Animals 1

- send answer to iClicker Question 16A now.
- ~~recruiting for a software study~~
- Animals plan
- Animals vs. plants
  - life-cycle
  - major systems
- Animal Diversity
  - history
  - major groups
- Hox genes
- iClicker Question 16B

Due in lab **this** week:
⇒ bring in a flower

Bio 112: Animal Lecture Outline

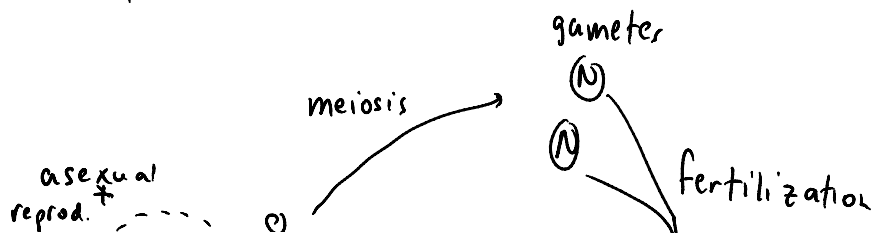This is the material that will be covered in lectures Animals 2-5.

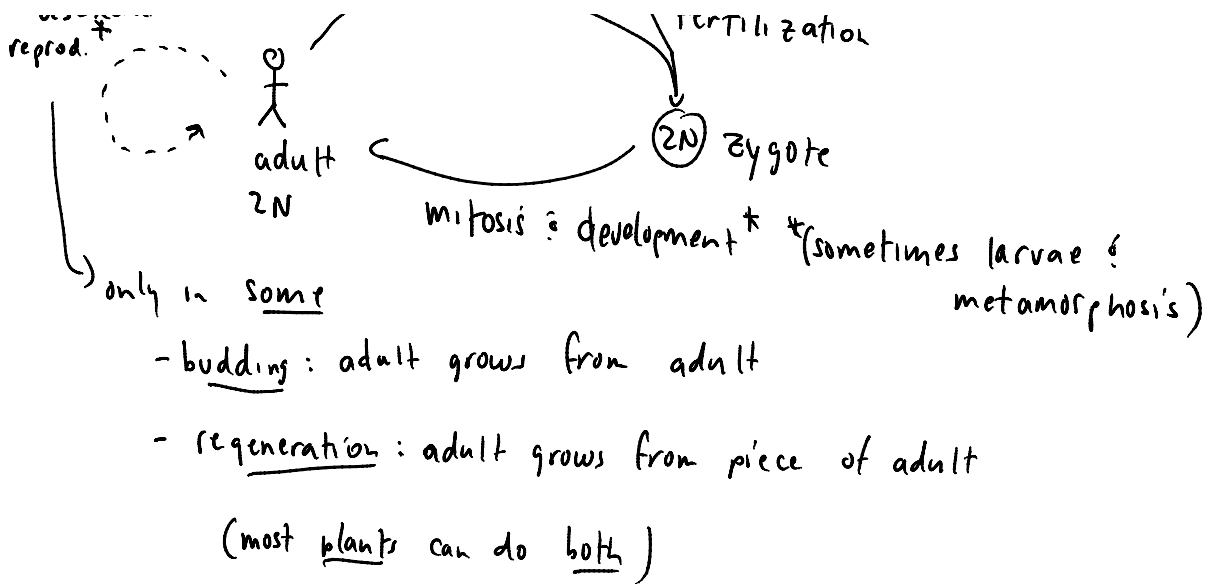| Organism	Sponge	Jellyfish	Planarian	nematode	Squid	tobacco hornworm moth	Earthworm	Starfish	trout	Rotifers
phylum										▨
habitat										
body plan										
structural support					▨		▨			▨
motion		▨						▨	▨	▨
eating										
digestive system								▨		▨
respiratory system										■
excretory system					■			■		■
circulatory system										▨
nervous system			▨					■		■
reproduction		▨					▨			▨
life cycle		▨	▨	▨	▨		■			▨
selected other members of phylum	■		▨	▨	▨			■	■	
interaction of selected other members with humans	■		▨	▨				■	■	

☐ = you **need** to know this for the exam; I **will** cover it in lecture.

▨ = you **need** to know this for the exam; I **will not** cover it in lecture.
(you should get it from reading, lab or the Aquarium field trip)

■ = you **do not need** to know this; I **will not** cover it in lecture.

Animals 1 - 2

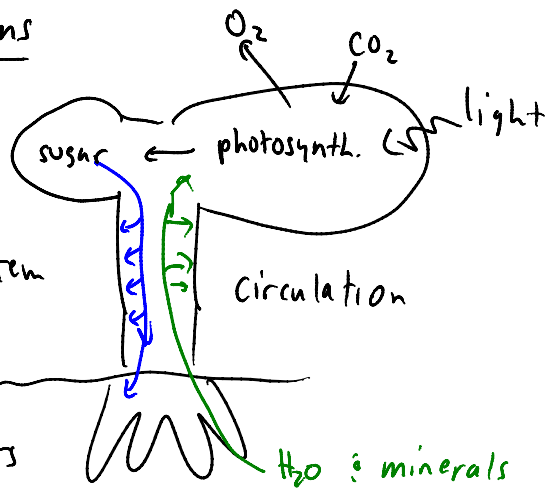Animal life cycle   same in all animals (exceptions)*

gametes
(N)

meiosis →

(N)

asexual reprod.* - - - →   (2)   fertilization

reprod.*

adult
2N

fertilization

(2N) zygote

mitosis + development* *(sometimes larvae &
metamorphosis)

) only in some

   - budding : adult grows from adult

   - regeneration : adult grows from piece of adult

    (most plants can do both)

Major physiological systems

plants

leaves

O_2 CO_2

sugar ← photosynth. ↺ light

relatively
simple

stem

Circulation

roots

H_2O + minerals

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animals - eat other organisms

   ∴ need other physiological systems

   - digestive : break down food to monomers

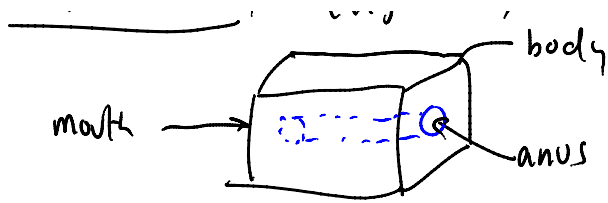   - excretory : to get rid of excess "stuff"
      unused monomers, toxins, etc) + balance salt
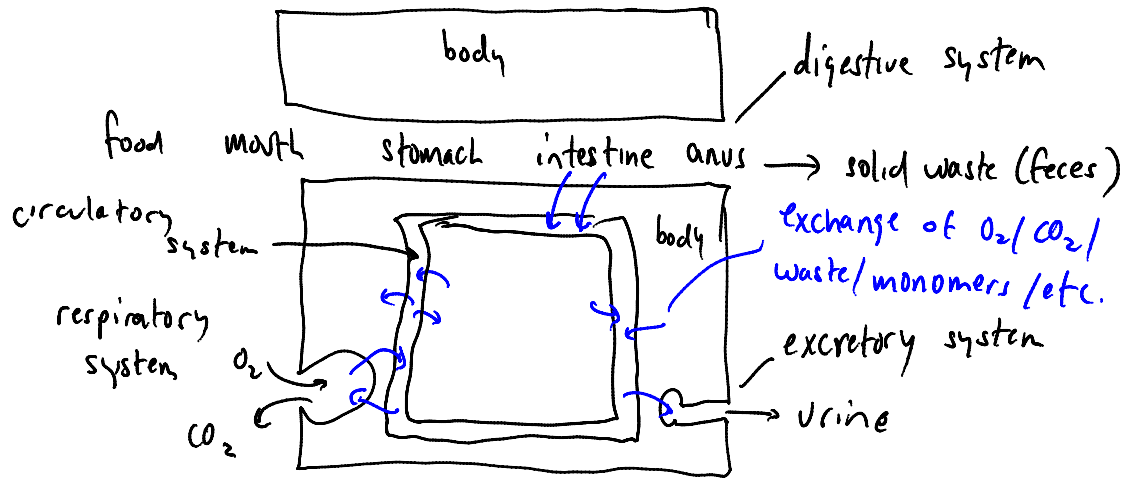
   - nervous, muscular, skeletal, etc
      - move, hunt, mate, etc.

Schematic animal (fig 40.4)

body

mouth → body, anus

cross section (not all animals arranged this way)

body — digestive system

food   mouth   stomach   intestine   anus → solid waste (feces)

circulatory system

respiratory system O_2

CO_2

body

exchange of O_2/CO_2/ waste/monomers /etc.
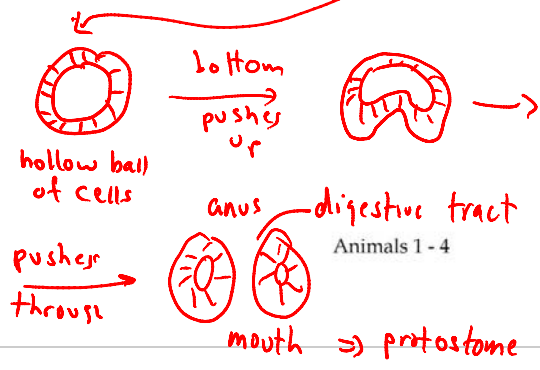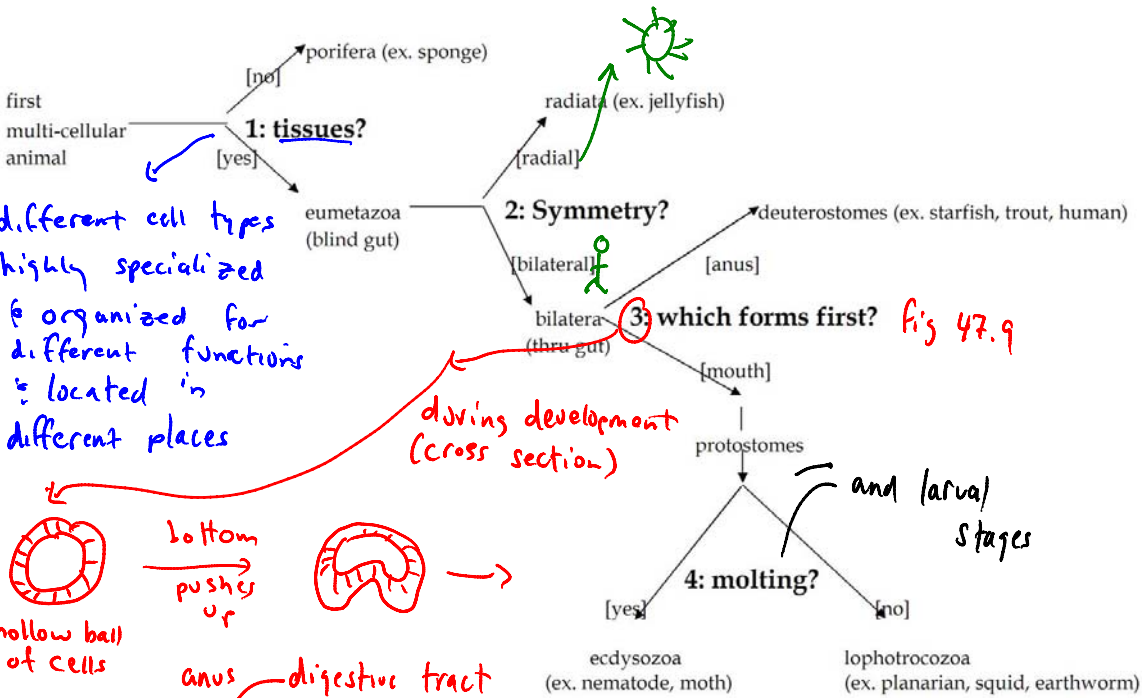
excretory system

→ urine

Animal phylogeny

   700 mya - first multicellular animals
   550 mya - representatives of all major groups present
        * fast - hard to trace lineages

Animal Phylogeny: Major groups

• virtually all groups were present by the end of the Cambrian period (~500Ma).
• organized by increasing "features", fossil evidence, and molecular phylogeny.

first
multi-cellular
animal

porifera (ex. sponge)
[no]

1: tissues?

[yes]

eumetazoa
(blind gut)

radiata (ex. jellyfish)
[radial]

2: Symmetry?

[bilateral]

bilateral
(thru gut)

deuterostomes (ex. starfish, trout, human)
[anus]

3: which forms first?

[mouth]

protostomes

4: molting?

[yes]

ecdysozoa
(ex. nematode, moth)

[no]

lophotrocozoa
(ex. planarian, squid, earthworm)

Animals 1 - 4

Handwritten annotations (blue): different cell types highly specialized & organized for different functions ~ located in different places

Handwritten annotations (red): fig 47.9 — during development (cross section) — hollow ball of cells — bottom pushes up — anus — digestive tract — pushes through — mouth ⇒ protostome (if anus ⇒ deuterostome) — and larval stages

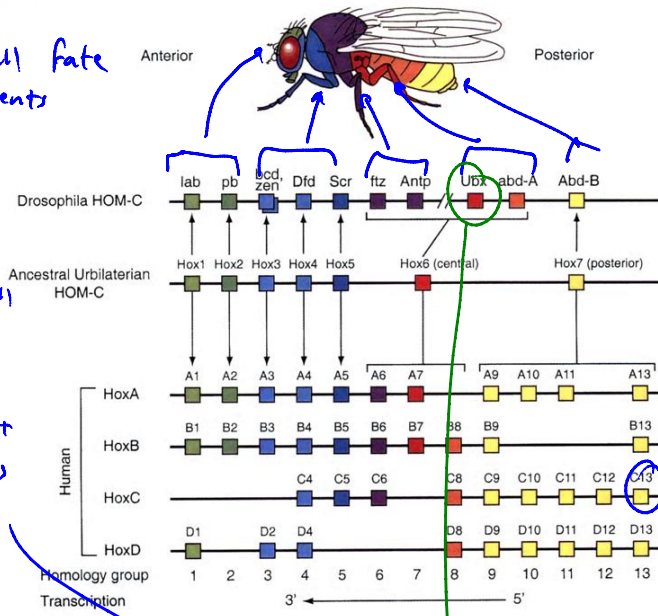# Bio 112 "HOX" genes in animal development   *Campbell pages 445-6*

- The "HOX" (short for homeobox) genes are a set of genes that control important parts of development in most, if not all animals.
- Many animal body plans consist of segments; in different segments different sets of HOX genes are expressed.
- Mutations in HOX genes lead to inherited errors of development due to improper segmentation.
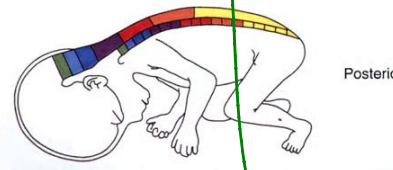
Control cell fate in segments

present in common ancestor of all bilatera
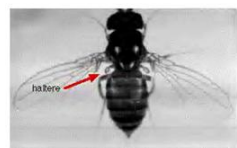
even present in humans

mutations in this gene cause polydactyly (extra fingers/toes)

important in evolution

Dragonfly (ancestral form)   Normal *Drosophila*   Ubx-mutant *Drosophila*

(4 wings)   (2 wings; 2 halteres)   (4 wings - duplicated segment)

Animals 1 - 4

seg 4 thinks its seg 3

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