

# Survey of Bio.

Wk. 14

MON., 2009-11-30, 8-9:20 AM:

Thripp  
Survey  
Pg. 1

Test 4 may be pushed up to Wed next week.

Bilateral symmetry = left & right is the same

Radial symmetry = cutting in any direction is the same 

The first branch point is defined by the presence of true tissues.

Porifera don't have → all other Animal phyla have true tissues.

A pencil has radial symmetry — you can cut it in half in different directions. A remote has bilateral symmetry.

A sponge has no symmetry. Third the evolution of body cavities:

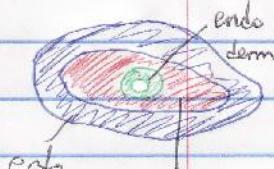
three tissue layers: ectoderm (most external)

mesoderm (middle layer), endoderm (innermost digestive layer)

Jelly doesn't count as a tissue layer — jellyfish have no coelom.

Coelom = body cavity = a fluid-filled space separating the digestive tract from the outer body wall. — your stomach can churn w/o your body moving

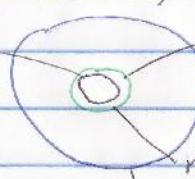
Acoelom = no body cavity.



Pseudocoelom is between the endoderm & mesoderm. Pseudocoelomates have to move their bodies to digest their food! — roundworms

ecto  
meso  
endo / (between meso & endo)  
(coelom      ecto  
(true "      meso  
-eucoelom      meso  
endo

endoderm



endoderm

skin-ectoderm

move stomach

move body

eucoelom      Fourth, animals w/ true coelom have 2 different ways  
the embryo develops.

Mon, 2009-11-30, 8:9:20 AM:

We are closely related to echinodermata - starfish.

↳ (chordata) Mollusca, annelida, & anthropoda are related

Invertebrates are animals without backbones. 95% of species have no backbones! Some scorpions are invertebrates w/ an exoskeleton. Ice worms have antifreeze to not freeze.

Sponges = Phylum Porifera = lack true tissues.

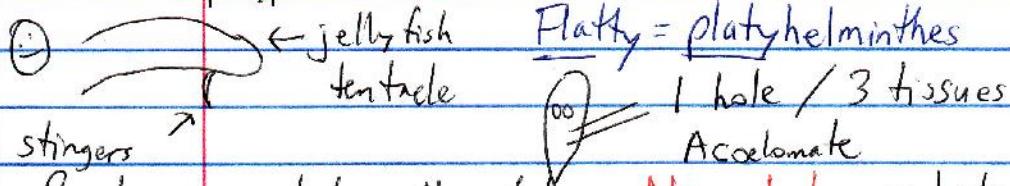
Pores = sponges some sponges have glass

Phylum Cnidaria (silent "c") : radial symmetry - one hole

body plan, only 2 tissue layers w/ "jelly" in between, tentacles with stinging cells. Example: jellyfishes & sea anemones.

② Dr. Backer's student grew a jelly fish in an aquarium — the jelly fish would eat lettuce & liver, but not rocks.

Cnidaria is named for stingers. Some species alternate between polyp & medusa form through their life.



③ Roundworms = phylum Nemotoda **Nemotoda** = 1st phylum w/ 2-hole body plan

mouth anus basically a feeding tube

Flatworms = Phylum Platyhelminthes - simplest bilateral animals

1-hole Includes parasites (blood flukes & tapeworms) & planarians

Nemotoda = roundworms & others = basically a feeding tube

complete digestive tract or two hole body plan, a mouth & anus

Phylum Mollusca = soft-bodied animals, most are protected by a hard shell. ex: snails, slugs, clams, octopuses, & squids

MON, 2009-11-30, 8-9:20 AM: Three classes of Mollusca: gastropoda w/ a single spiral shell; ↑ → foot Bivalvia = protected by shells G.I. (stomach) divided into two halves, ex: scallops anus mouth clams; Cephalopoda, which may or may not have a shell. head ↑ foot ↗ ex: octopus (no shell), chambered nautilus (shelled).

Phylum Annelida = worms with body segmentation — have 2-holk body plans & bilateral (NOT radial) symmetry.  
→ ex earthworms — very advanced worms: true coelom, 2-chambered sided hearts, etc. Polychaetes (phylum Annelida)  
— burrow in the sea floor Leeches (phylum Annelida)  
— some are parasitic, some are used in medicine because they secrete chemicals to prevent clotting.

Phylum Arthropoda ⇒ think arthritis ⇒ arthro = joints joint foot Named for their jointed appendages.  
Ex: crustaceans, arachnids, & insects. Body is covered completely by an exoskeleton to prevent drying out  
Earthworm w/ exoskeleton = millipede → close to Arthropoda

More species of arthropoda than any other animal phylum

4 groups: #1) Arachnids (spiders), #2) Crustaceans = mostly aquatic  
② Scorpion vs tarantula species, such as crabs, lobsters;  
scorpion stung tarantula crayfish, shrimps, & barnacles.  
tarantula eventually ate #3) Millipedes (two pairs of legs per scorpion - Dr Becker segment) & centipedes (1 pair of legs per segment). #4) Insecta are the most diverse class of arthropoda. ex: black-banded mantis, bee hawkmoth, longhorn beetle

Thripp  
Survey

MON, 2009-11-30, 8-9:20 AM: Phylum Echinodermata Pg. 4

Named for spiny surfaces. ex: sea stars, sand dollars, sea urchins, & sea cucumbers. We (chordates) are related.

Unique to Echinodermata is a water vascular system.

Phylum Chordata: #1 dorsal, hollow nerve chord - i.e. spinal

fluid in us. Pharyngeal slits = disappear in adult humans but are present in foetus. Notochord, #2 post-anal tail for rigid structure - not a backbone movement

in many animals, becomes a backbone in humans.

TUE, 2009-12-01, 9:30-10:50 AM: Cumulative final will be on

① Arthropods are numerous: there are tests 1-4.

$10^{18}$  on the planet. Reptiles can survive on  $\frac{1}{10}$  the energy of mammals

Animals & plants both evolved from Protista

Animals have 1+ cells, are eukaryotic, chemoheterotrophic, & obtain energy by digesting organic molecules within their body

Animals are diploid. plants are haploid (they have a living haploid generation, i.e. pollen).

Embryonic development of starfish is like humans initially.

Animals probably evolved from a Protista in the Precambrian seas.

Porifera → Cnidarians → Flatworms → Roundworms → Mollusks → Annelids  
→ Arthropods → Echinoderms → Chordates No body cavity:



radial symmetry is no separation between the cells  
like a radial tire - = no "guts" to spill out.

cut the organism in any direction & it is the same related.

bilateral symmetry is 2 ways only: left & right ☿

TUE, 2009-12-01 9:30-10:50 AM.

Phylum	Symmetry	# hole	Coelem
Sponges	none	none	none (0 tissues)
Cnidaria	radial	1	none (2 tissues)
Flatworms	bilateral	1	acelomate (3 tissues)
Roundworms	"	2	pseudocoelomate
Segmented Worms	"	2	true coelom
Arthropoda	"	2	"
Mollusca	"	2	"
Echinodermata	radial as adult	2	"
Chordata	bilateral	2	"

Porifera (sponges) have no tissues. all other phyla have 2 or more tissues. Radial symmetry is like a ferris wheel or pencil. Bilateral symmetry is like a lobster or shovel.

A body cavity requires 3 tissues. □ Organelles

Ectoderm = the skin

Mesoderm = the muscles (middle) i.e moving our arms &

Endoderm = Cells (?) touch food peristalsis in esophagus

Coelem = body cavity = a fluid-filled space separating the digestive tract from the outer body wall. - i.e. our stomach churns & pushes on fluid around stomach.

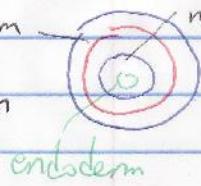
Acelom = no body cavity i.e. Platyhelminthes flatworms

= all cells are together in flatworm w/ no space in between

Pseudocoelom is a false body cavity between the endoderm (inner) & the mesoderm. Ectoderm      ectoderm      mesoderm

Roundworms (Nematodes)  
\* have a pseudo coelom!

Mesoderm → Pseudocoelom  
Endoderm



✓ TUE, 2009-12-01, 9:30-10:50 AM:

Eucoelom is totally within the mesoderm. Acoelom is true body cavity like eukaryote no body cavity.

Invertebrates are true nucleus Pseudocoelom is between animals without backbones: 95% the endoderm & mesoderm

of animals are invertebrates.

Many have an exoskeleton or live deep underwater using mesoderm

water pressure for support instead of a backbone

Iceworms have anti-freezing chemicals to prevent ice crystals from forming inside them.

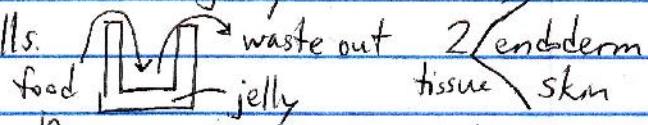
Sponges = Phylum Porifera = 0-hole body plan because liquid

can go in or out anywhere = lack true tissues

Some sponges secrete silicon dioxide (glass). More secrete proteins which are sold as sponges.

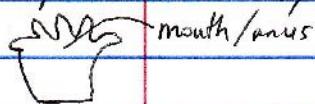
Phylum Cnidaria = characterized by organisms with radial symmetry,

1-hole body plan, 2 tissues with jelly in between, and tentacles with stinging cells.



Tropical

Fish are hard to maintain... sea anemones are much easier, & they can identify food with their tentacles. Phylum Cnidaria.



polyp (anemone)



medusa

Phylum Platyhelminthes =

(jellyfish)

bilateral animals,

includes tapeworms, flatworms. 3 tissues, acoelomate

Phylum Nematoda: no post-anal tail - the tail is the anus.

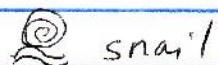
First Phylum with a 2-hole body plan: a mouth and anus.

3 tissues, pseudocoelomate, ex: roundworms

TUE, 2009-12-01, 9:30-10:50 AM:

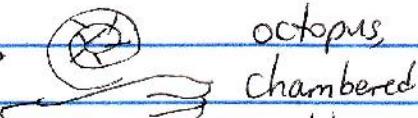
Phylum **Mollusca** = soft-bodied animals, most are protected by a hard shell, ex: snails, slugs, clams, octopuses, & squids. ☐ They have: a muscular foot, a visceral mass, and a mantle.

Gastropoda = single spiral shell



Bivalvia = protected by shells divided in half i.e. clams

Cephalopoda →



Phylum **Annelida** ☐

nautilus

: ☐ earthworms with body segmentation. Bilateral symmetry

also: giant Australian earthworm.

☐ Polychaetes burrow in the sea

☐ A coral has a worm body underneath so it has bilateral symmetry though it looks like it has radial symmetry.

☒ Leeches, some are parasitic.

Phylum **Arthropoda** named for their jointed appendages, including antennae, feet, arms etc. Includes crustaceans, arachnids, & insects. Most diverse animal phylum. Arthropods are segmented animals with specialized segments & appendages.

Ex: lobsters. Completely covered by an external skeleton (exoskeleton). ☐ A 2-year old pillow is 30% mites & feces by weight!

☐ 1) Arachnids (spiders, scorpions, ticks & mites).

Dr. Becker: Scorpion vs. Tarantula: Tarantula ate the Scorpion eventually, poison did not affect.

☐ 2) Crustaceans are mostly aquatic species: crabs, lobsters, crayfish, shrimp, & barnacles. end the morning



TUE, 2009-12-01, 12:30-1:50 PM.

① Whales can be up to 30 meters.

② Animal = eukaryotic, multicellular, & ingest organic molecules.

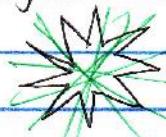
Starfish (Echinoderms) grow like us in the embryos.

③ 545 Million years ago, animals evolved rapidly.

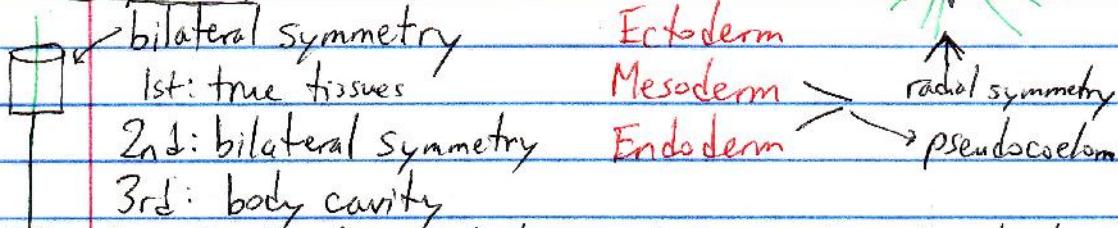
④ Animal Phylogeny reconstruct our history.

1. multicellularity, 2 true tissues, 3 bilateral symmetry,
4. body cavity, 5. true coelom, 6. Coelom from digestive tube

Radial symmetry is like a pot or ferris wheel



Bilateral symmetry is like a shovel or lobster.



A jelly fish has no body cavity... just jelly which is not a tissue (mass of organized cells).

eucelom = true coelom = coelom → space separating the digestive

Coelom = body cavity = fluid-filled tract from outer body wall.

→ allows muscles to move independently of each other

Flatworms (Platyhelminthes) are very very flat with no coelom. || When pseudocoelomates move their bodies they move their food — only nematodes have ~~it~~ are pseudocoelomates

True coelom = totally in the (roundworms)

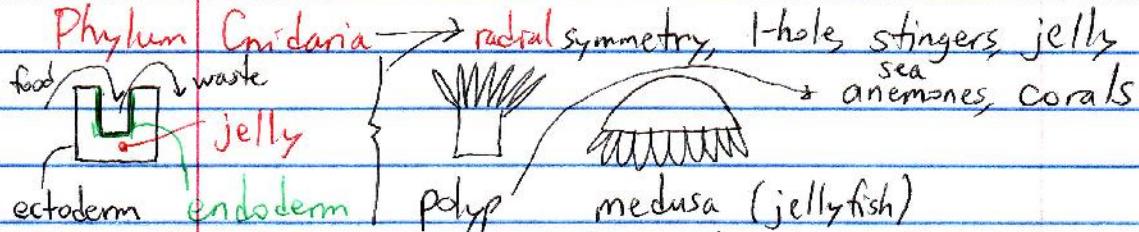
mesoderms = muscles = middle layers.

Centipedes & millipedes are similar to worms → (arthropoda)

→ (annelida)

ecto	skin
meso	muscle
meso	coelom
meso	muscle
endo	digestive cell tissue

② TUE 2009-12-01, 12:30-1:50 PM: Tiny mites & giant squids are invertebrates. Sponges = Phylum Porifera Crustaceans are invertebrates. = lack true tissues.



② Polyps & medusas will eat lettuce, etc., but not rocks.

**Flatworms (Phylum Platyhelminthes)** - simplest bilateral animals includes parasites, free-living planarians. No blood because flatworms are thin & tiny.

**Phylum Nematoda** = roundworms

MARKER 1:30PM: Video from Animal

Planet about a woman who had roundworms in her digestive tract

(Phylum Nematoda) → sm. intestines

for 3 years ② Tapeworms can come from a cyst in a fish & then grow to be ~~most~~ many feet long in your intestines. ③ Deer flies from Africa can bite you & grow in your body & go to your eyes. Loa loa (spelling?) is many worms in your body which are hard to eliminate.

**Phylum Mollusca**: soft-bodied animals-most are protected by a hard shell



3 major classes (DKPC OFG-S)

cephalopoda

② Bivalvia: (mussels, scallops, oysters, clams)

③ Cephalopoda: squid, octopuses, cuttlefish

→ may or may not have shells



END