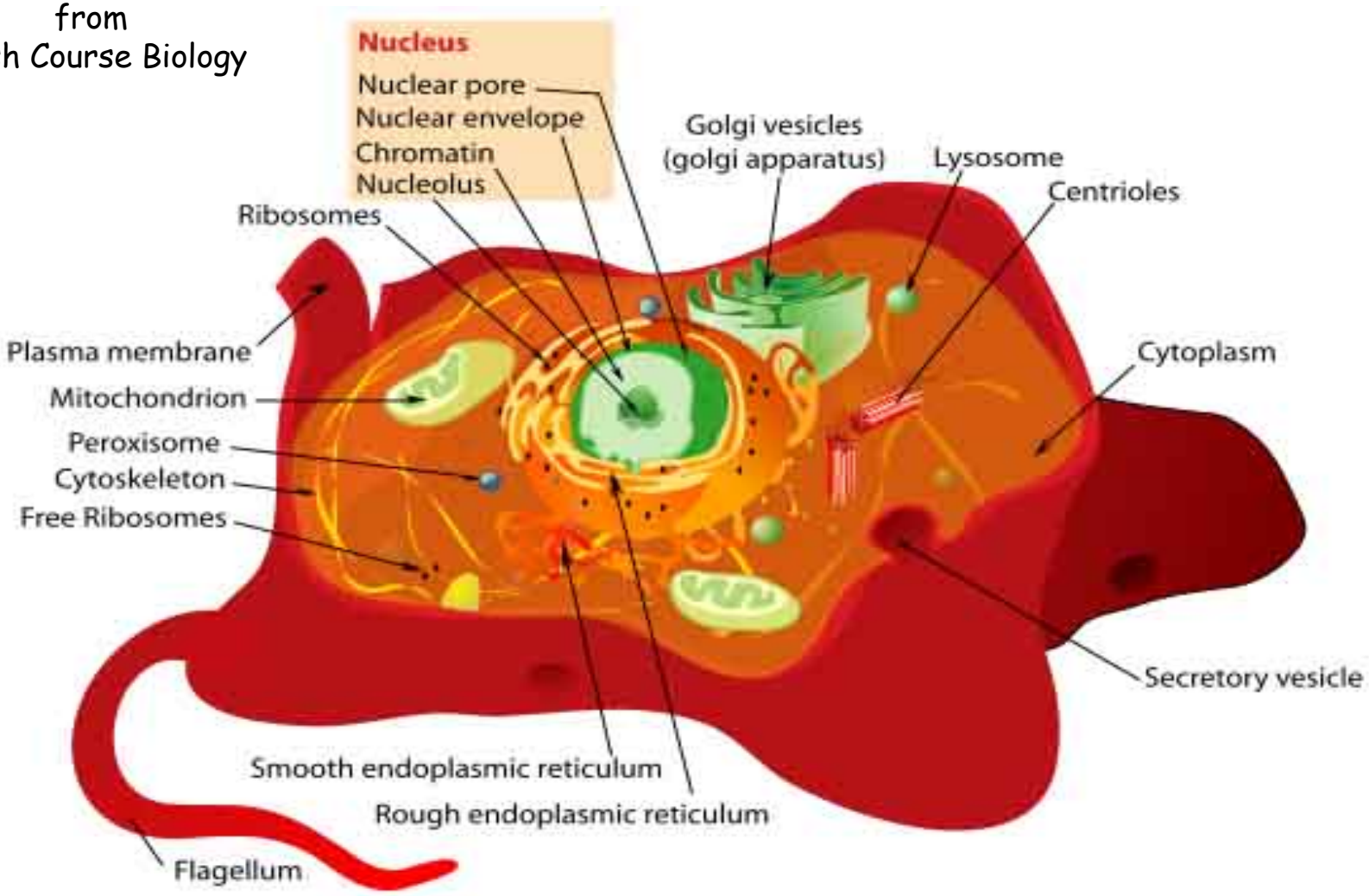


Image: Animal cell, M. Ruiz

From the Virtual Biology Classroom on ScienceProfOnline.com

Classifying Living Things

The hierarchy of biological classification has eight major taxonomic ranks which encompass all known life.

How about a trick to help us remember

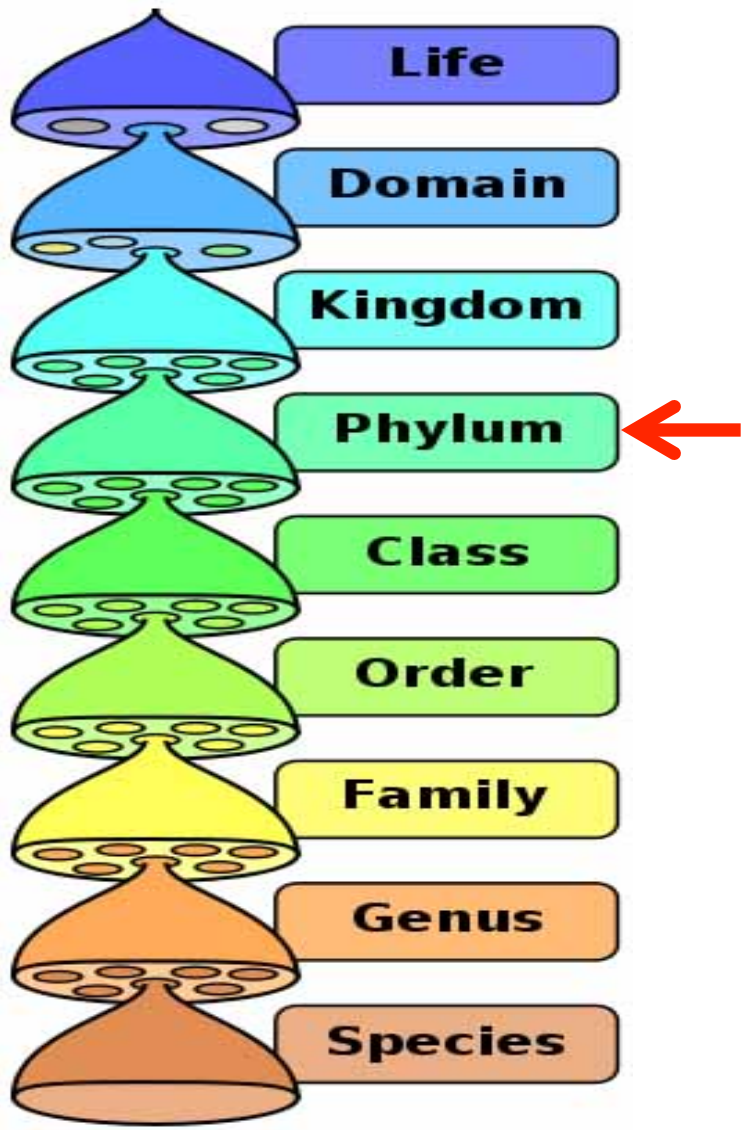


Image: Biological classification diagram, Peter Halasz

From ScienceProfOnline.com, free science education website.

Classifying Living Things

Three Domains

Eubacteria
- True bacteria
- Prokaryotes

Exs. Streptococcus pneumoniae
Escherichia coli

Archaea
- Were thought to be same as Bacteria until recently.
- Prokaryotes

Ex. Extremophiles

Eukaryota
- All eukayotic organisms.

Fall into 4 Kingdoms:
Protista – *Ex. algae*
Fungi – *Ex. mushroom*
Plantae – *Ex. Maple tree*
Animalia – *Ex. you*

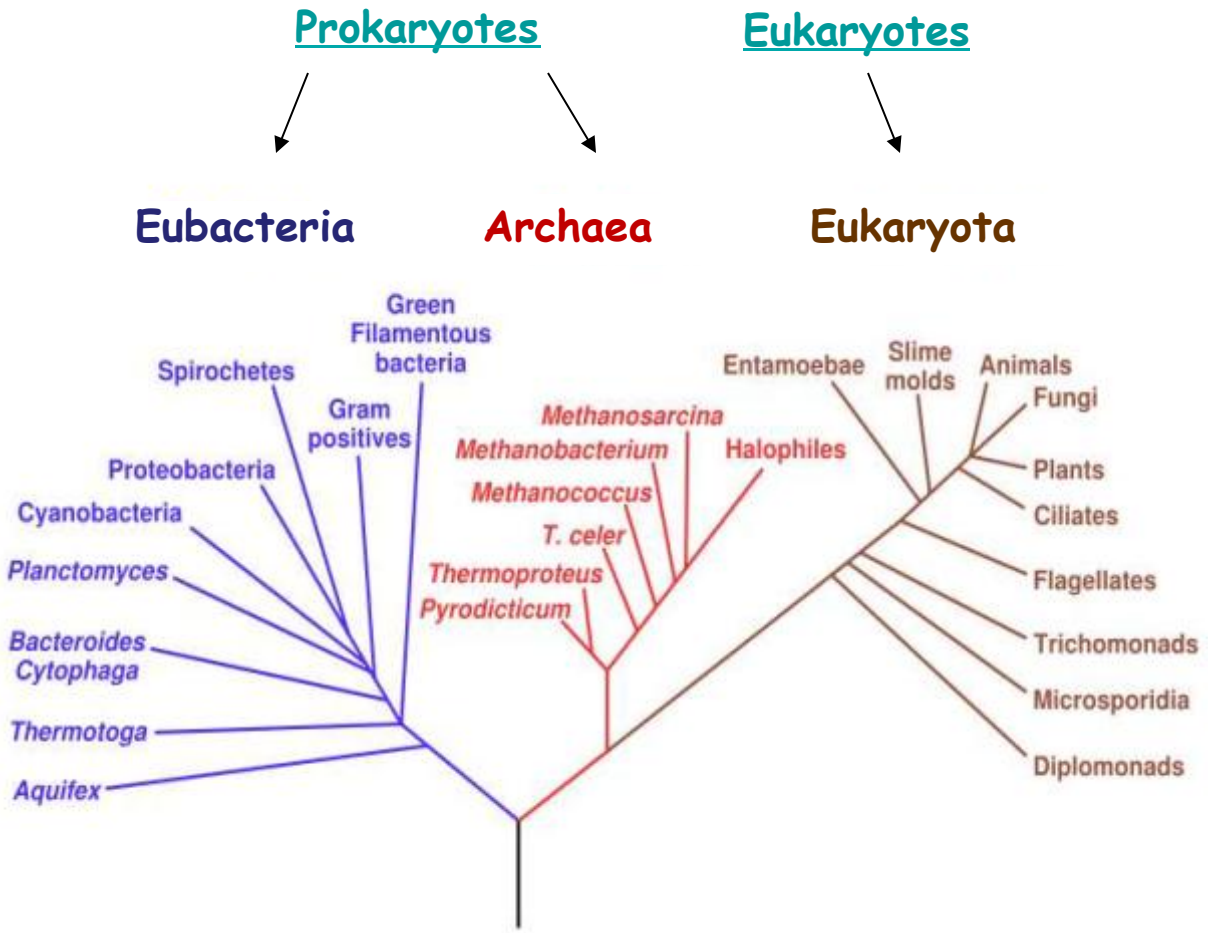
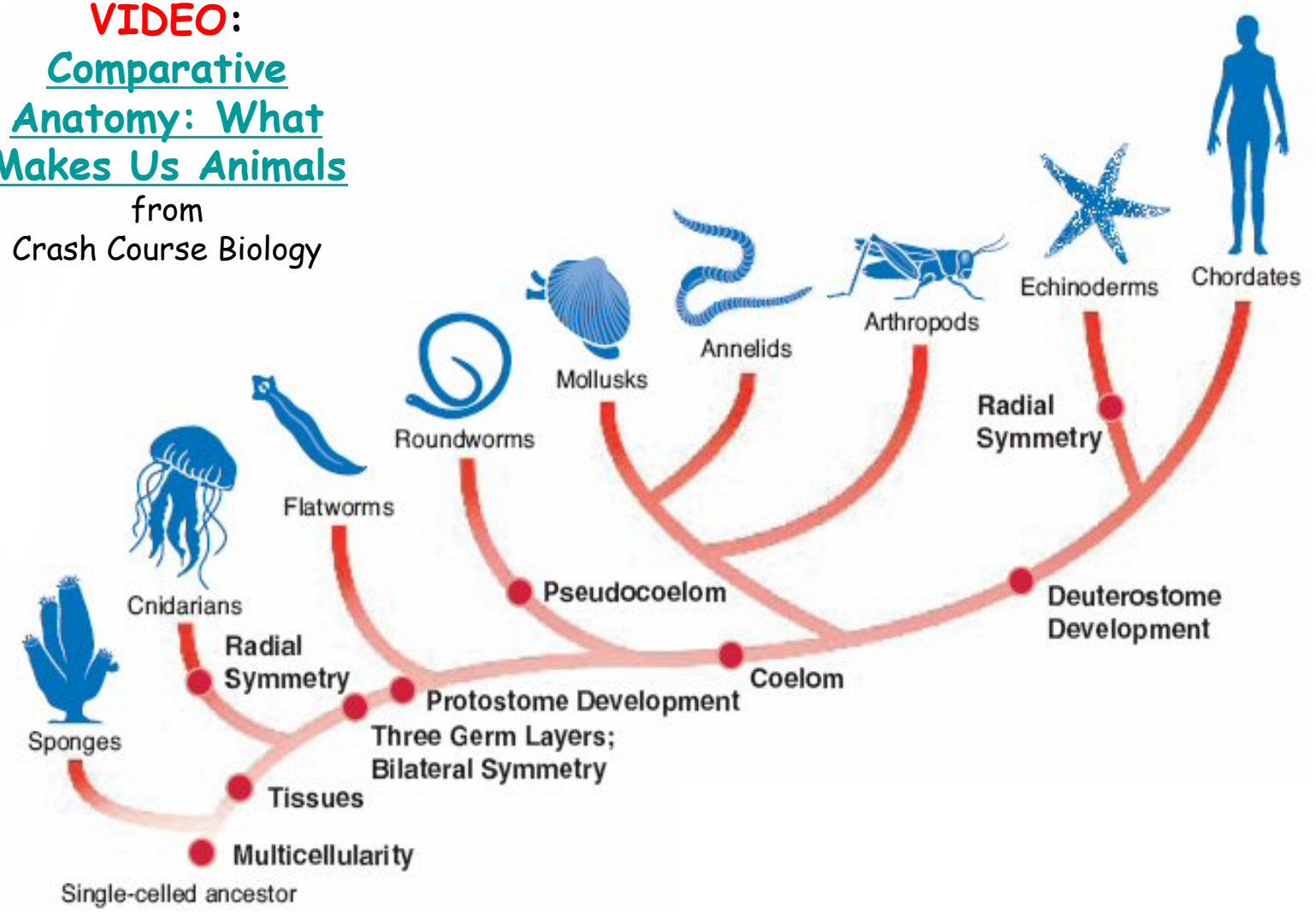


Image: Phylogenetic Tree, Eric Gaba, NASA Astrobiology institute.

Evolutionary Relationship of Animals

VIDEO:
Comparative Anatomy: What Makes Us Animals
from
Crash Course Biology



Characteristics Animals Have In Common

1. **Eukaryotic**

2. **Multicellular**

3. **No cell wall**

4. **Cell Specialization**

5. **Heterotrophic**
Obtain energy by consuming other living things.

6. **Locomotion**
Most are motile or have a stage in their life cycle that is.

7. **Most reproduce sexually**
Some can reproduce asexually as well.

Image: Robin mother and nestlings, T. Port

Phylum Porifera: The Sponges

VIDEO:
Simple Animals: Sponges, Jellies & Octopuses
from
Crash Course Biology

There are more than 5,000 species of sponges.

All sponges are sessile as adults and do not have any appendages.

Habitat: Most are marine but about 150 species live in fresh water.

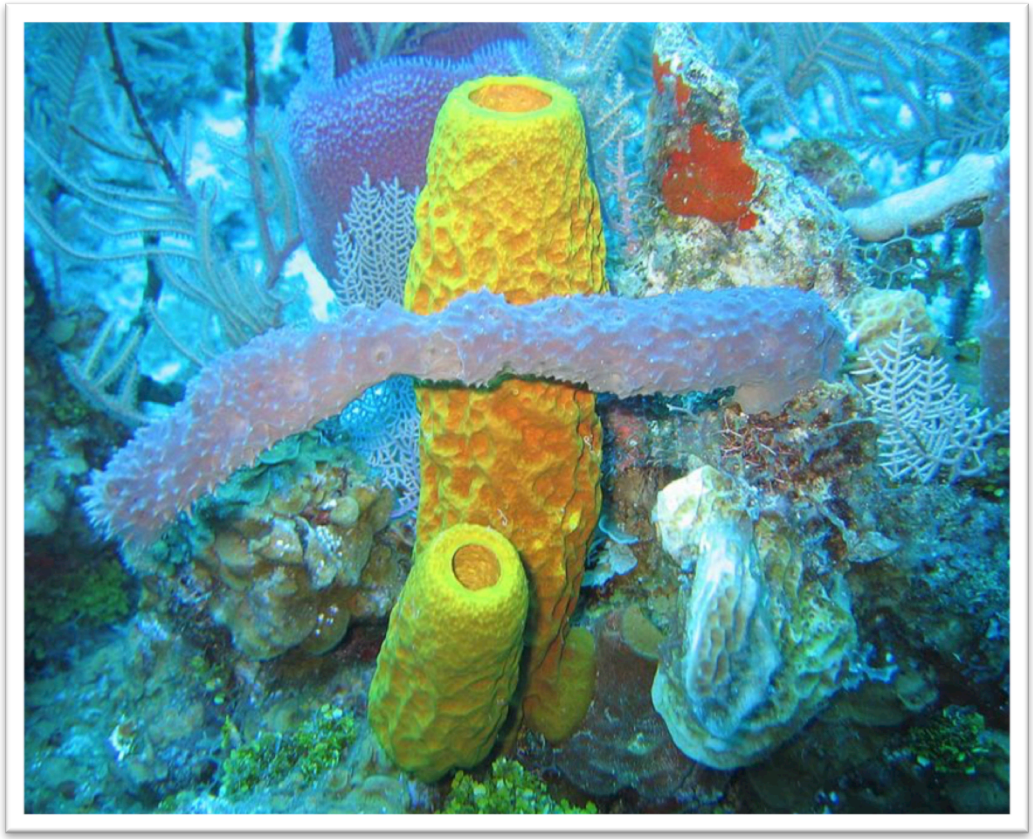
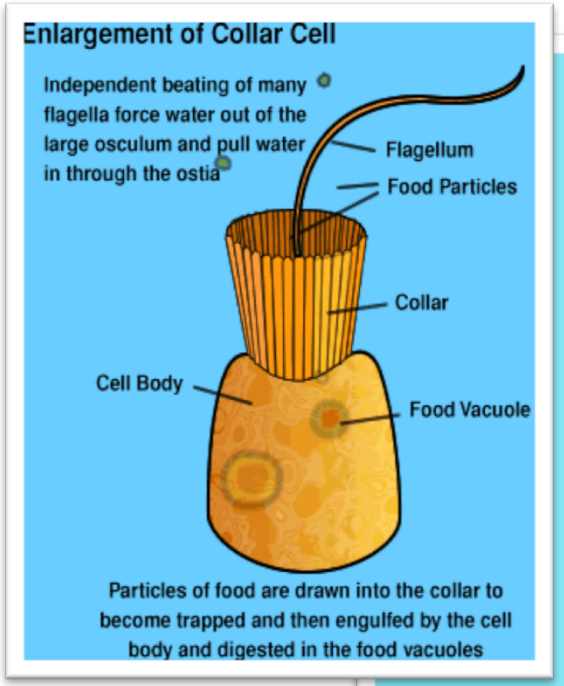
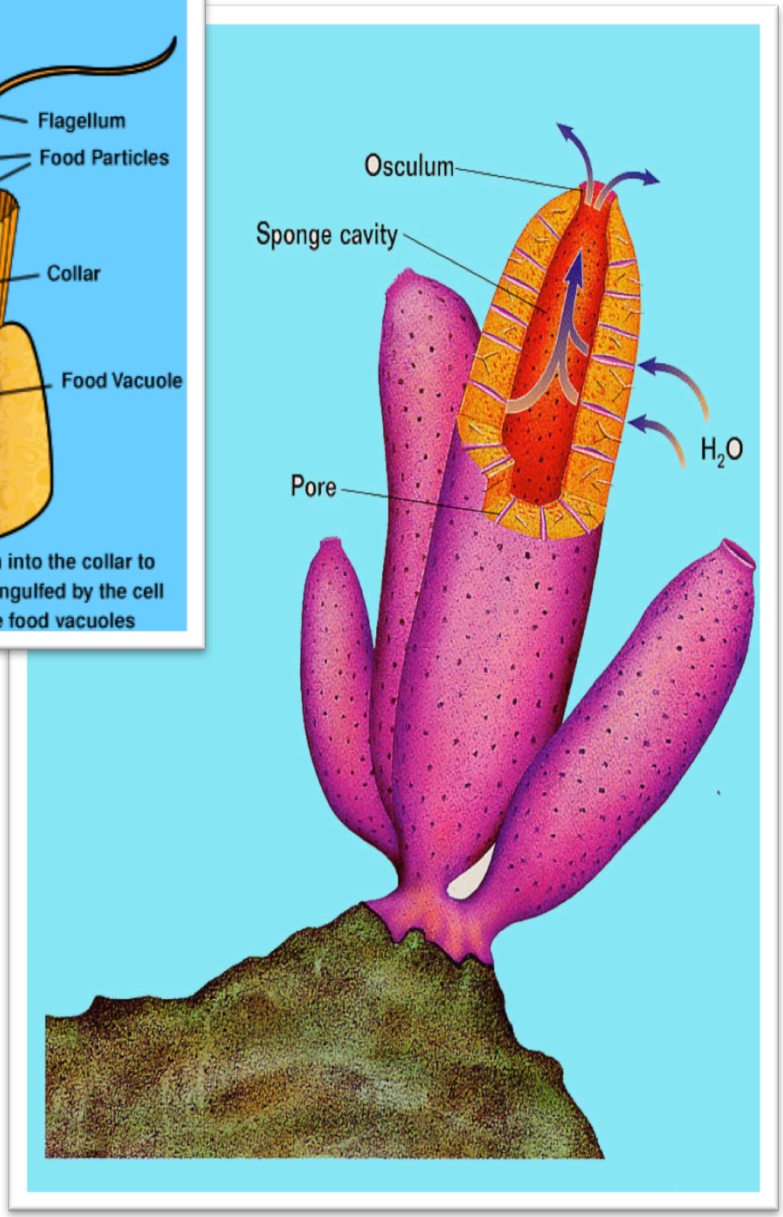


Image: Sponge biodiversity, Wiki.

Phylum Porifera:
The Sponges





Asymmetrical

Specialized cells:
Body = Two cell layers with a jelly-like substance in between.

No specialized tissue:
Therefore, no organs or organ systems.

Skeleton: Have **spicules** that support their structure.

Feeding & Reproduction
Sponges pump water through their body, allowing them to capture food and release sperm.

Specialized collar cells use cilia to move water though the body cavity and trap food particles.

First animals to reproduce sexually.

Phylum Cnidaria:
Jellyfish, Anenomes, Coral & Hydra

Habitat: All aquatic, most marine.

Movement: Some sessile. If move use the cup of the body.

Radial Symmetry…like a pizza.

Two Embryonic Germ Layers
Diploblast > ectoderms & endoderm.
More complex development than sponges.

Specialized tissue

NO!! Head, Skeleton, Segmentation

Images: 5-eared,moon jelly, Hydra budding, Wiki.

Phylum Cnidaria

Feeding

Most have specialized stinging cells called nematocysts for defense and capturing prey.

Use tentacles with nematocysts to help catch food and for defense.

Some more dangerous than others.

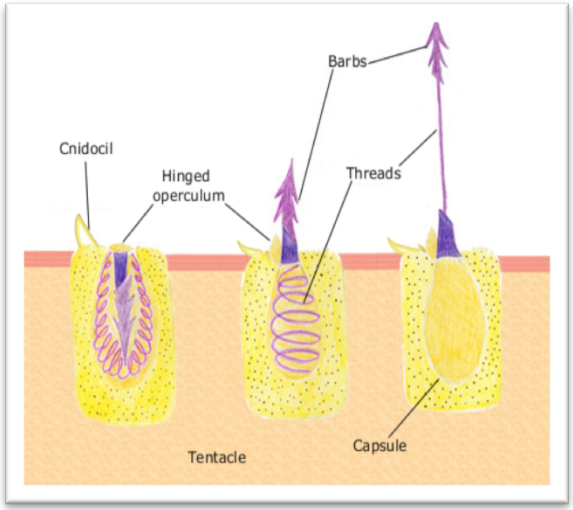
Reproduction

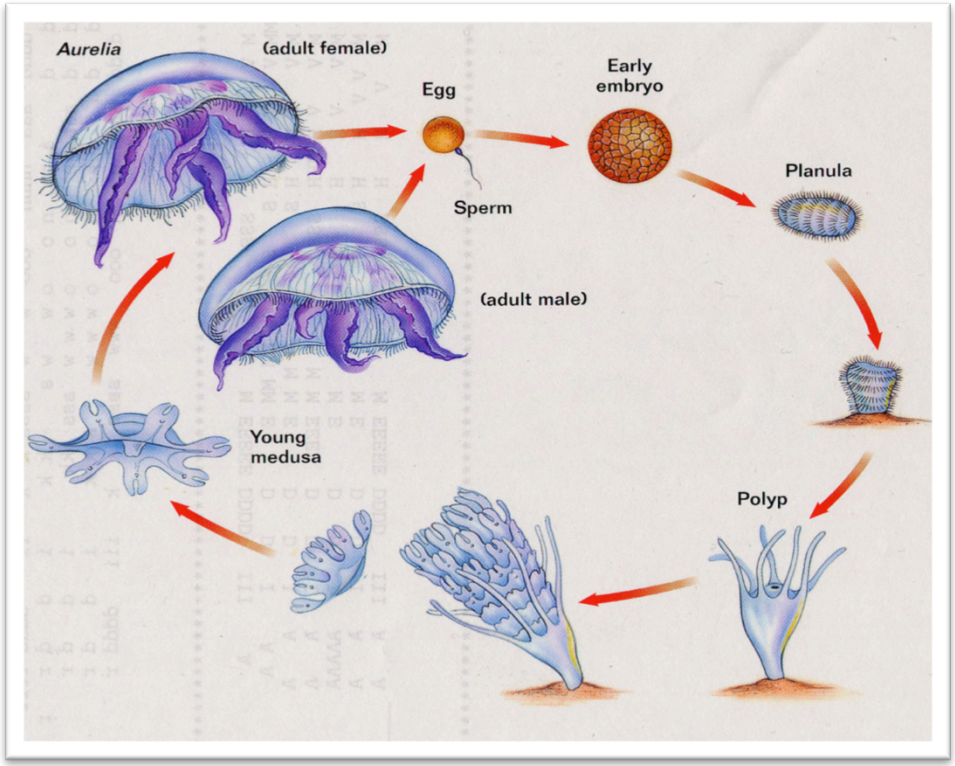
Polyp and medusa stage.

Polyp is sessile, medusa is mobile.

Life cycle stages vary among species

VIDEO:
Anemone Feeding on Fish





Images: Diagram namatocyst discharging, Wiki.

Phylum Cnidaria:
Coral

Typically live in compact colonies of many identical individual polyps.

Each polyp is a tiny sac-like animal.

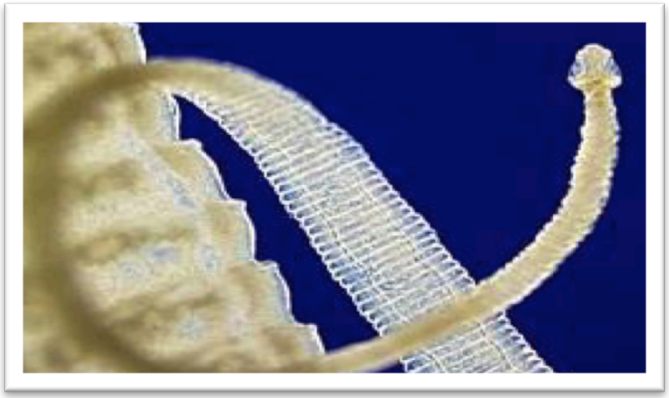
Tentacles surround a polyps central mouth opening.

Most secrete a body covering made of calcium carbonate. This exoskeleton is excreted near the base of a polyp.

Over many generations, the colony creates a large skeleton, and many together a coral reef.

VIDEO:
AMAZING!
Poriferans & Cnidarians Up-Close

Images: Coral outcrop, Coral polyps with tentacles extended, Wiki.



Phylum Platyhelmenthes:
Flatworms: Planarians, Flukes, & Tapeworms

Triploblast > ectoderm, mesoderm & endoderm.
More complex development than Cnidarians.

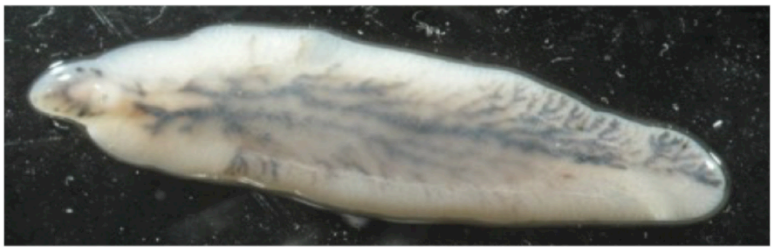
Free-Living Flatworms
- All aquatic
- Freshwater & marine
- Use cilia to move

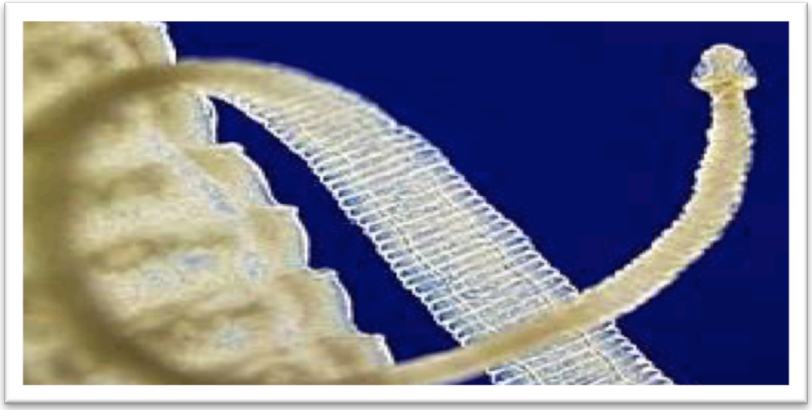
Parasitic Flatworms
- Have very complex lifecycles, often with more than one host
- Use hooks to attach to intestines

VIDEO:
World's Weirdest: Flatworm Penis Fencing!

Images: Liver fluke; Planarians, T. Port.

Phylum Platyhelmenthes:
Flatworms: Planarians, Flukes, & Tapeworms





Bilateral Symmetry
Mirror symmetry, left and right halves.

True epidermis as outer covering

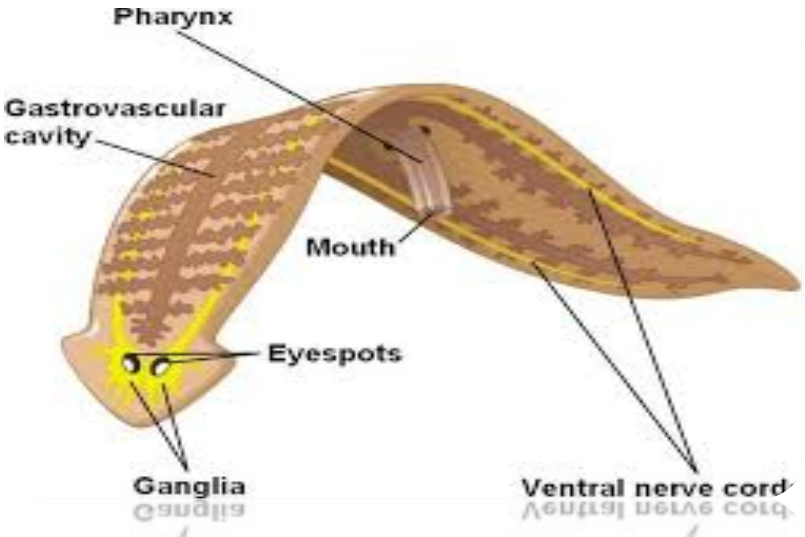
Nervous System
Rudimentary cephalization: Sensory structures and nerve ganglia in head area.

Feeding
Free-living flat worms have a pharynx. (mouth and bootiehole same thing. Eeeew!)

Parasitic flat worms live off of their hosts in various ways.

Unique Characteristics
Some can regenerate from in pieces.

NO!: Skeleton, Segmentation



Images: Liver fluke; Planarian anatomy, T. Port.

Flatworms

Cestoda:

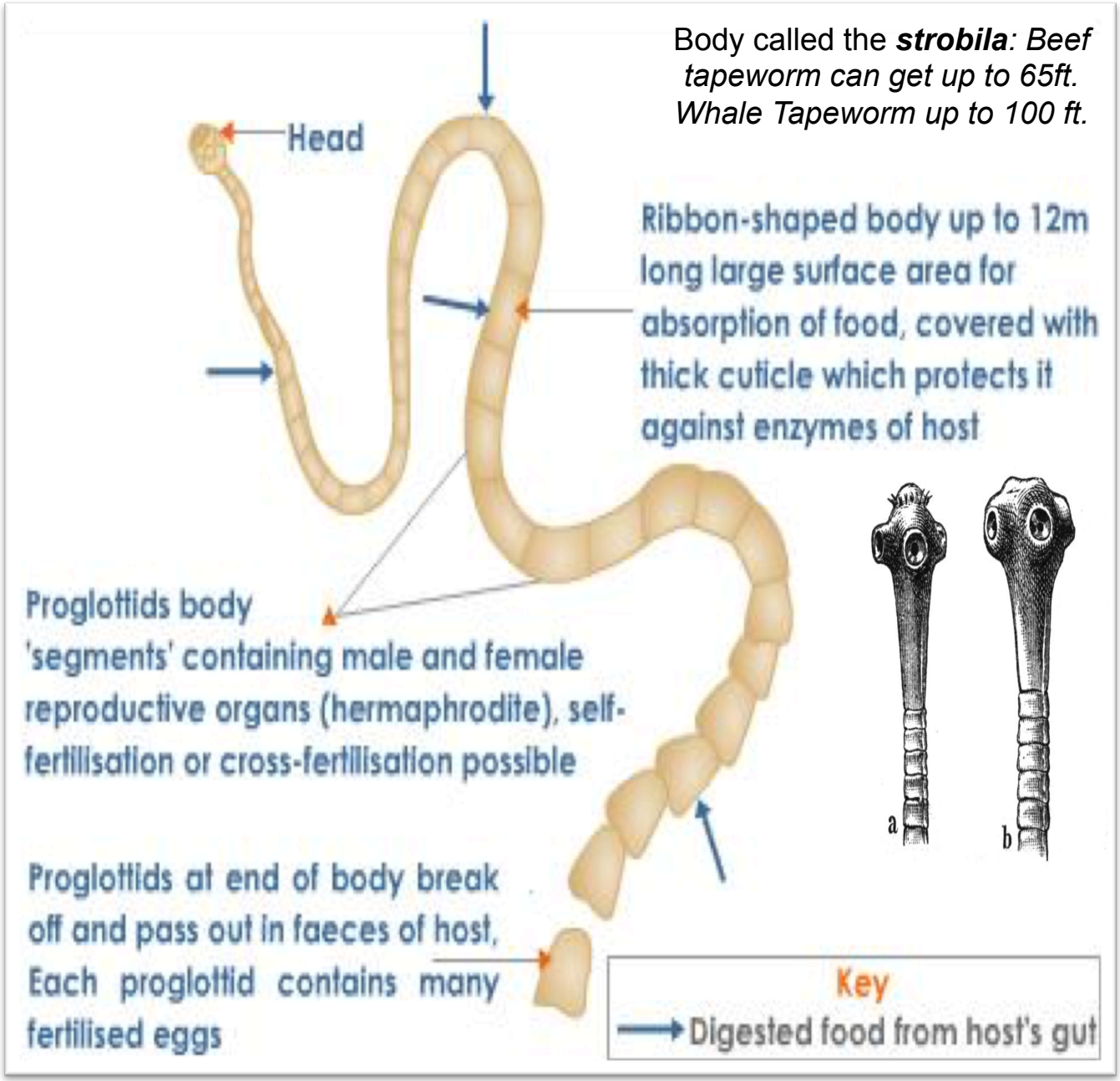
Tapeworms

All are parasitic.

Have more than one host during life cycle.

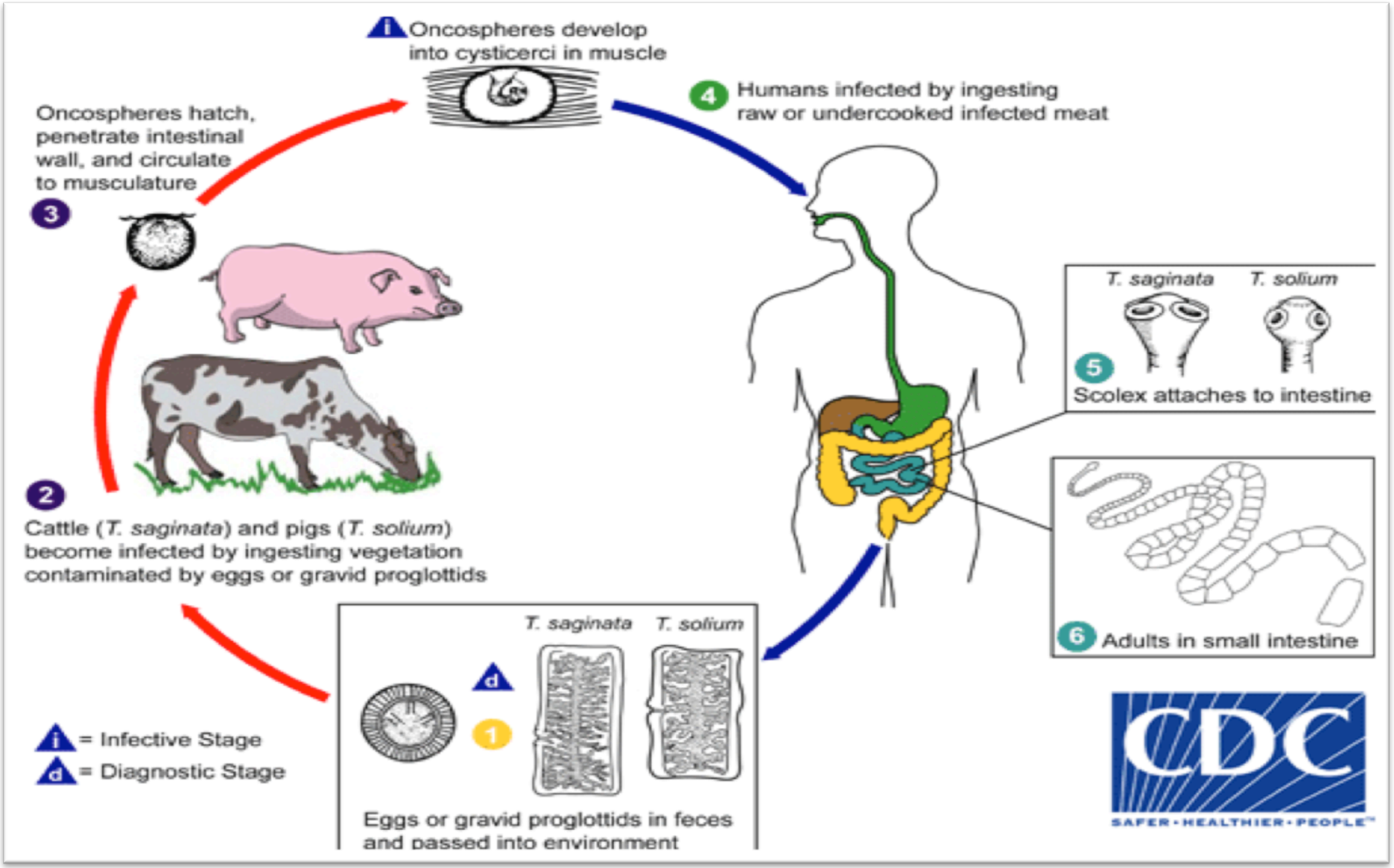
3 main body parts:

- scolex (head)
- neck
- strobila (made of many proglottids)



Images: Tapeworm scolex Wiki

Flatworms: Cestoda - Tapeworms



From the Virtual Biology Classroom on ScienceProfOnline.com

Image: Tapeworm lifecycle;, CDC.

Phylum Nematoda:
Roundworms

Diverse animal phylum found in many environments.

More than 25,000 species have been described (but scientists estimate there are about a million different kinds).

Most very small (< 2.5 mm) and slender

Free-Living Roundworms

- Live in the soil and mud on the ocean bottom
- One square meter of ocean mud can contain > 4 million nematodes

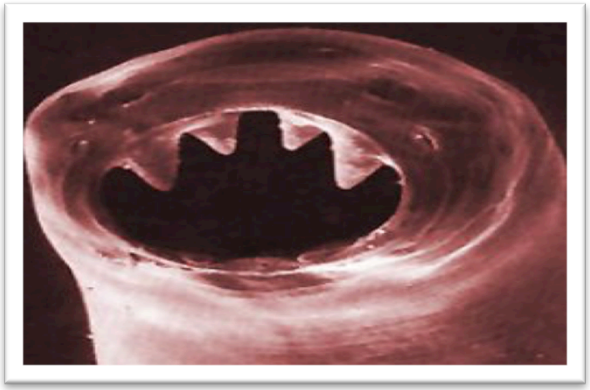
Parasitic Roundworms

- More than half are parasitic.
- Have very complex lifecycles, often with more than one host.
- Use teeth to attach to intestines.

VIDEO: Worm In My Butt from series Monsters Inside Me

Images: Hookworm, Roundworm *Ascaris*, Wiki.

Phylum Nematoda:
Roundworms



Bilateral Symmetry

Epidermis covered with tough cuticle
Controls water loss

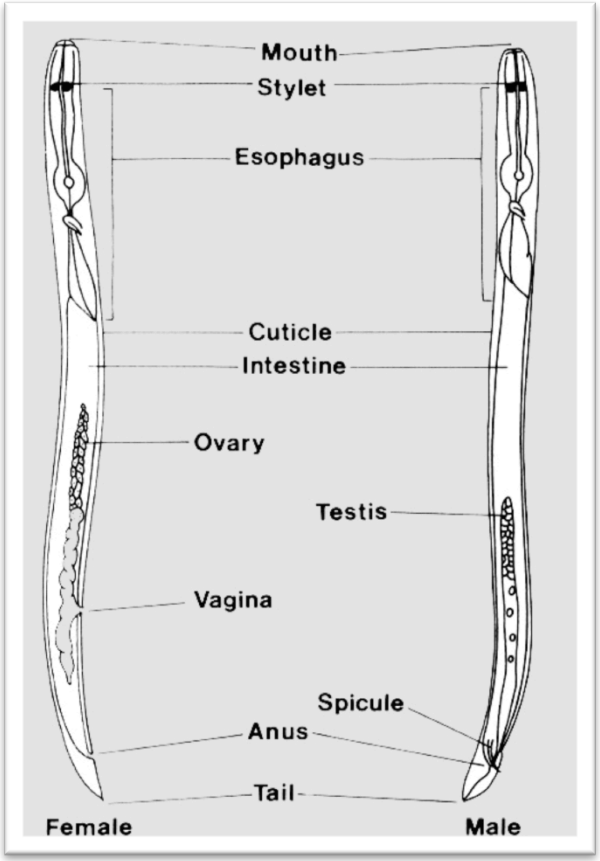
Feeding
Unlike the phyla Cnidarians and Platyhelminthes, nematodes have tubular digestive systems with openings at both ends.

Mouth often bears a series of teeth on inner edges.

Nervous System
Have very simple cephalization and nerves to control longitudinal muscles

Hydroskeleton
The relatively rigid cuticle works with the longitudinal muscles to create a hydroskeleton

NO!: Segmentation



Parasitic Nematode: *Ascaris*

Adult worms (1) live in small intestine.

Female may produce ~ 200,000 eggs per day, which are passed with the feces.

Unfertilized eggs are not infective (2).

Fertile eggs (2-3) become infective after 18 days to several weeks.

After infective eggs are swallowed (4) larvae hatch (5) and invade the intestines.

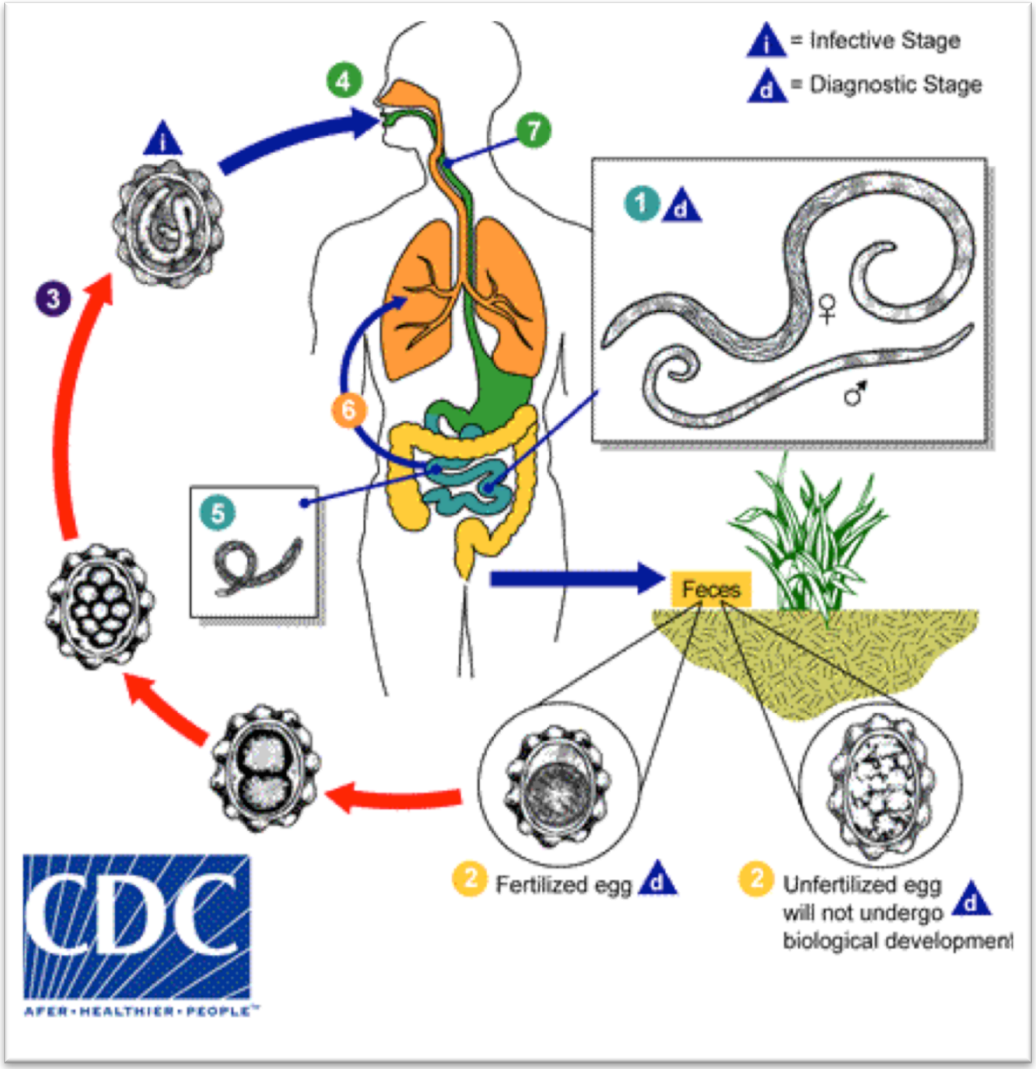
Larvae carried via the circulation to lungs (6).

Larvae mature further in the lungs (~2 weeks), then penetrate lungs into the throat, and are swallowed (7).

When reach small intestine, larvae develop into adult worms (1).

Two to three months required from ingestion of eggs to egg generation by the adult female.

Adult worms can live 1 to 2 years.



Images: Tapeworm scolex Wiki

Phylum Mollusca: Squid, Octopuses, Snails & Clams

Bilateral
But sometimes not obvious.

Development: 3 germ layers

Nervous System
Display a wide variety of nervous systems.

- Most complex = Cephalopods;
- Simplest = Bivalves
- Cephalopods have well developed eyes.

VIDEO: Octopuses are Wicked Smart!

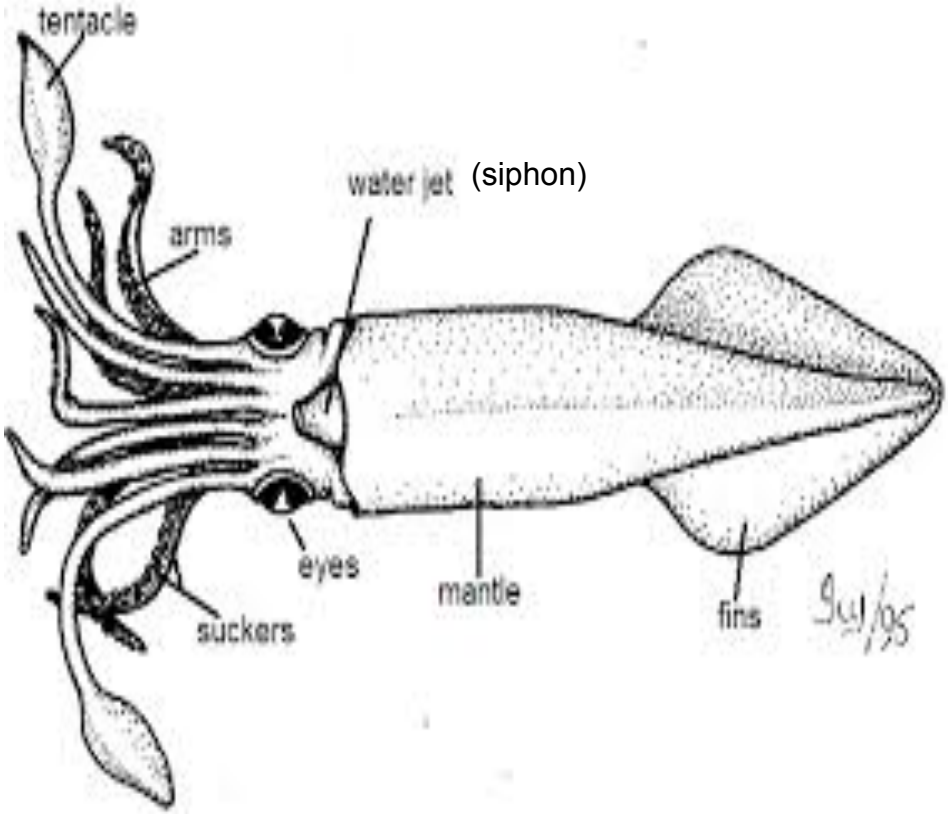
VIDEO: World's Weirdest: Killer Cone Snails

Skeleton
Some have shells, some have simple endoskeletons and some lack a skeleton.

Image: Mollusca biodiversity, Cone snail shell, Wiki.

Phylum Mollusca:
Squid

VIDEO:
Deep Look –
That's Just Squid Skin!



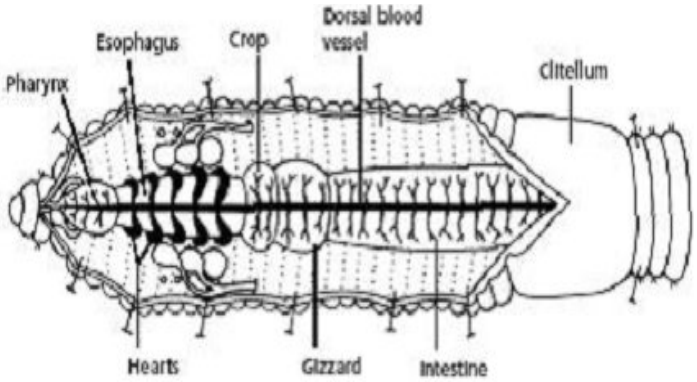
Images: Squid, Giant squid beak, Wiki.

Complex Animals:
Phylum *Annelida*

VIDEO:
Complex Animals: Annelids & Arthropods
From Crash Course Biology

Segmented!
Ya, it's a big deal.

Leeches,
Earthworms &
Bloodworms



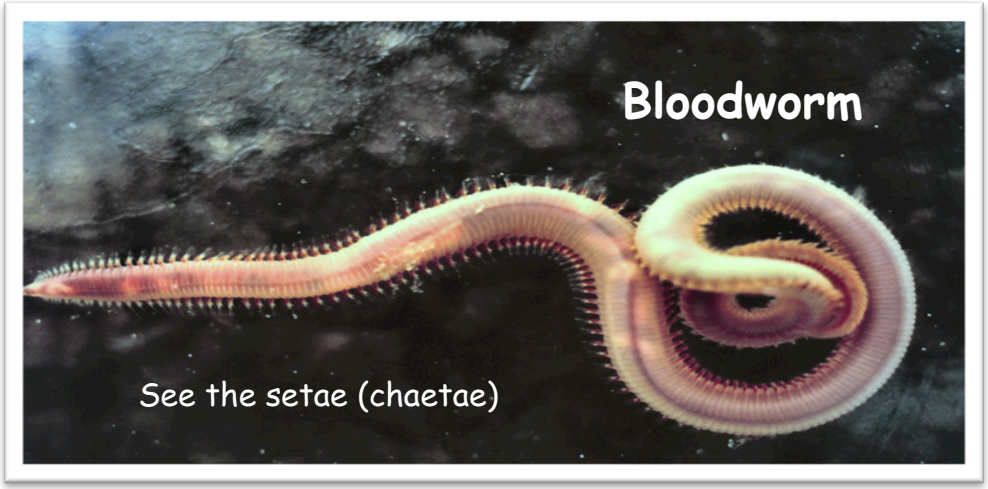


Image: Leech,, Bloodworm, Wiki.

Complex Animals:
Phylum **Arthropoda**
(Arachnids , Insects & Crustacea)

Arthropod means "jointed feet"
(but really, they have lots of jointed stuff)

Segmented bodies

Exoskeleton made of chitin.

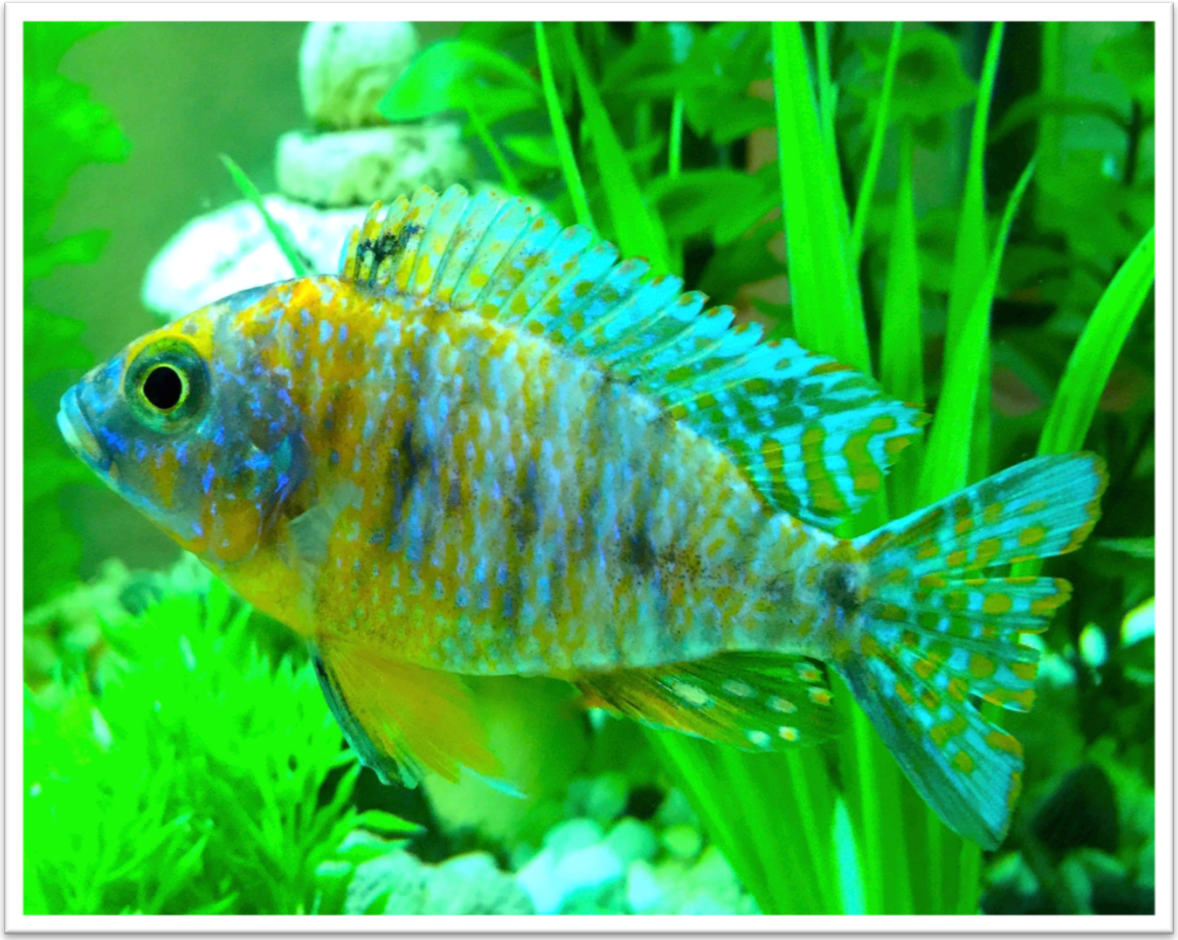
Arachnids (Cheliceriformes):
Spiders, Scorpions, Horseshoe crabs, Mites &Ticks
- "Arm lips" … crazy-ass Greeks
- Simple eyes
- Caephalothorax
- No antennae

Insecta
- Hexopoda (six pairs of legs)
- Three main body parts: head, thorx, abdomen
- Three pair of jointed legs
- Compound eyes
- Most can fly
- Metamorphosis

Crustacea
- Aquatic, "insects" of the water.

Image: Arthropoda, Horseshoe crab, Wiki.

Complex Animals: Phylum Cordata



VIDEO:
Chordates
from Crash Course Biology

Image: "Charlotte" the Peacock African Cichlid & I are a couple chordates, T. Port.

Confused?

Here are some links to fun resources that further explain Cell Biology:

- Eukaryotic Cells Main Page on the Virtual Cell Biology Classroom of Science Prof Online.
- Eukaryopolis: The City of Animal Cells, video from Crash Course Biology.
- Comparative Anatomy What Makes Us Animals, video from Crash Course Biology.
- Simple Animals: Sponges, Jellies & Octopuses, videofrom Crash Course Biology.
- Anemone Feeding on Fish video.
- Poriferans & Cnidarians Up-Close beautiful video.
- World's Weirdest: Flatworm Penis Fencing! video.
- Worm In My Butt video from series Monsters Inside Me.
- Octopuses are Wicked Smart! video of octopus learning experiment.
- Killer Cone Snails video from series World's Weirdest.
- That's Just Squid Skin! video from Deep Look.
- Complex Animals: Annelids & Arthropods video from Crash Course Biology
- Chordates video from Crash Course Biology.

Smart Links