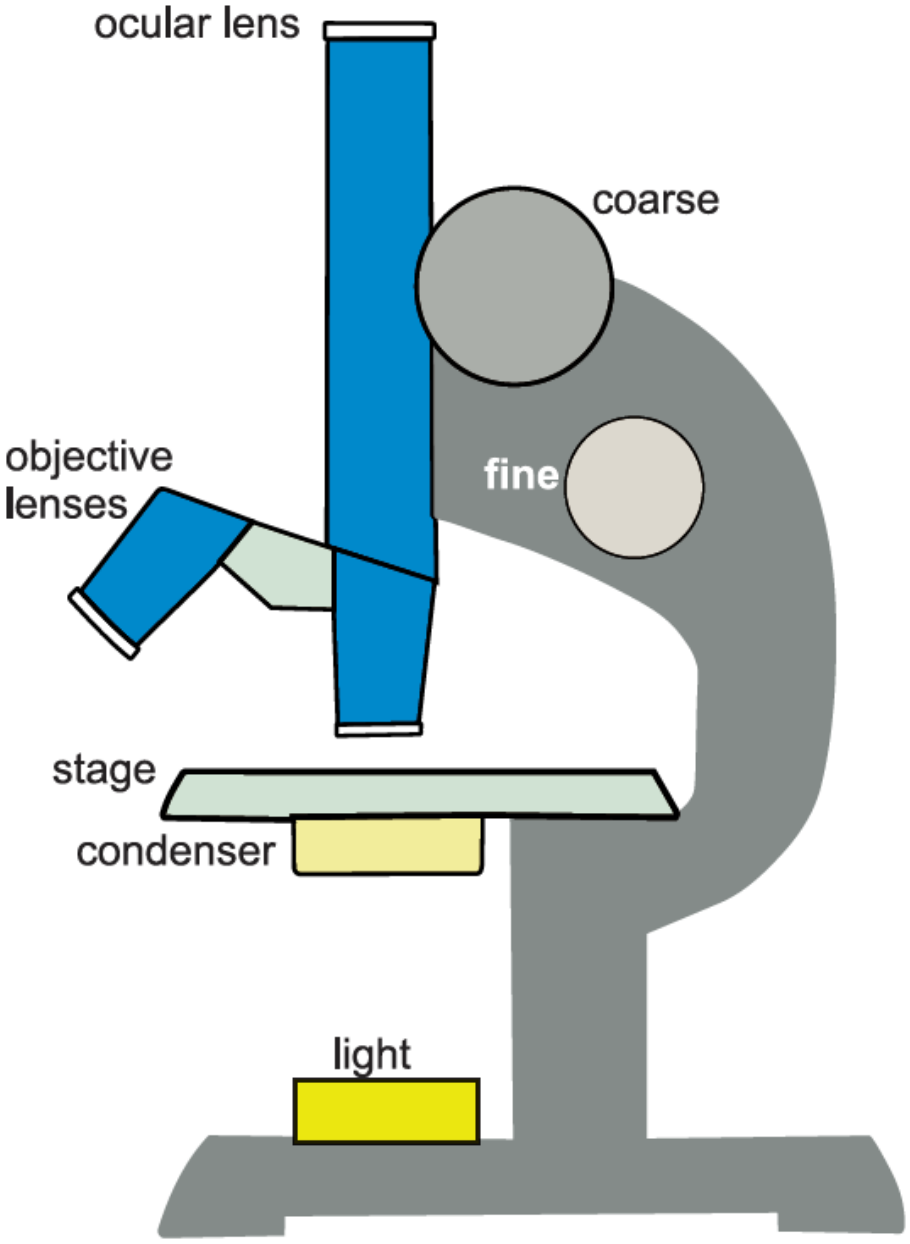
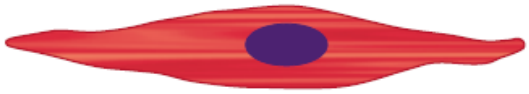
1

Light or Compound Microscope



Cell Sizes and Shapes



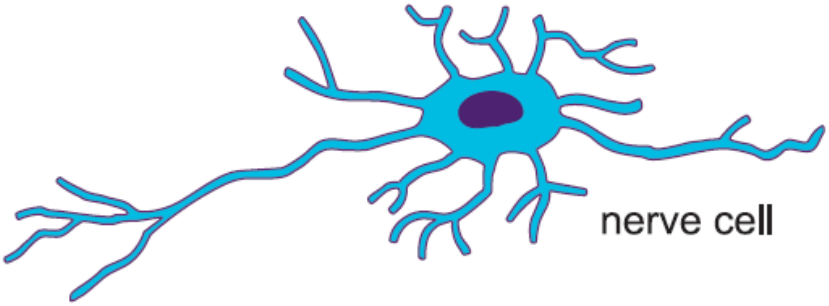
muscle cell

protist

red blood cell

plant cell

bacterium



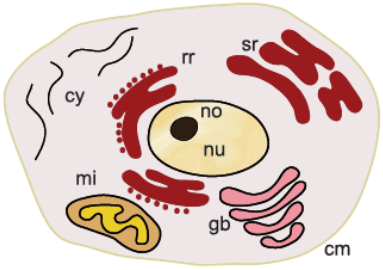
nerve cell

Key:

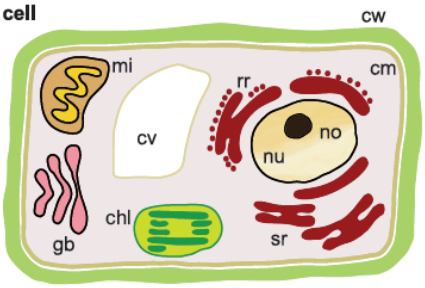
chl	chloroplast
cm	cell membrane
cv	central vacuole
cw	cell wall
cy	cytoskeleton
gb	Golgi body
mi	mitochondrion
no	nucleolus
nu	nucleus
rr	rough endoplasmic reticulum
sr	smooth endoplasmic reticulum

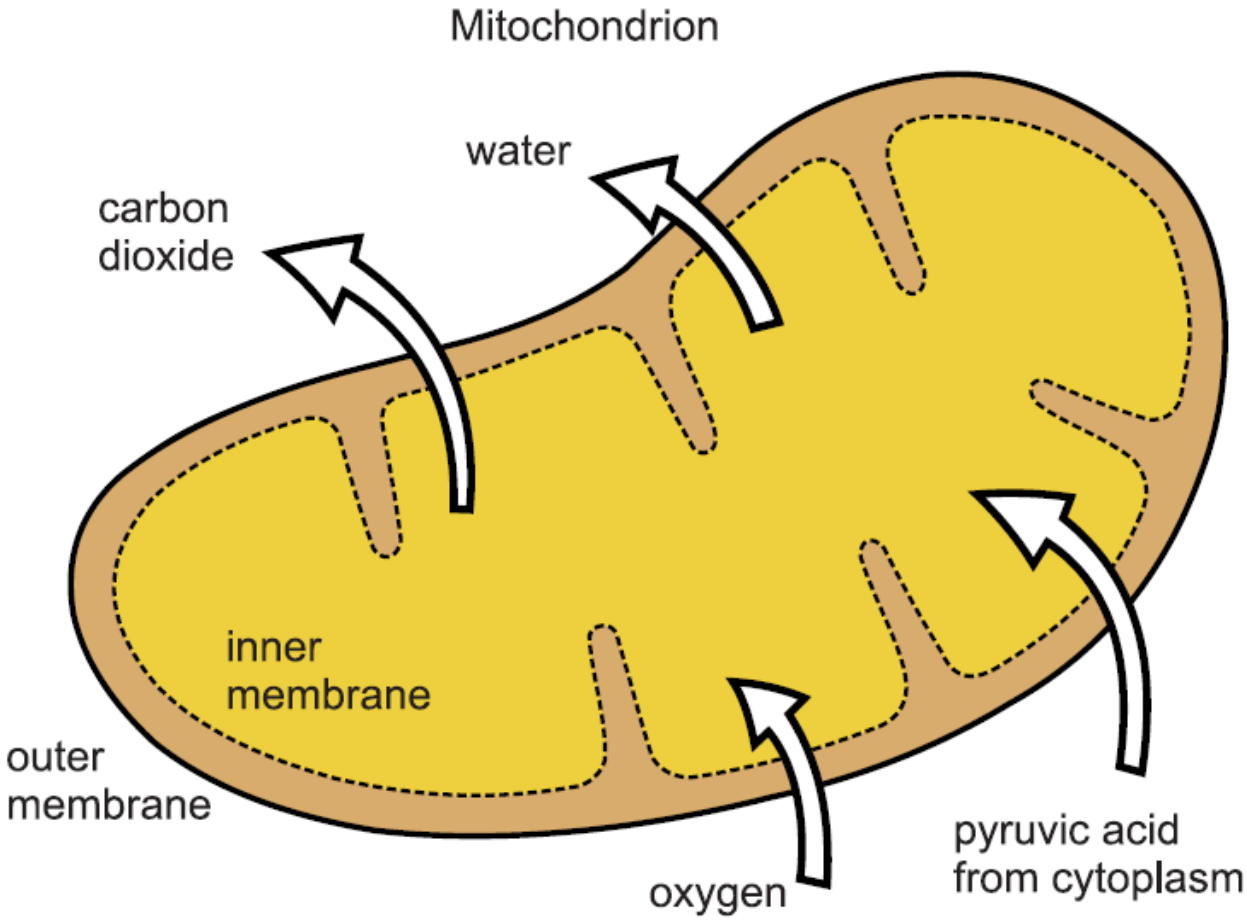
Comparing Animal and Plant Cells

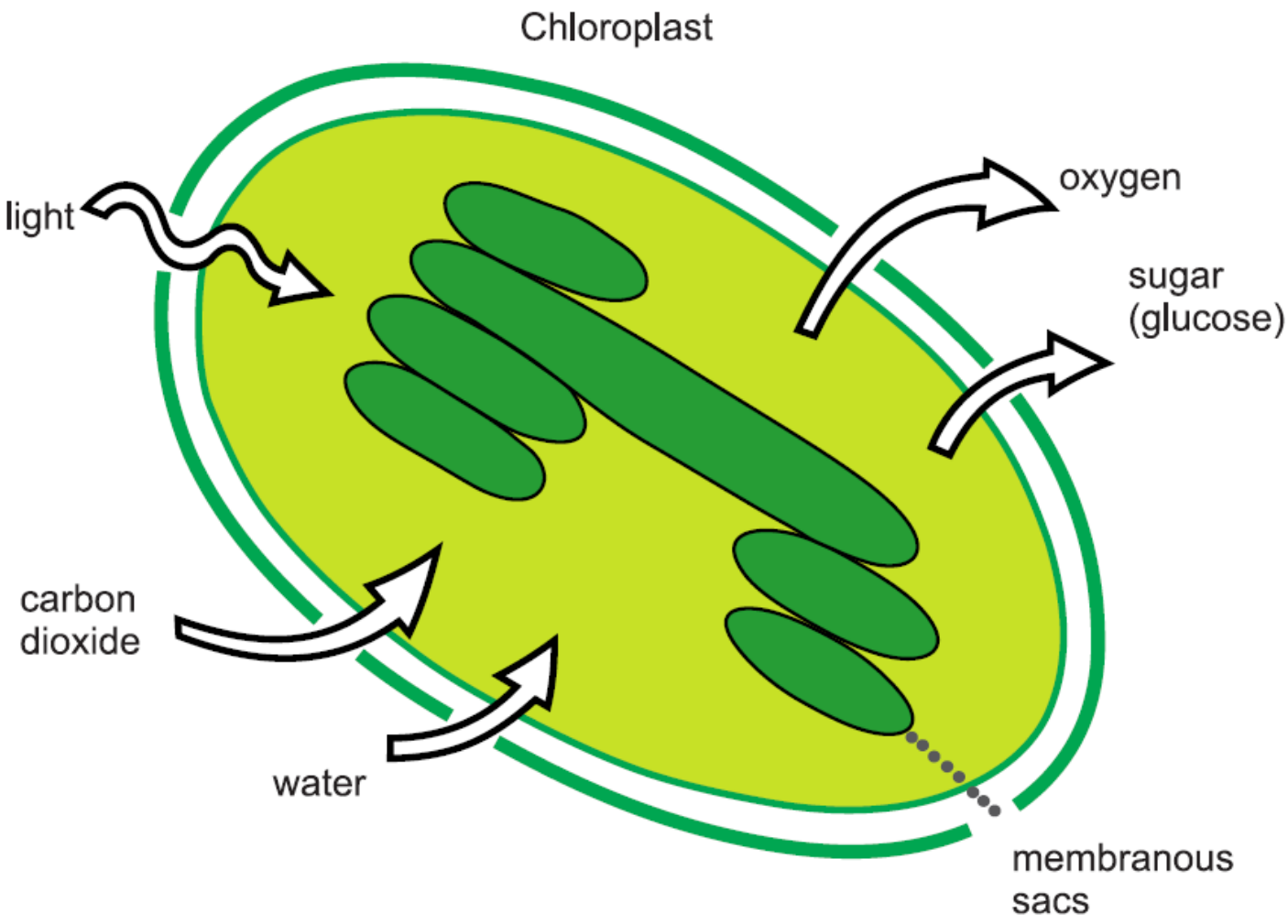
animal cell



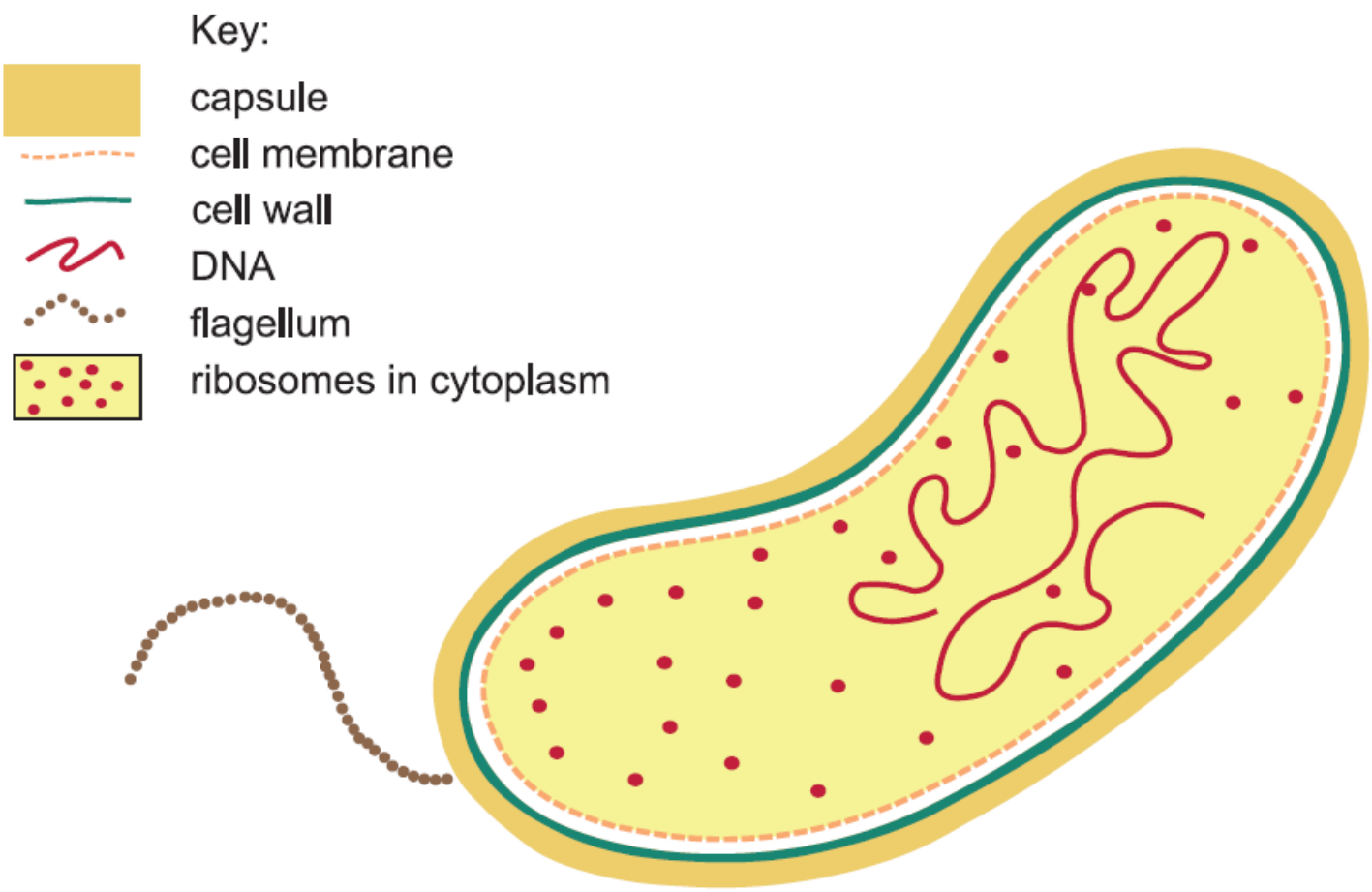
plant cell




Mitochondrion
water
carbon dioxide
inner membrane
outer membrane
oxygen
pyruvic acid from cytoplasm


Chloroplast
light
oxygen
sugar
(glucose)
carbon
dioxide
water
membranous
sacs

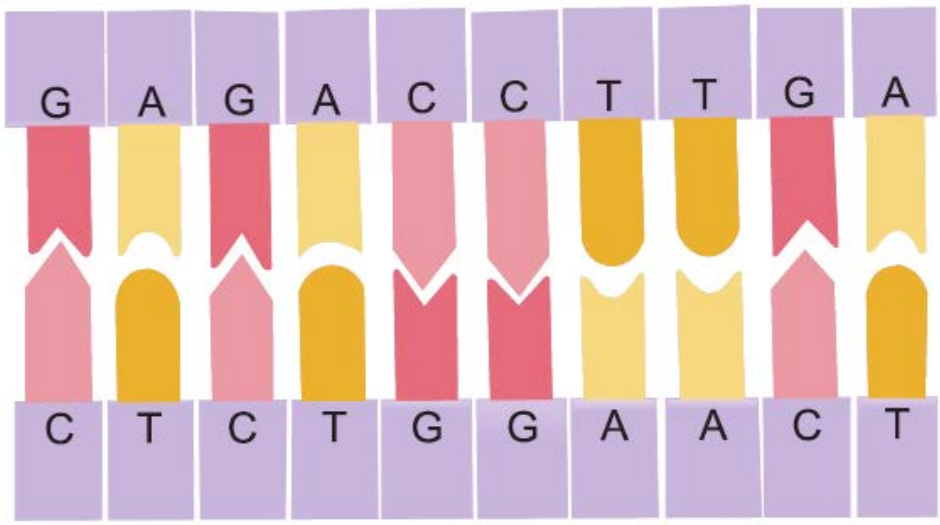
Prokaryotic Cell

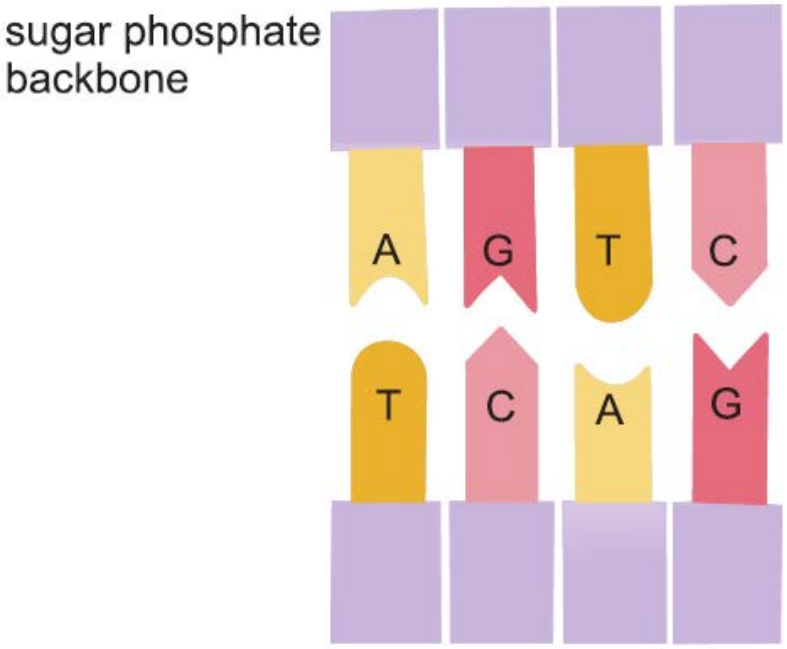


Bacterial Types
bacillus
coccus
spirillum
bacilli
cocci
spirilli

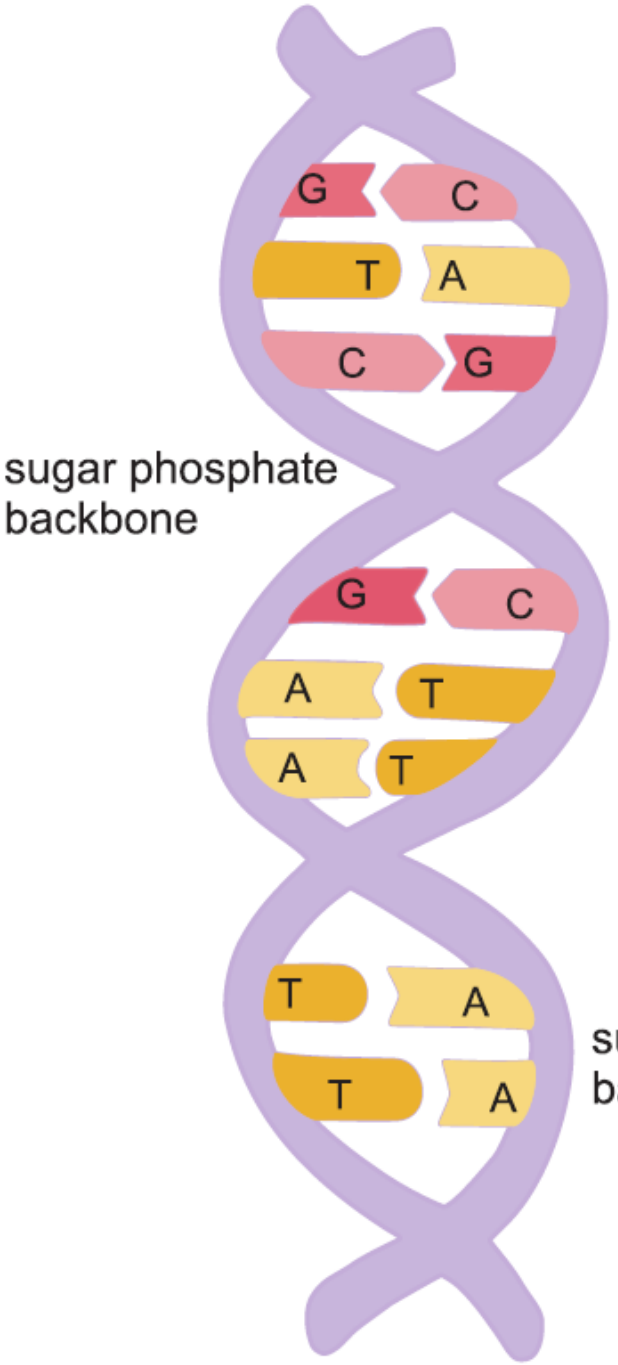
8

DNA


G A G A C C T T G A
C T C T G G A A C T


sugar phosphate backbone
A G T C
T C A G

DNA Double Helix



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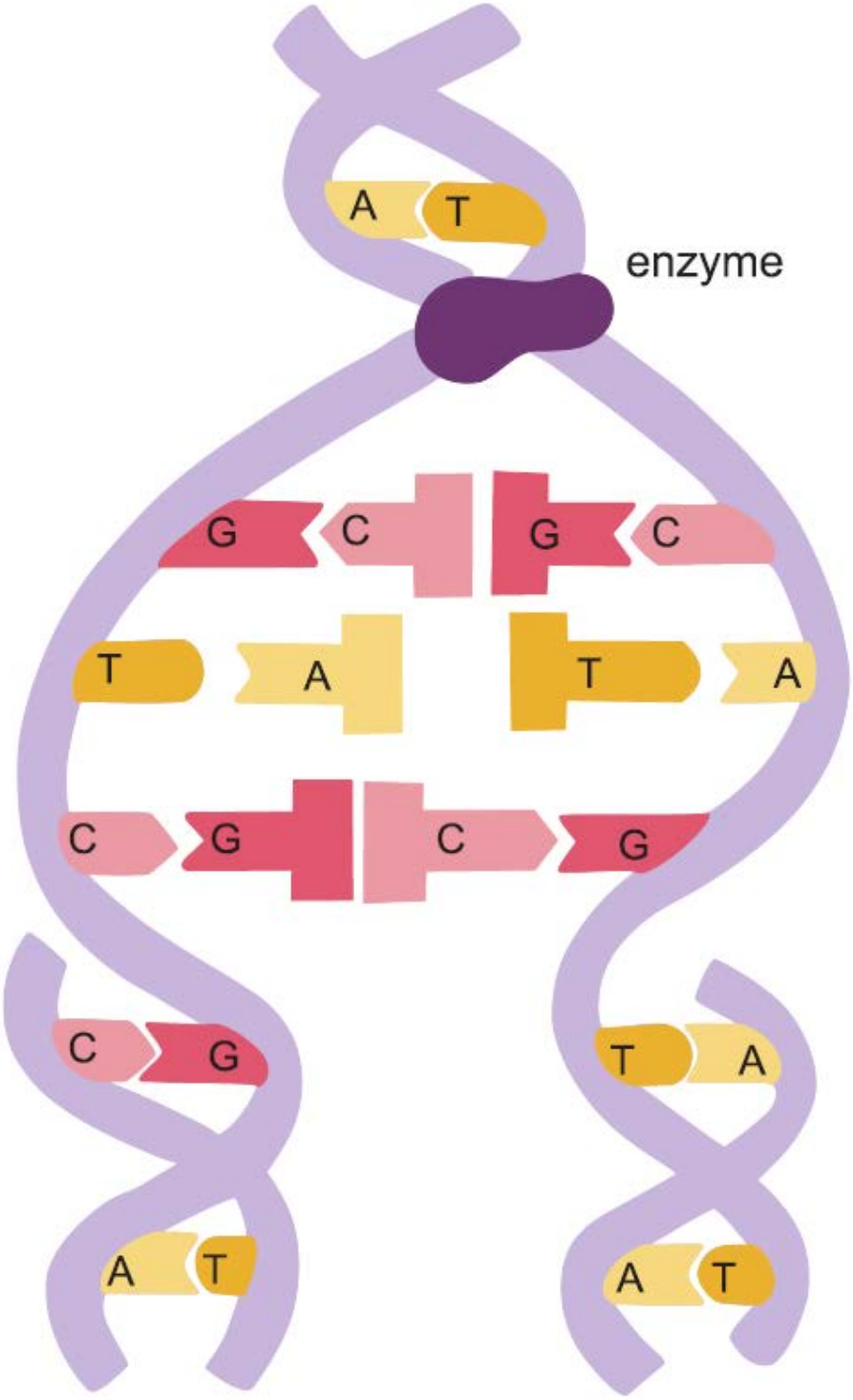
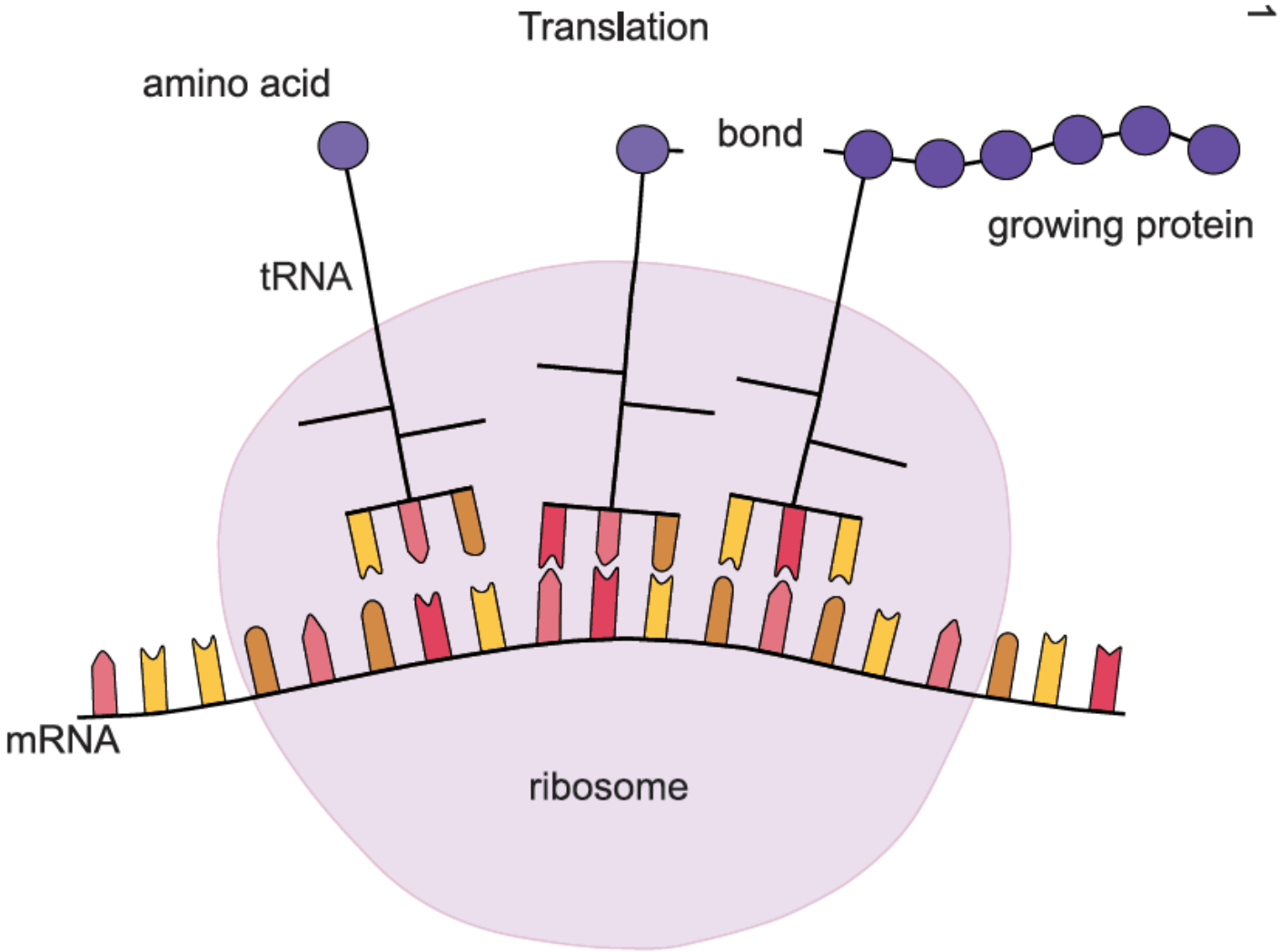
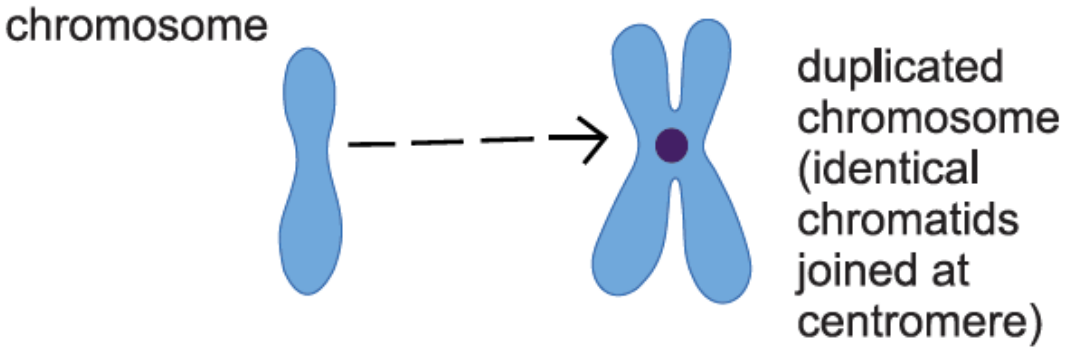
DNA Replication




Translation
amino acid
bond
growing protein
tRNA
mRNA
ribosome

12

Chromosome Duplication



Cell Cycle Chart

Key:

Interphase

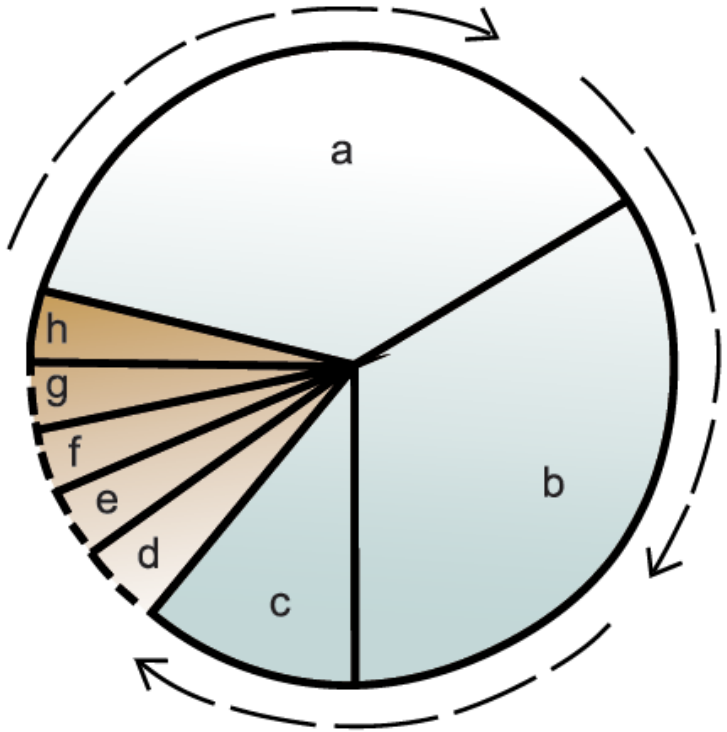
- a Cell grows
- b DNA and chromosomes replicated
- c Cell prepares to divide

Mitosis

- d Prophase
- e Metaphase
- f Anaphase
- g Telophase

Cytokinesis

- h Cytoplasm divides



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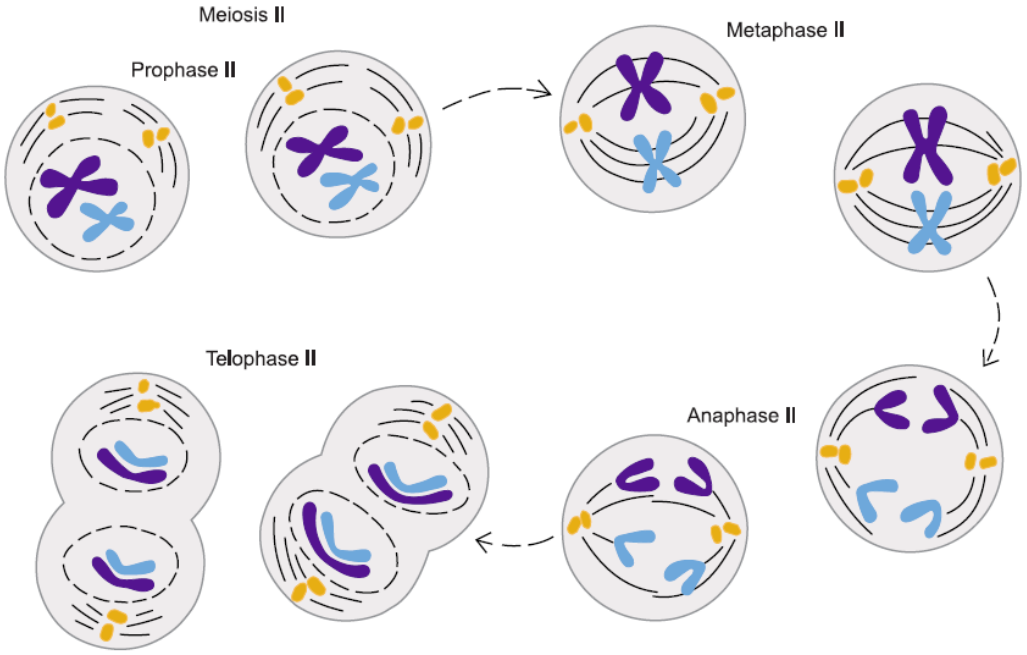
Mitosis
Key:
1 Mitosis begins
2 Prophase
3 Metaphase
4 Anaphase
5 Telophase
1
2
3
4
5

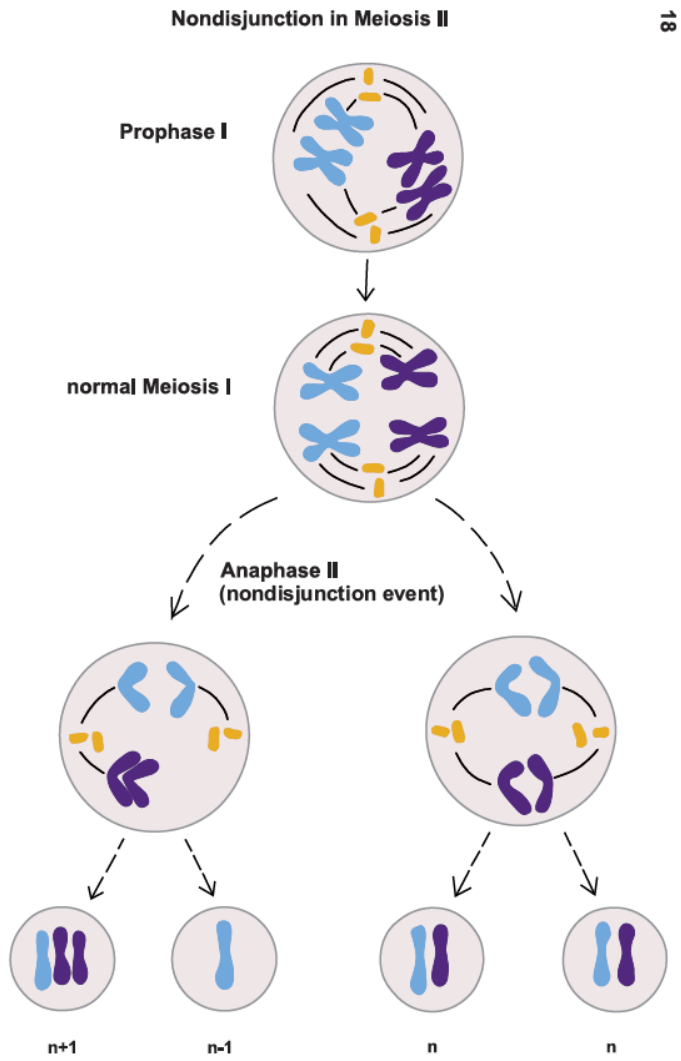
15

16


Meiosis II
Prophase II
Metaphase II
Telophase II
Anaphase II

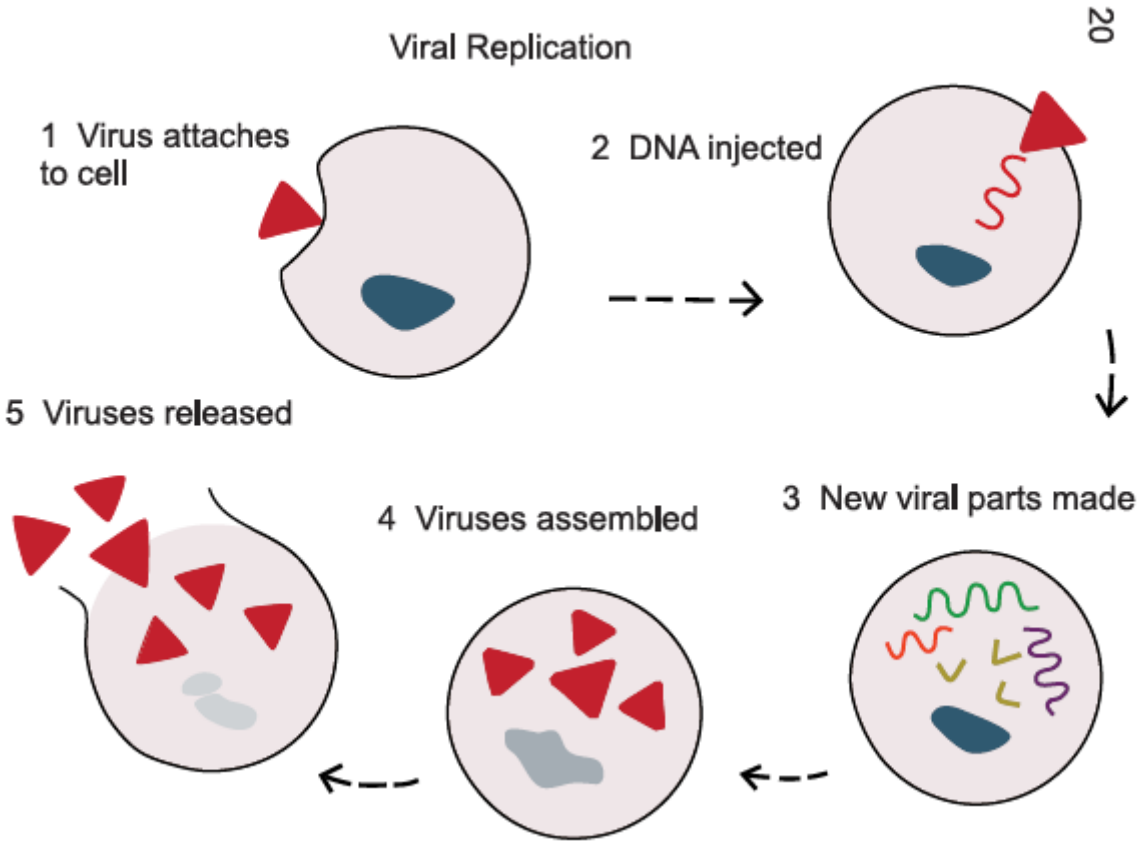
17

Nondisjunction in Meiosis I
Prophase I
Anaphase I
(nondisjunction
event)
Anaphase II in
Meiosis II
n-1
n-1
n+1
n+1

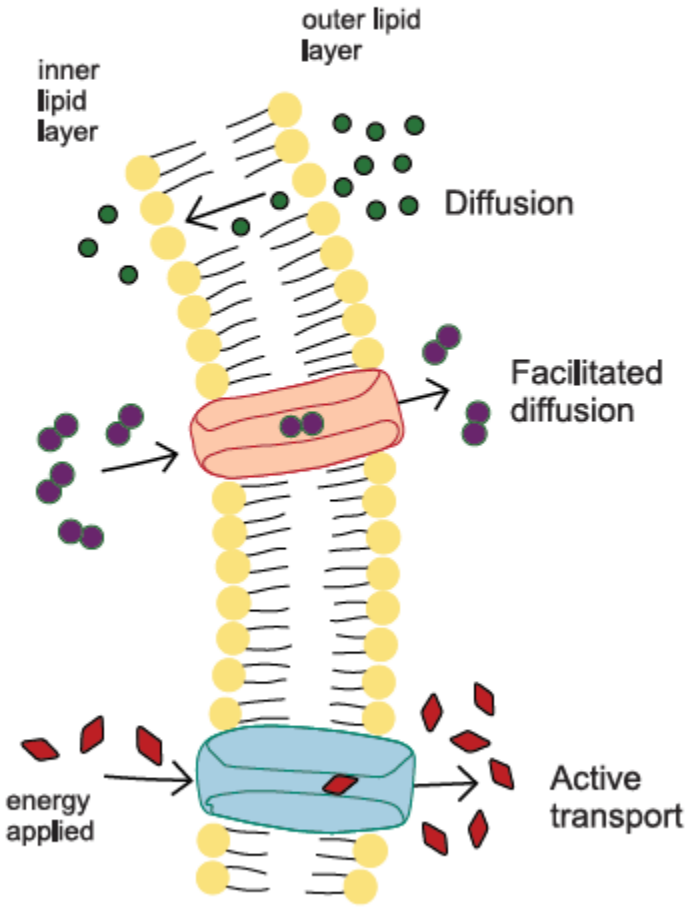

Nondisjunction in Meiosis II
Prophase I
normal Meiosis I
Anaphase II
(nondisjunction event)
n+1
n-1
n
n

19

Development
offspring
Fertilization
zygote (2n)
Meiosis
in male
sperm (n)
egg (n)
Meiosis
in female


Viral Replication
1 Virus attaches to cell
2 DNA injected
3 New viral parts made
4 Viruses assembled
5 Viruses released

Membrane Transport (1)



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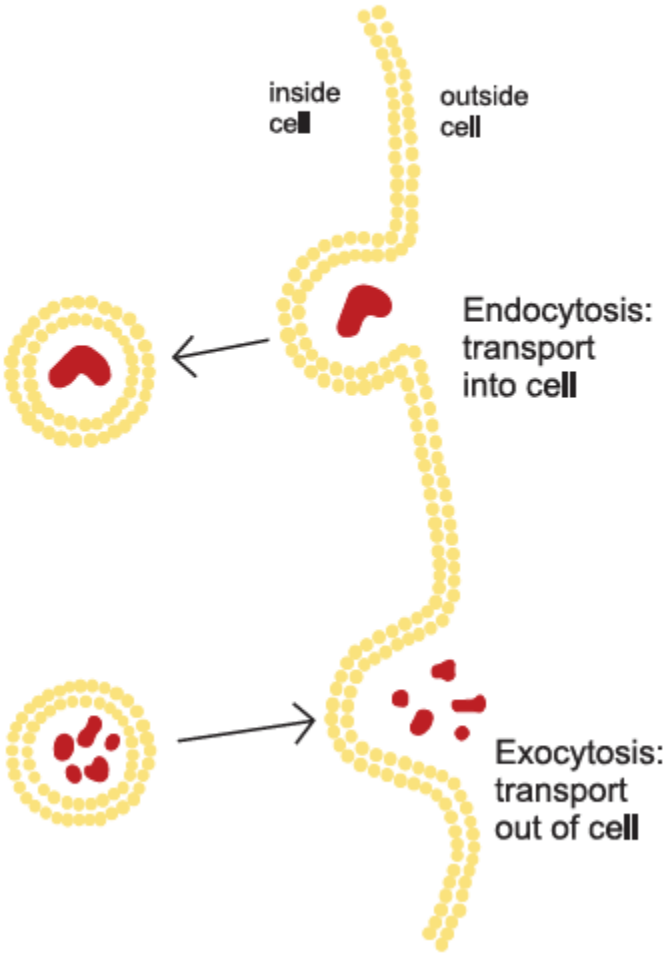
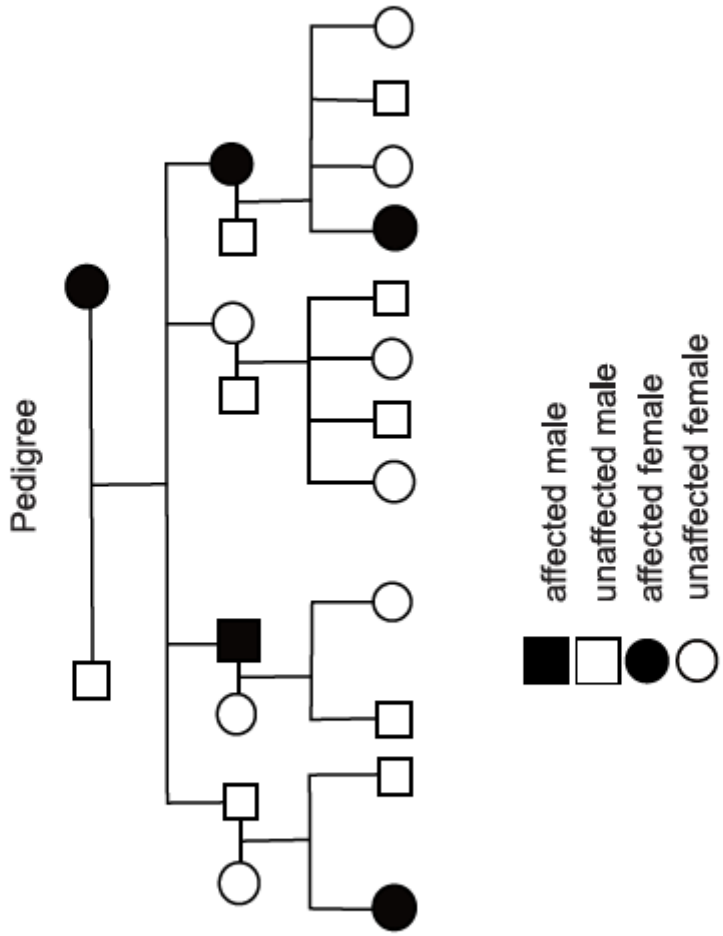
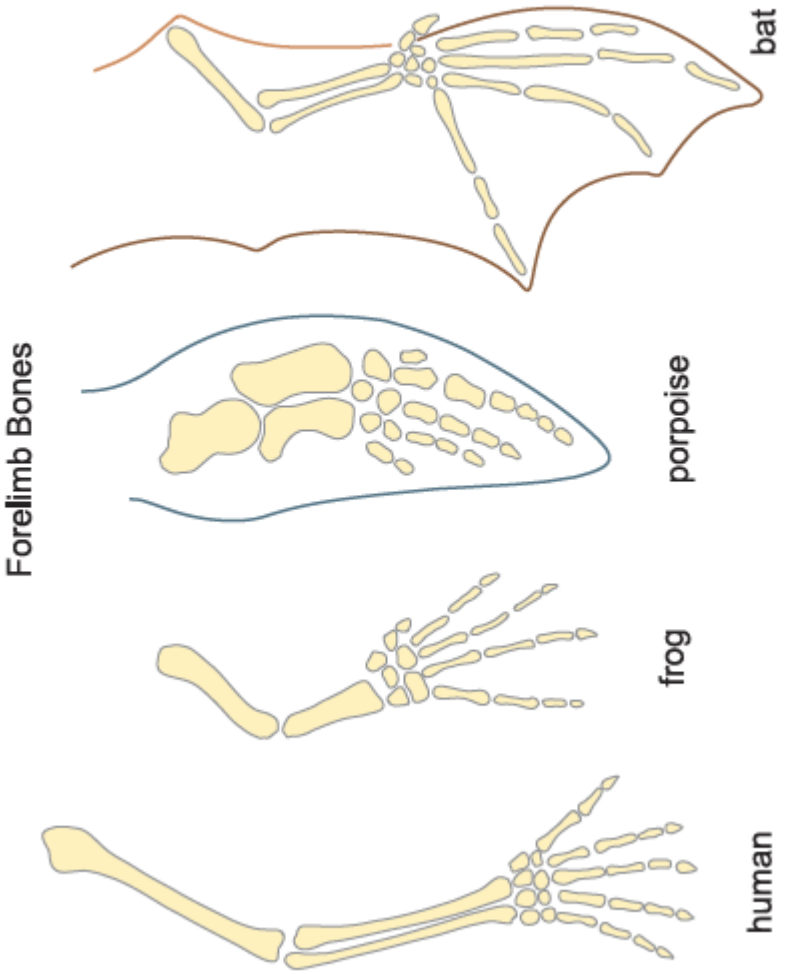
Membrane Transport (2)

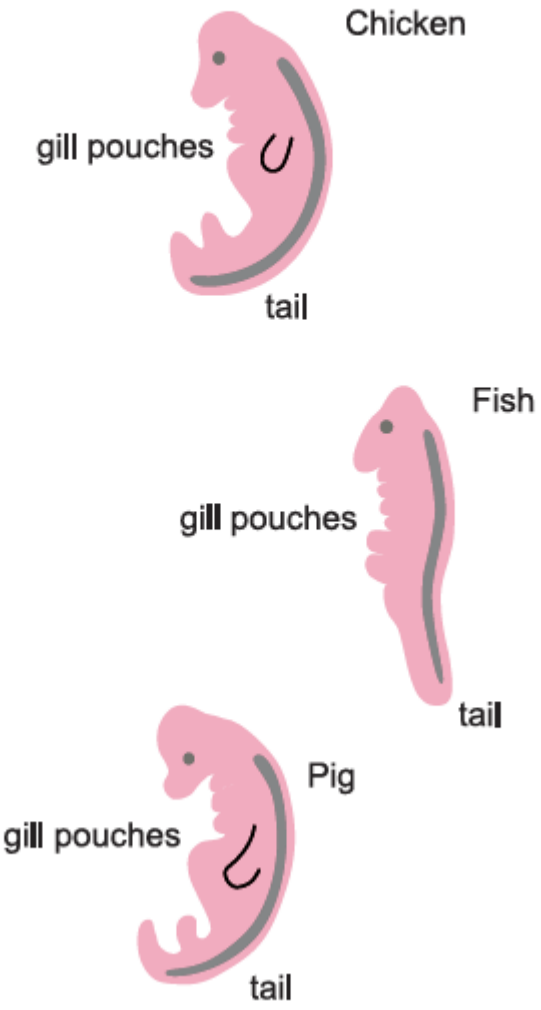



Pedigree
affected male
unaffected male
affected female
unaffected female

24



Comparative Embryology

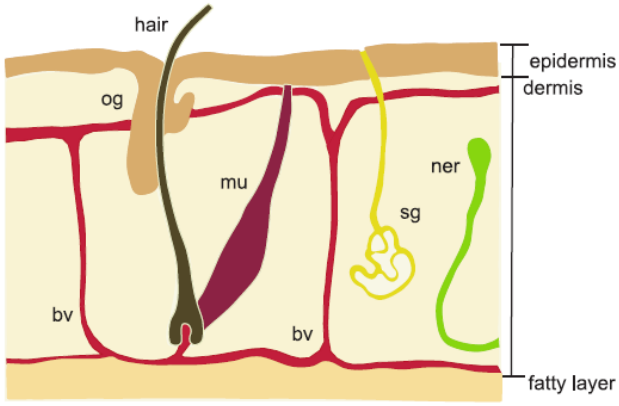


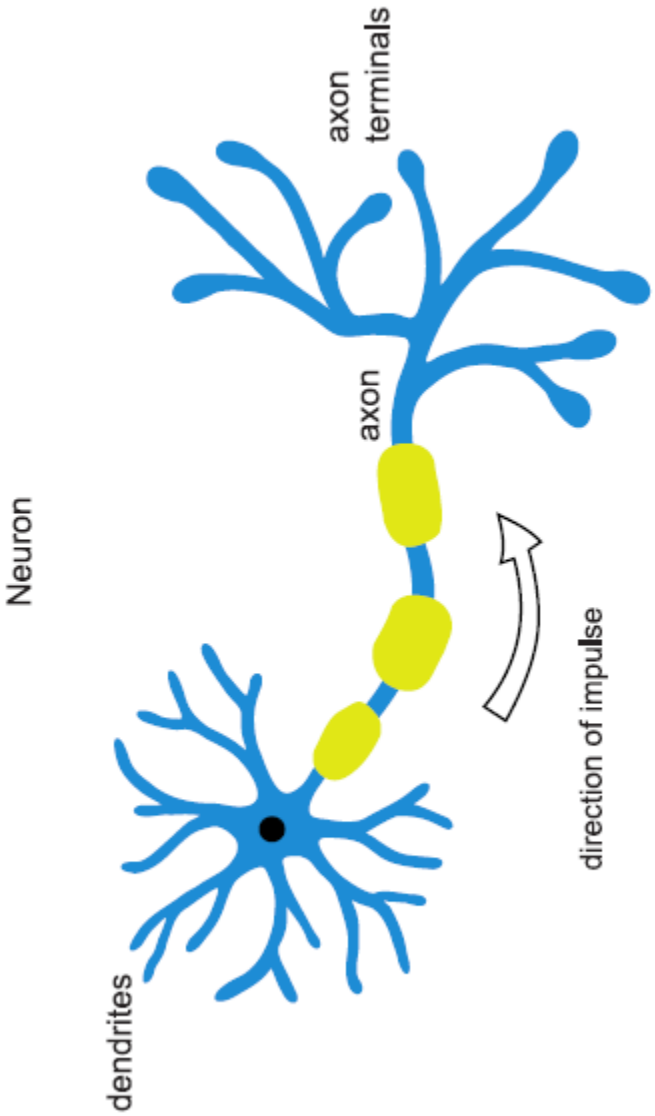
Skin Cross-Section

Key:

bv blood vessel
mu muscle
ner nerve
og oil gland
sg sweat gland

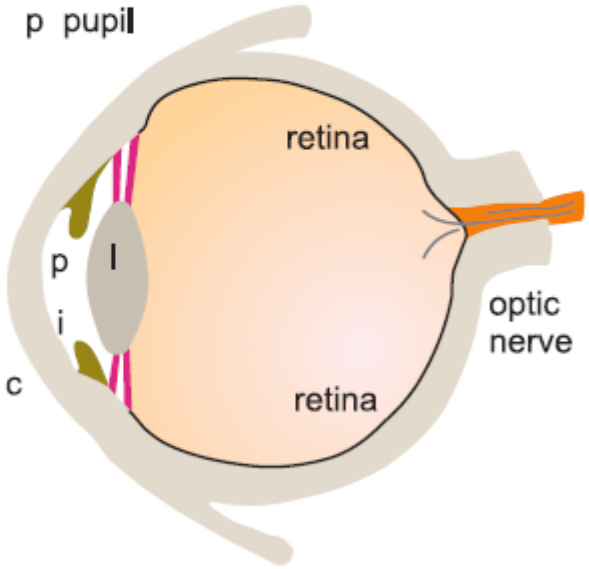
Skin Cross-Section




Neuron
axon terminals
axon
direction of impulse
dendrites

The Eye

Key:
c cornea
i iris
l lens
p pupil

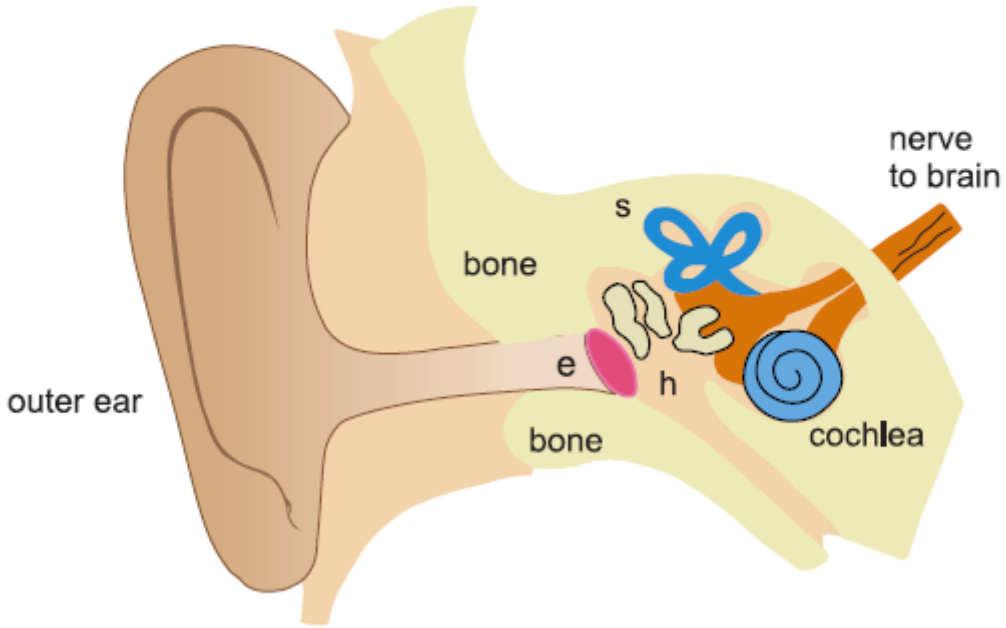


cutaway side view

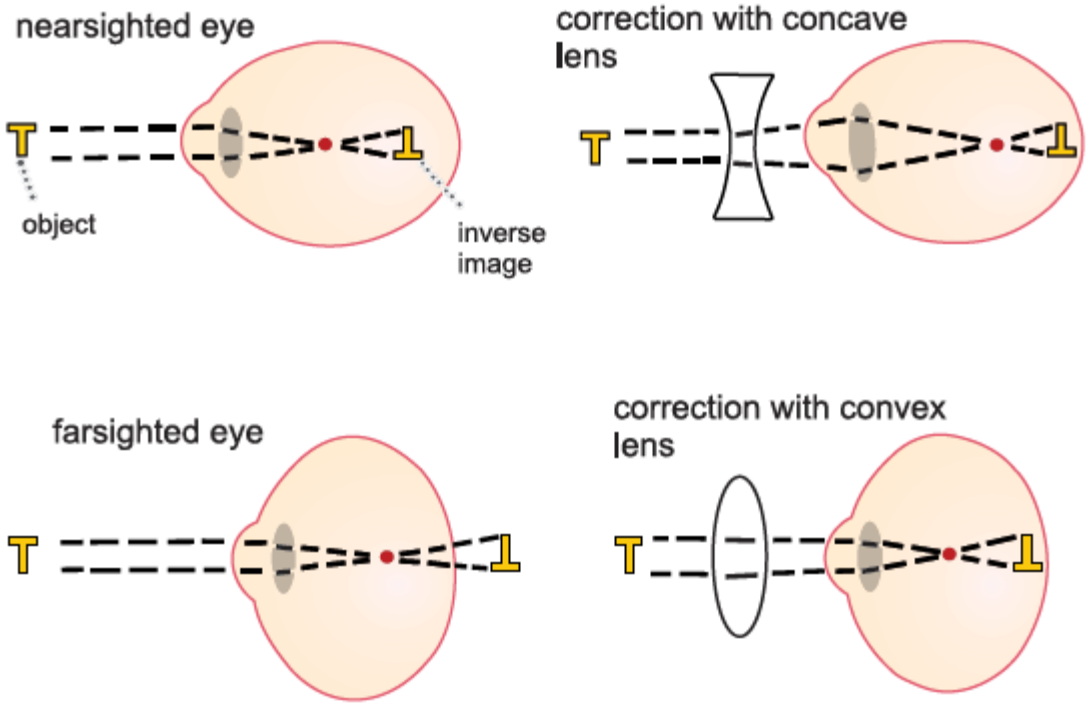
front view

The Ear

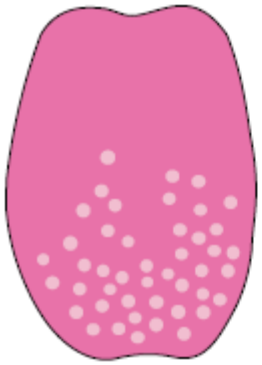
Key:
e eardrum
h hammer, anvil, stirrup
s semicircular canals



Using Lenses for Vision Correction

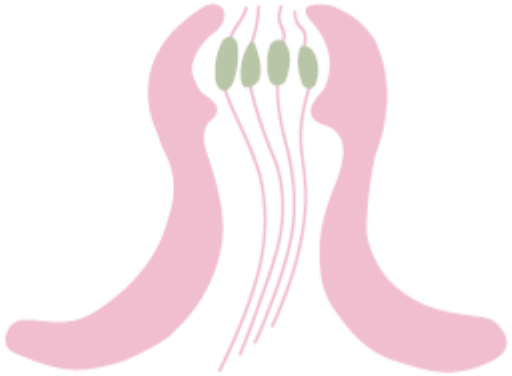


Sense of Taste



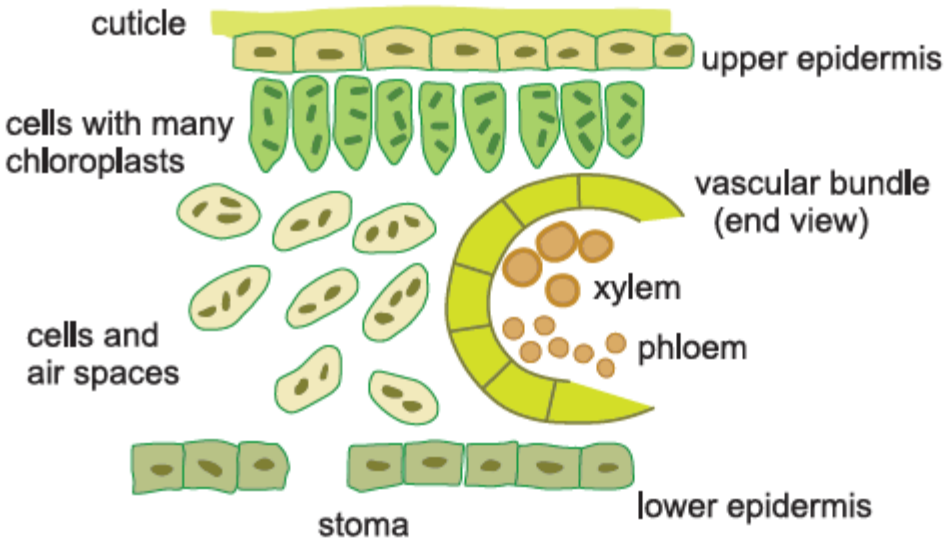
tongue with papillae

taste hairs within taste pore



papilla with taste bud

Leaf Cross-Section



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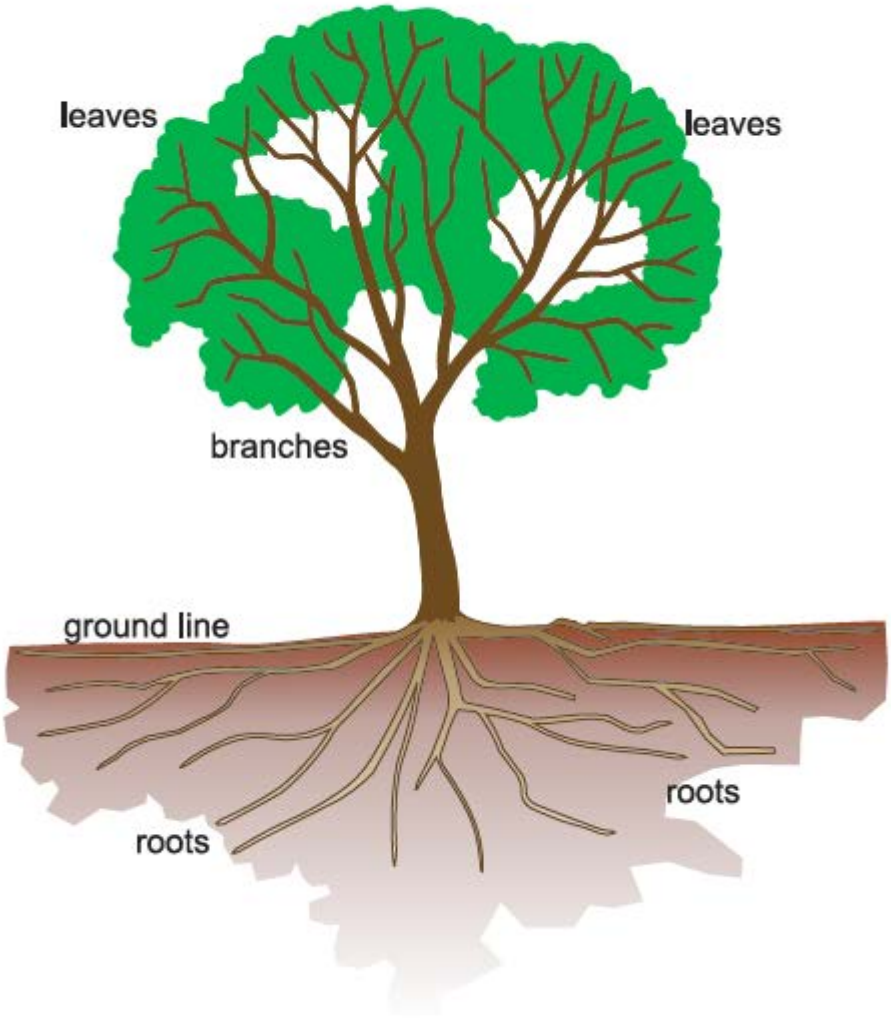
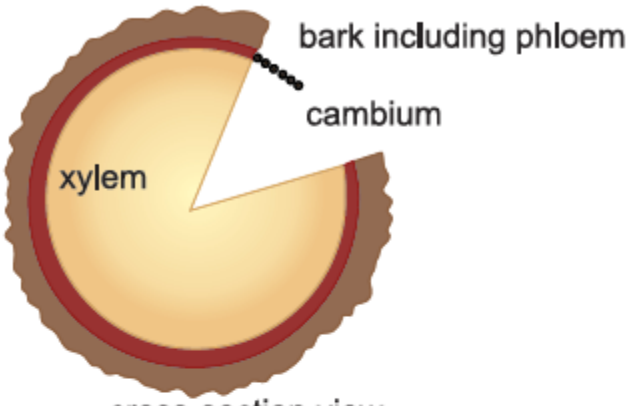
Tree Canopy and Roots Compared



34 Vascular Structure of Wood



cross-section view

---

phloem (magnified)

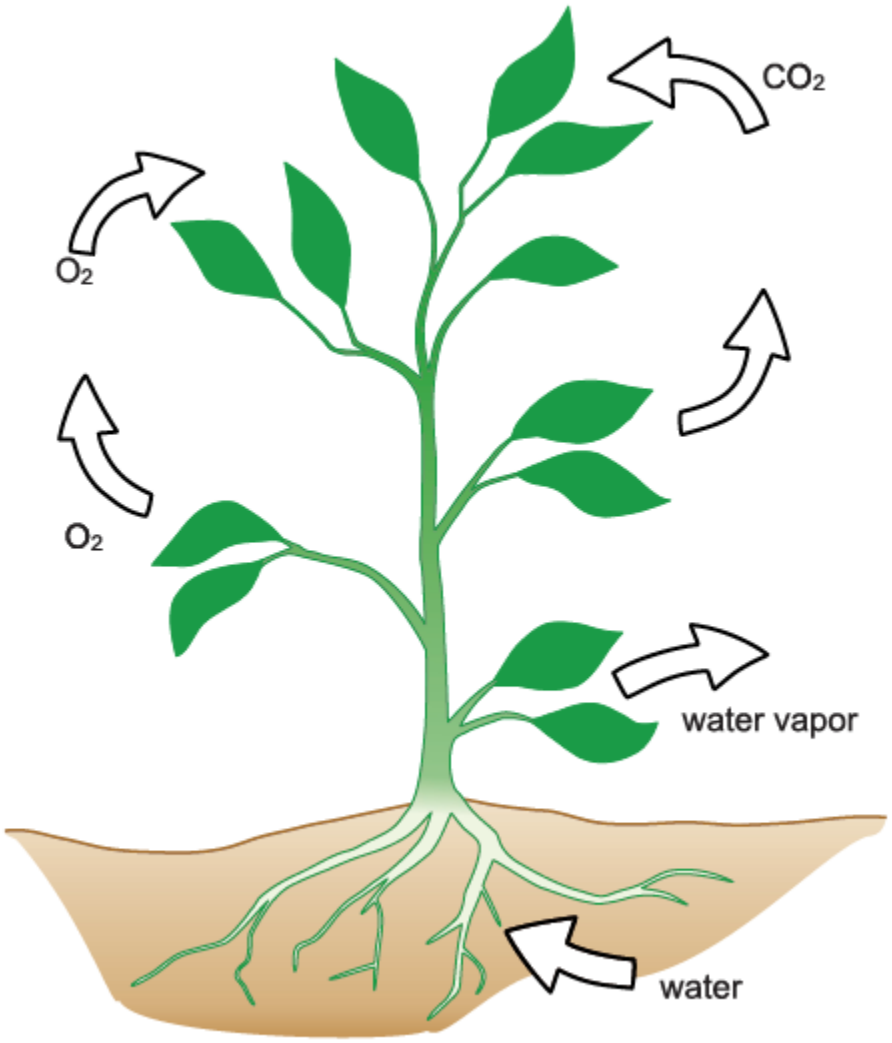
end view cutaway side view

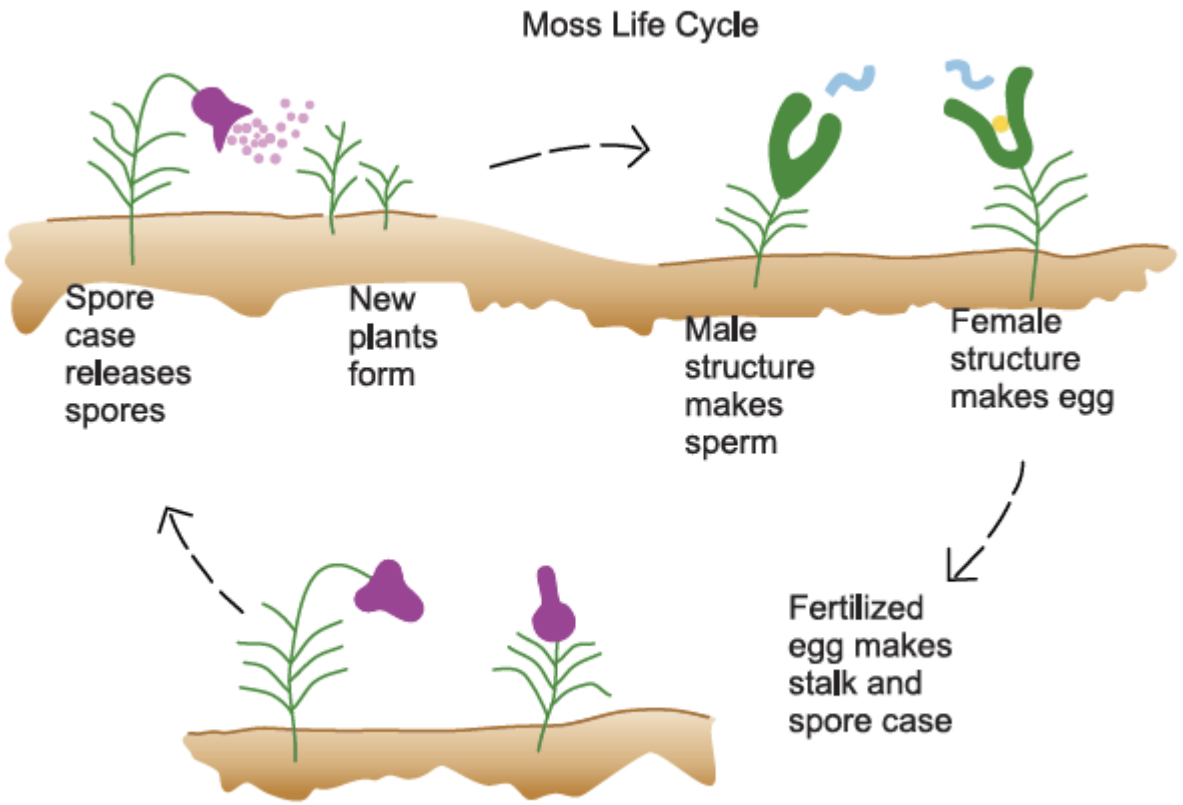
xylem (magnified)

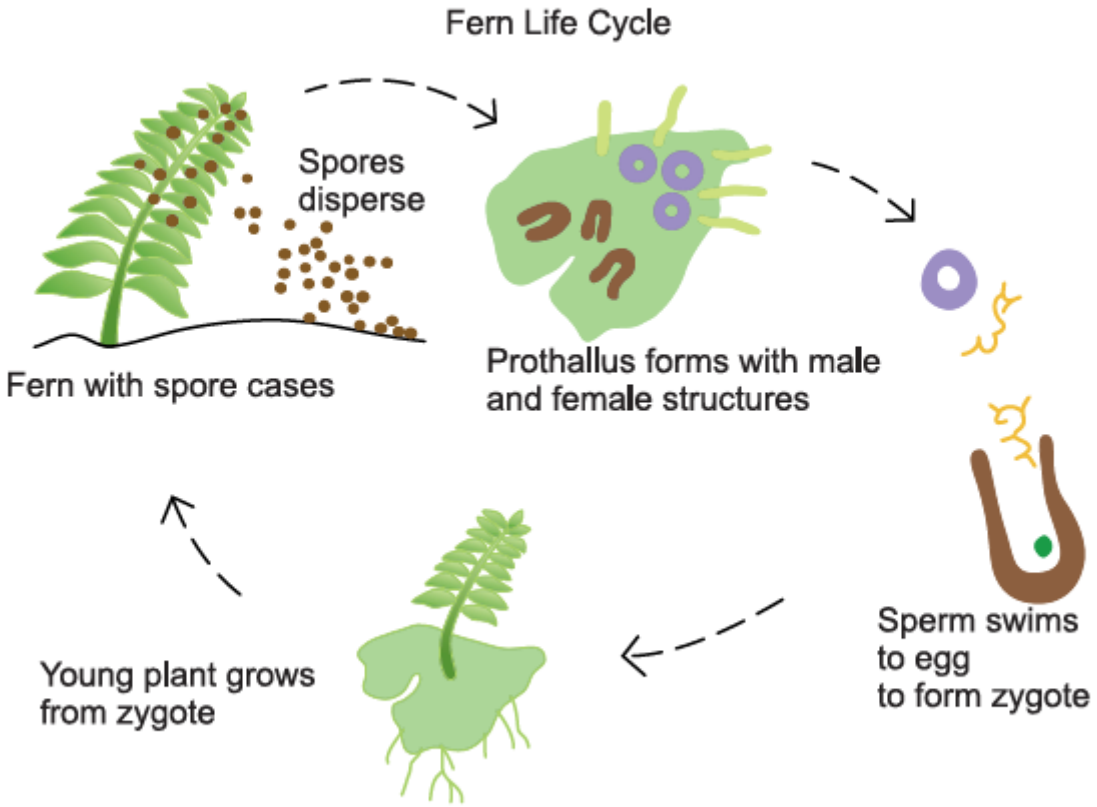
end view cutaway side view

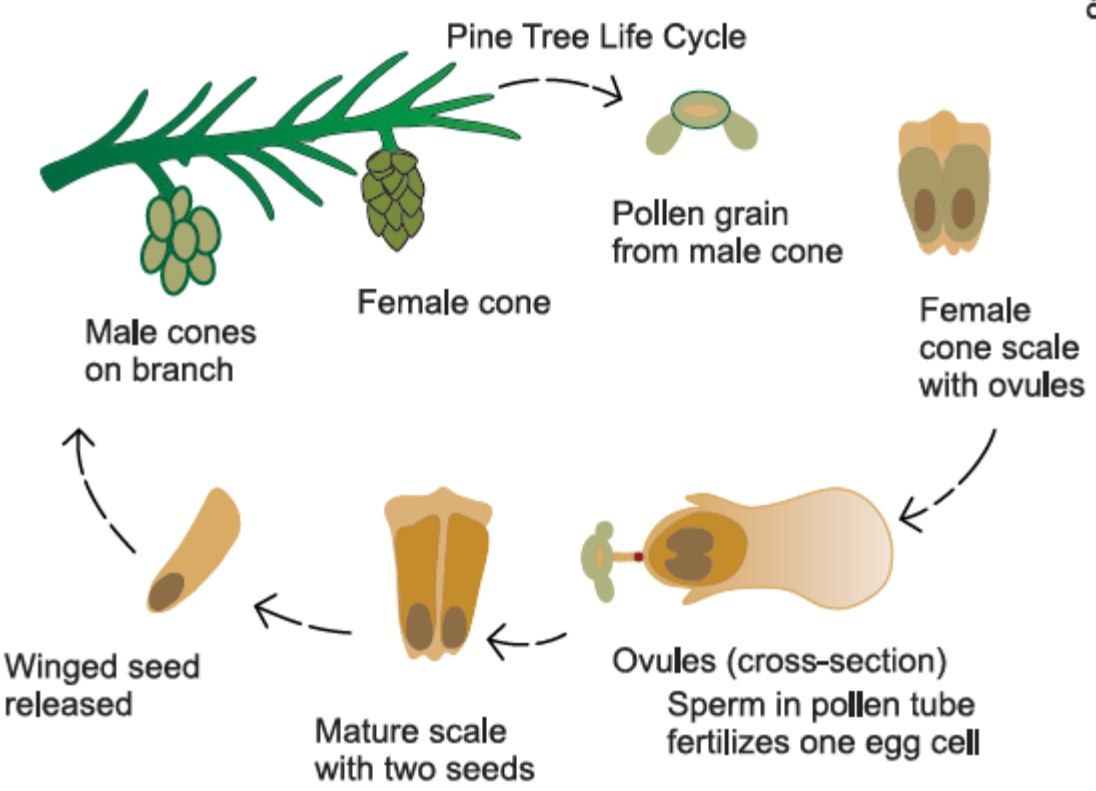
35

Plant Intake and Output

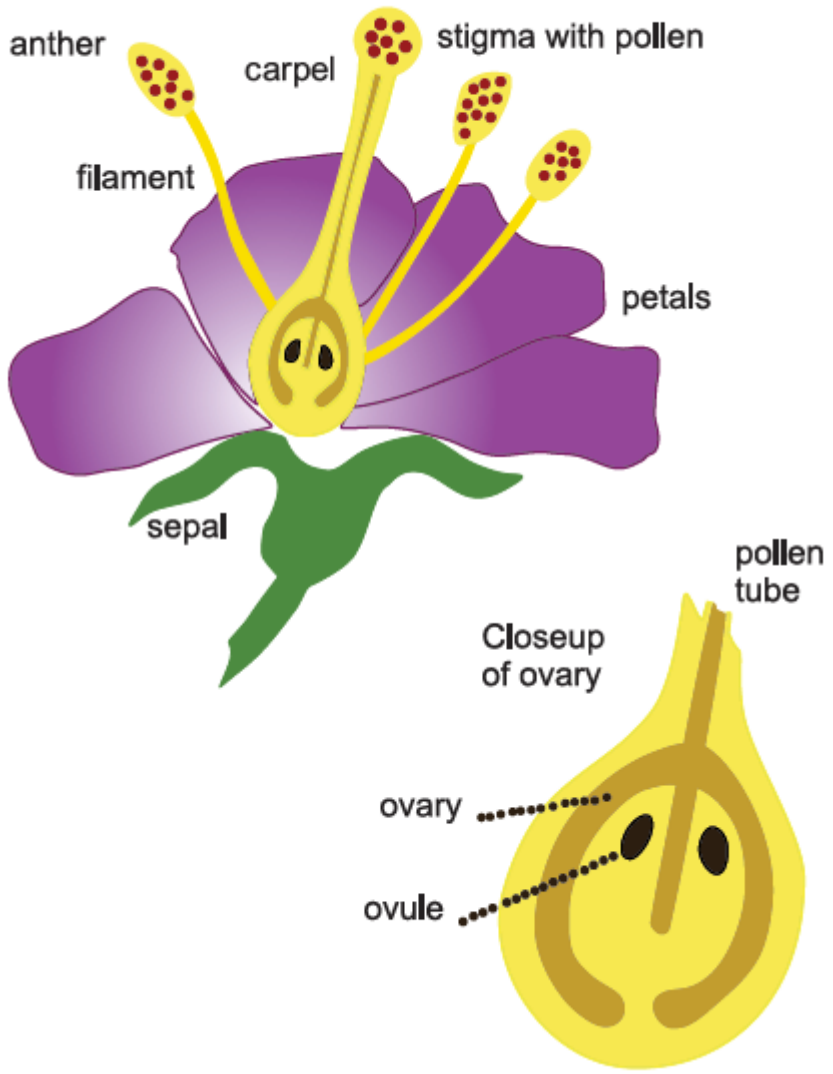



Moss Life Cycle
Spore case releases spores
New plants form
Male structure makes sperm
Female structure makes egg
Fertilized egg makes stalk and spore case


Fern Life Cycle
Spores disperse
Fern with spore cases
Prothallus forms with male and female structures
Sperm swims to egg to form zygote
Young plant grows from zygote


Pine Tree Life Cycle
Pollen grain
from male cone
Female cone
Male cones
on branch
Female
cone scale
with ovules
Ovules (cross-section)
Sperm in pollen tube
fertilizes one egg cell
Mature scale
with two seeds
Winged seed
released

39 Parts of a Flower



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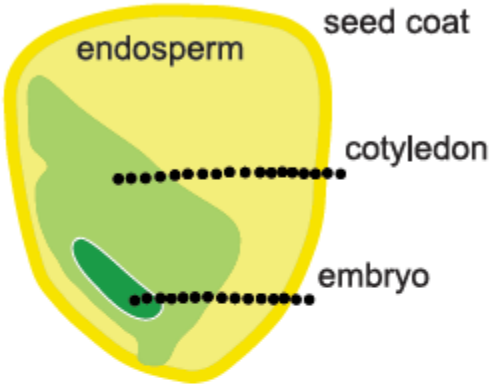
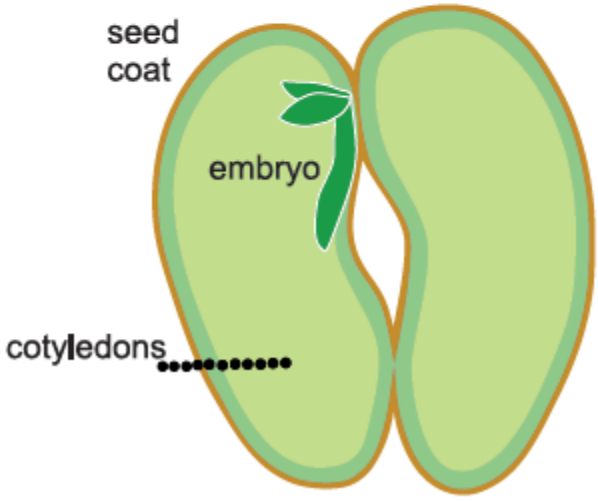
Monocot and Eudicot Seeds
(cutaway view)





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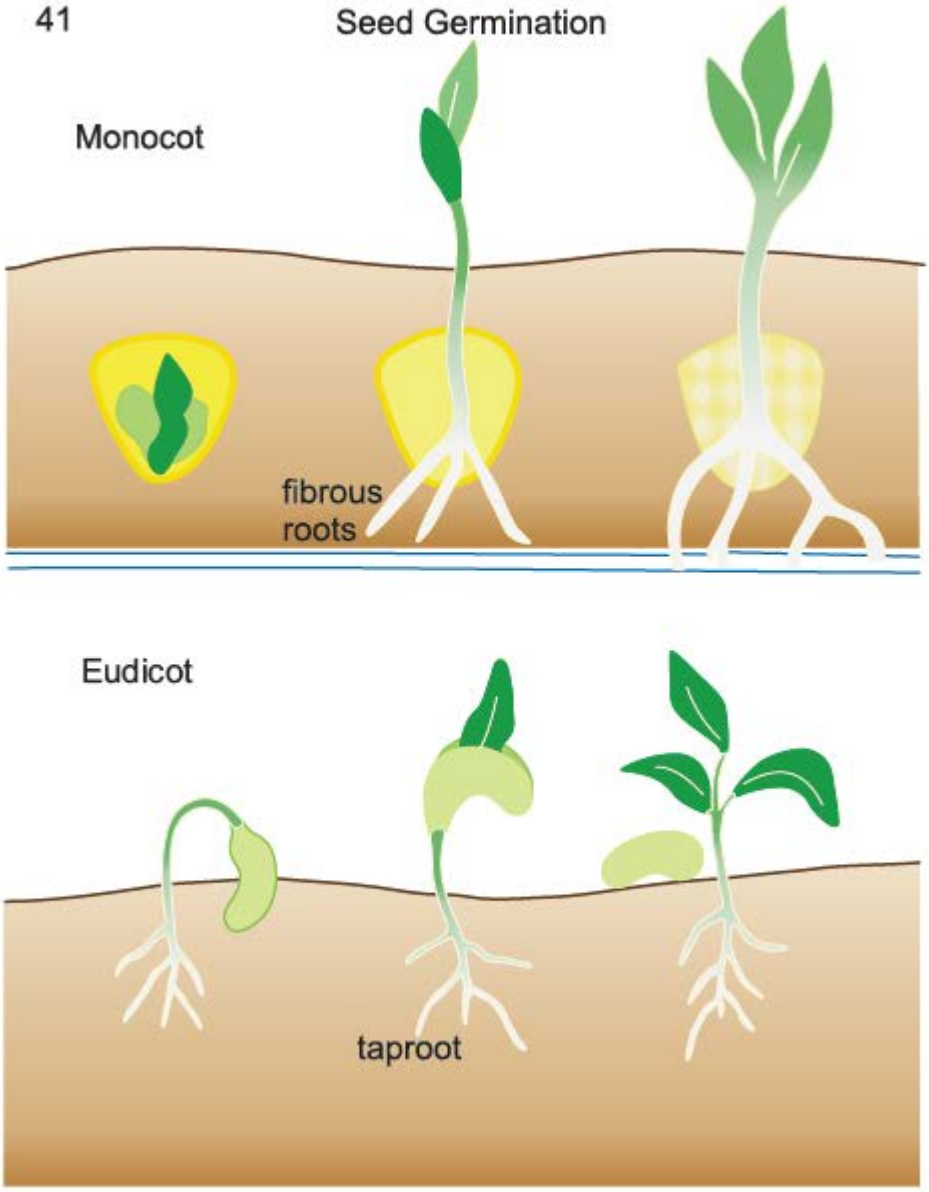
Seed Germination



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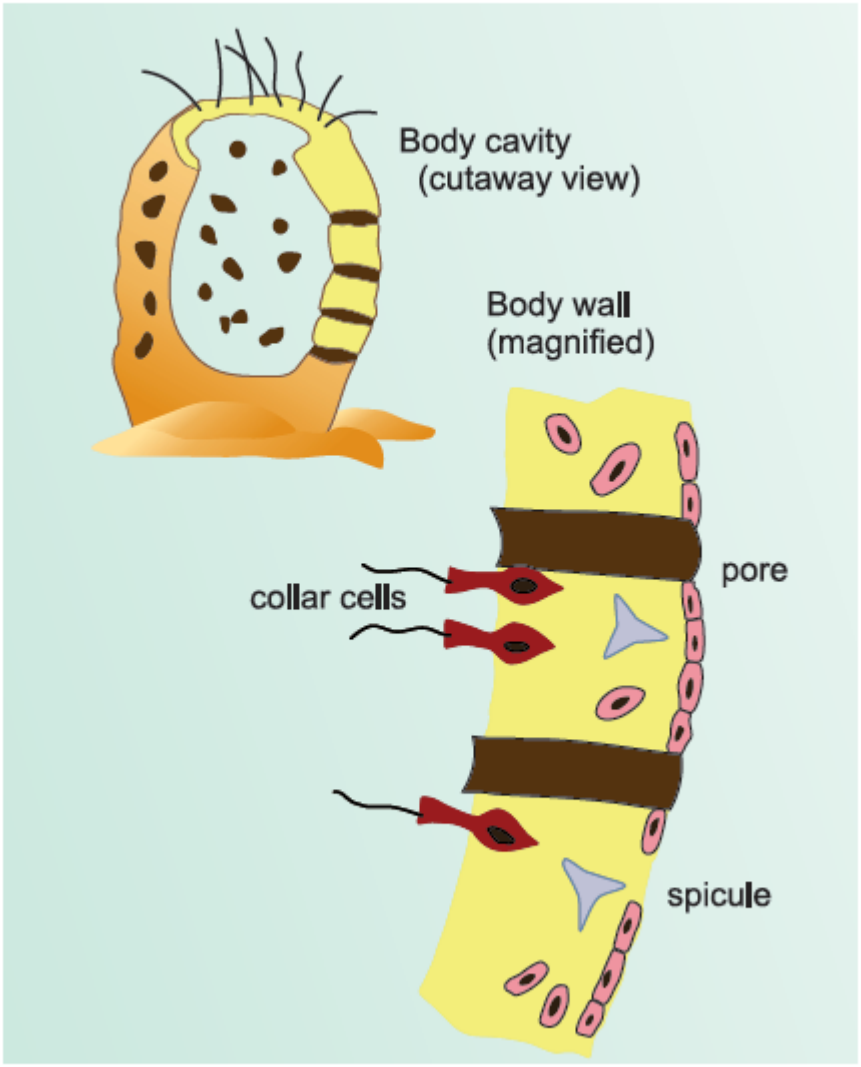
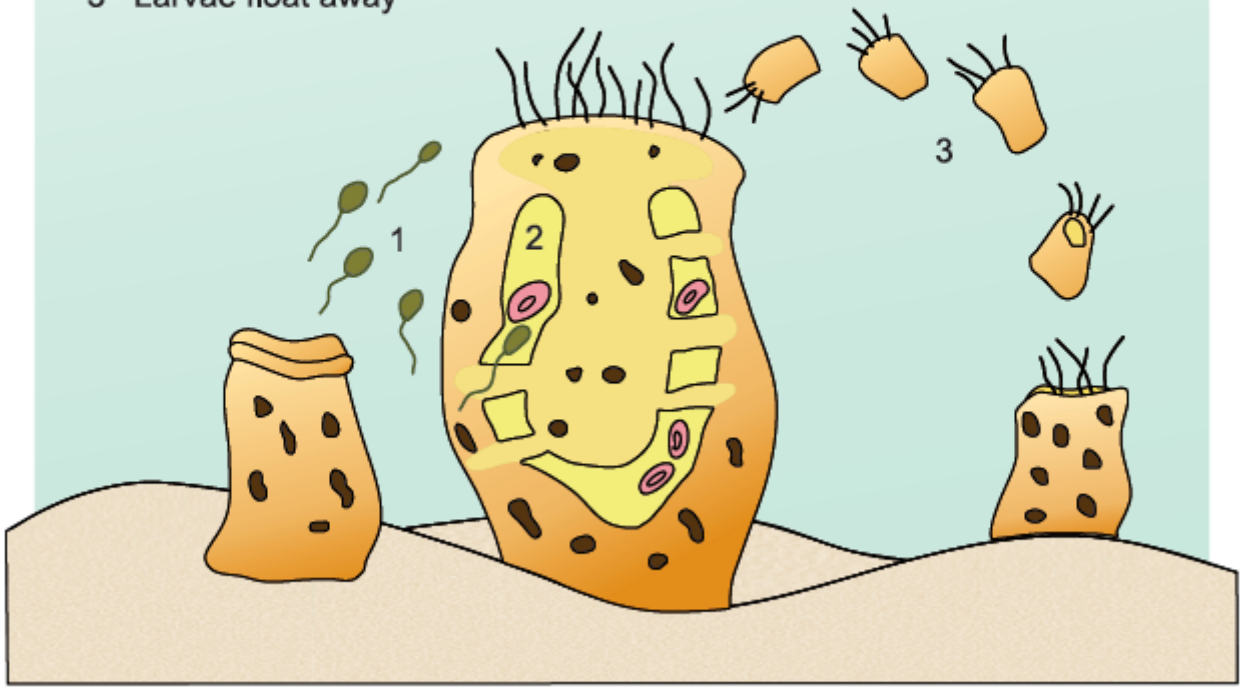
Sponge (detail)



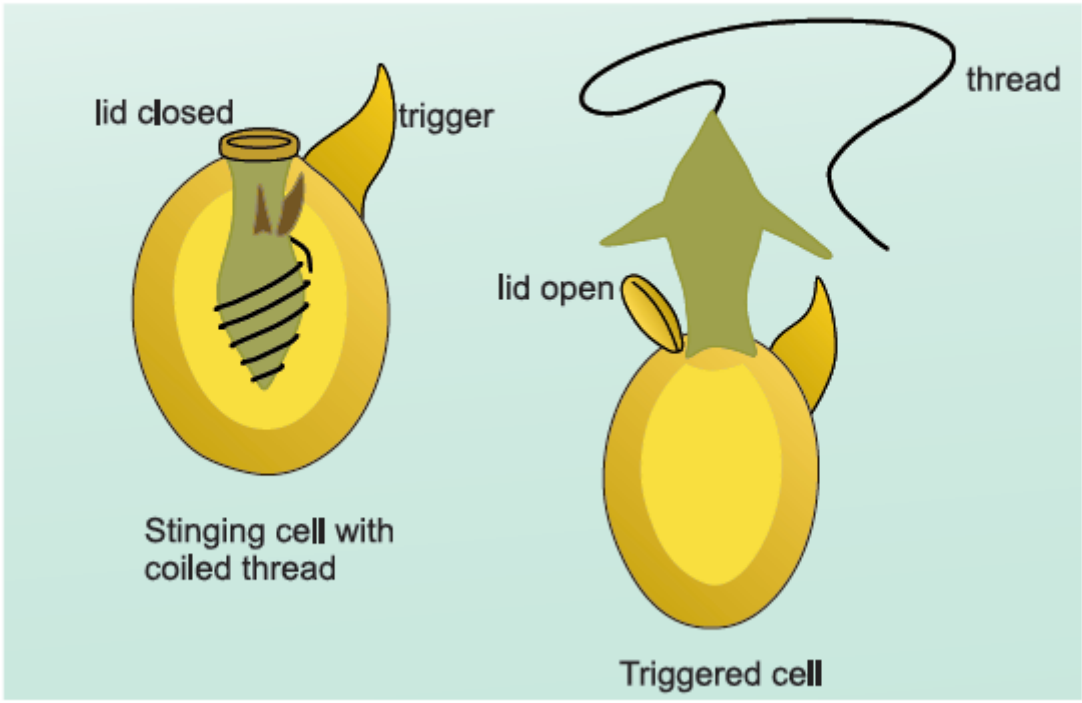
Sponge Life Cycle

Key:

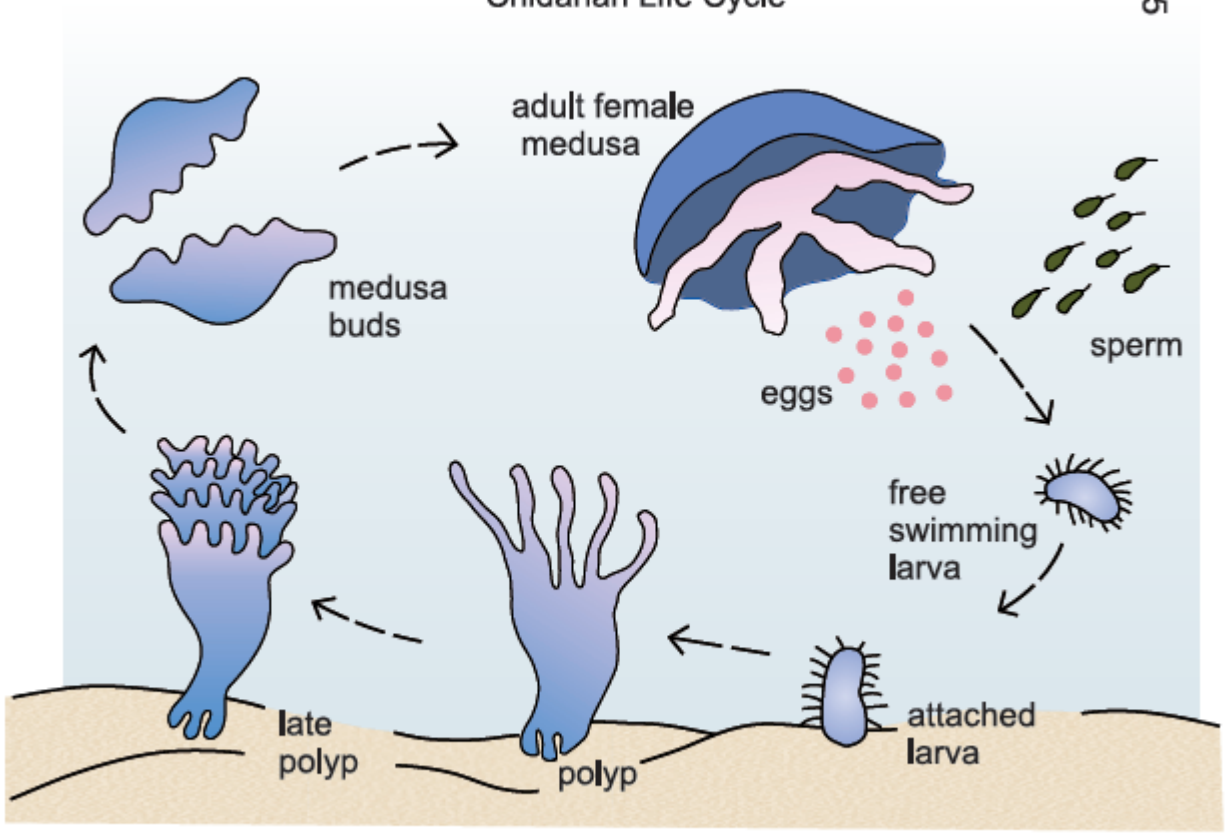
1 Sperm swim between sponges
2 Sperm fertilize egg cells
3 Larvae float away



Cnidarian Stinging Cell
(magnified cutaway view)



Cnidarian Life Cycle

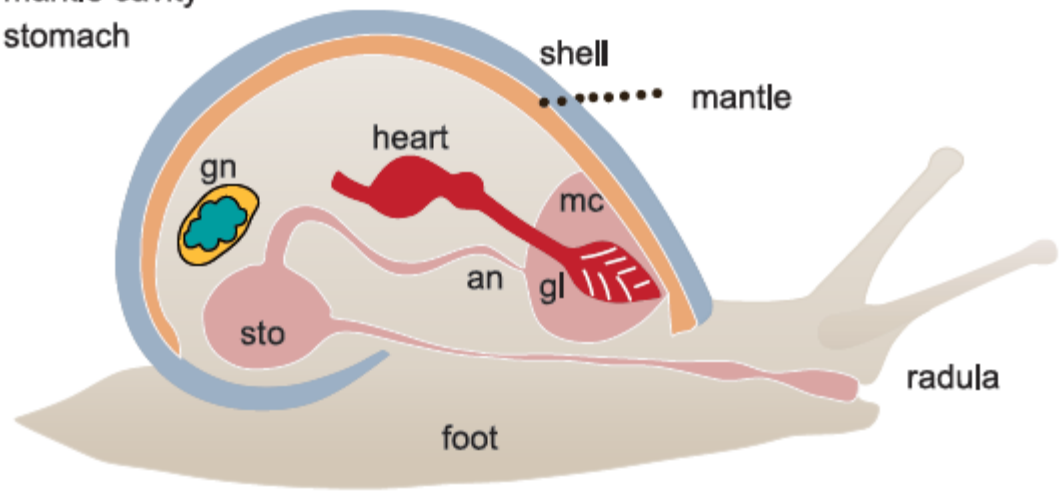


46

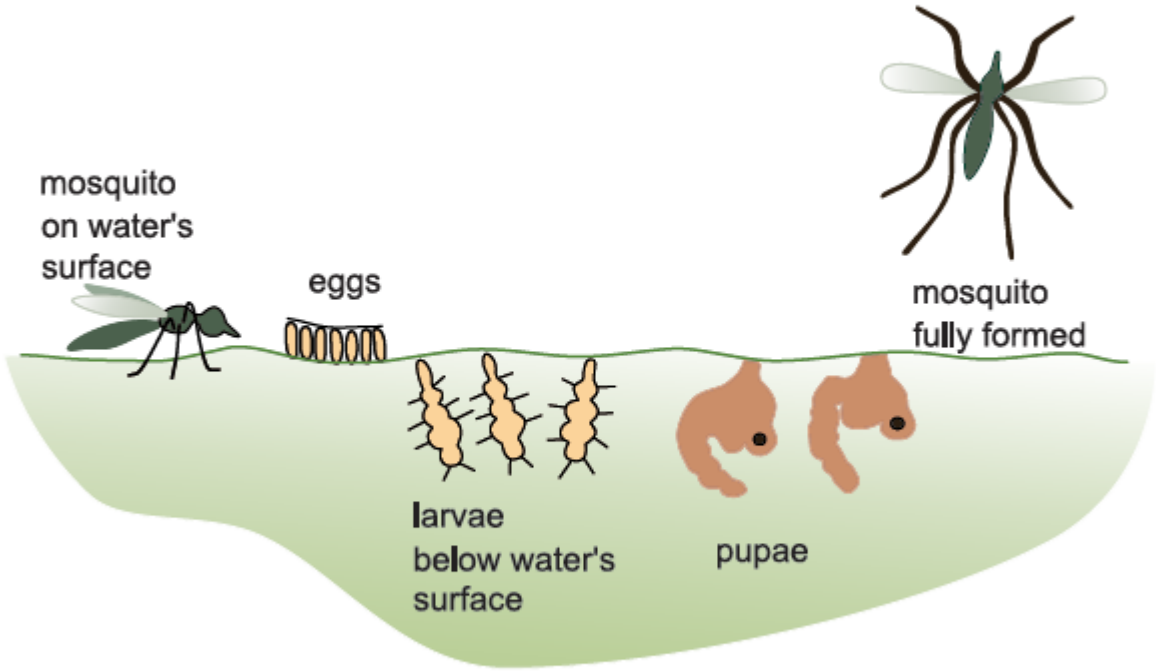
Flatworm and Roundworm
(cross-section)
fluid-filled cavity
inner layer
digestive tract
middle layer
outer layer

Snail Body Plan

Key:
an anus
gl gill or lung
gn gonads
mc mantle cavity
sto stomach



Insect Metamorphosis



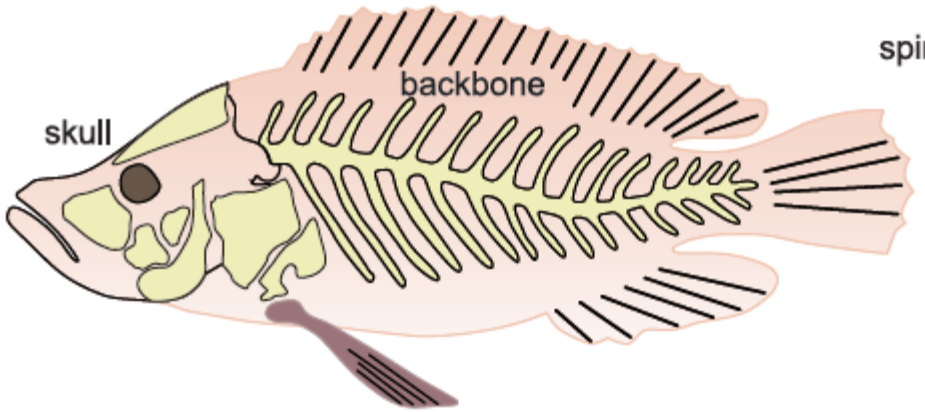
Insect Feeding Adaptations
(magnified heads)
Honeybee
eye
glossa
Butterfly
eye
siphon
antenna
Grasshopper
eye
mandible
palps

Fish Internal Organs

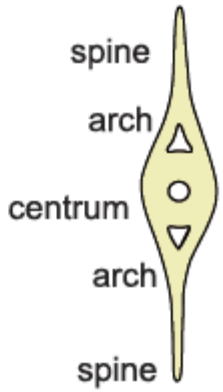
Key:

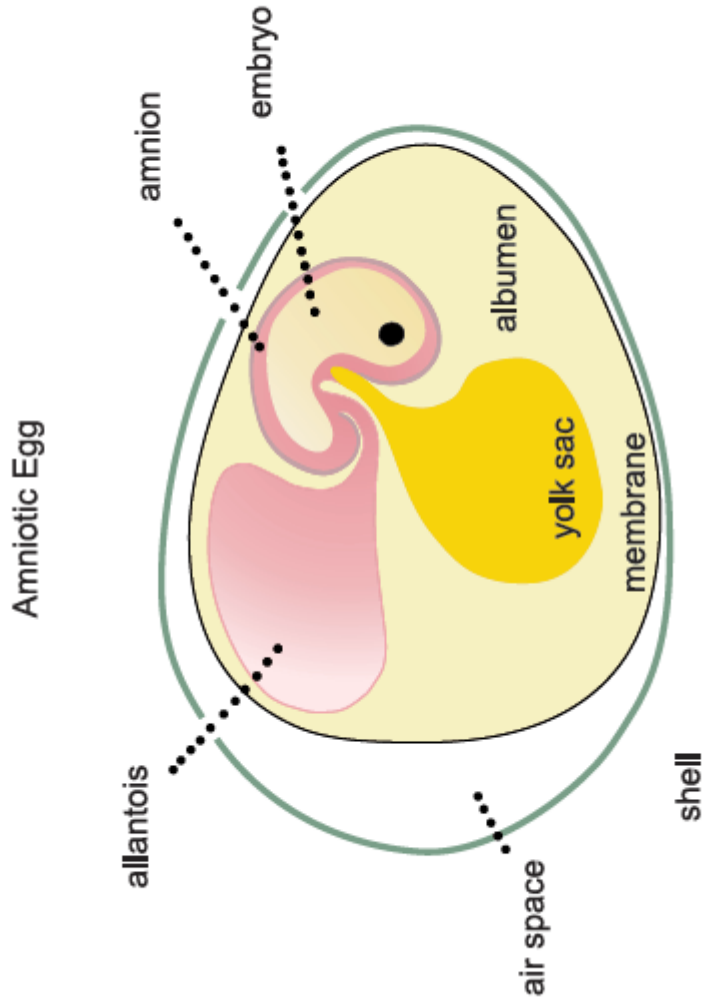
gl	gills
ht	heart
li	liver
sb	swim bladder
sto	stomach & intestines
ub	urinary bladder

Fish Skeleton

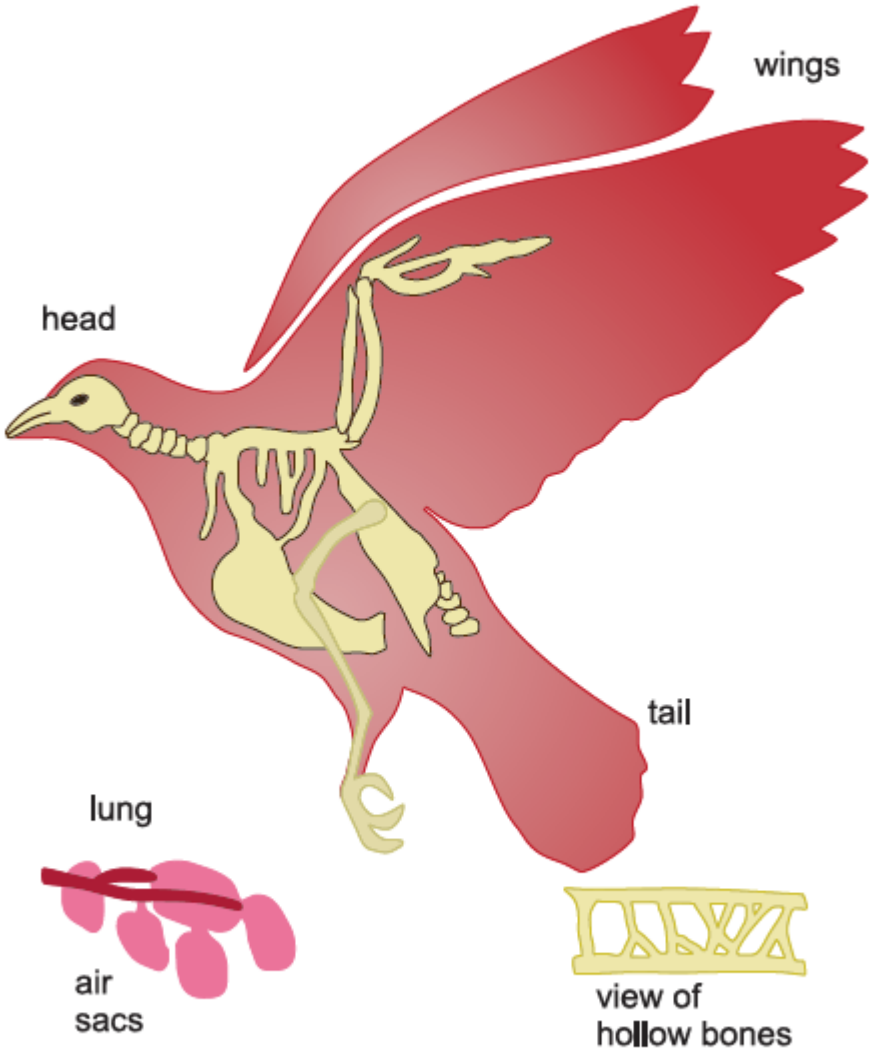


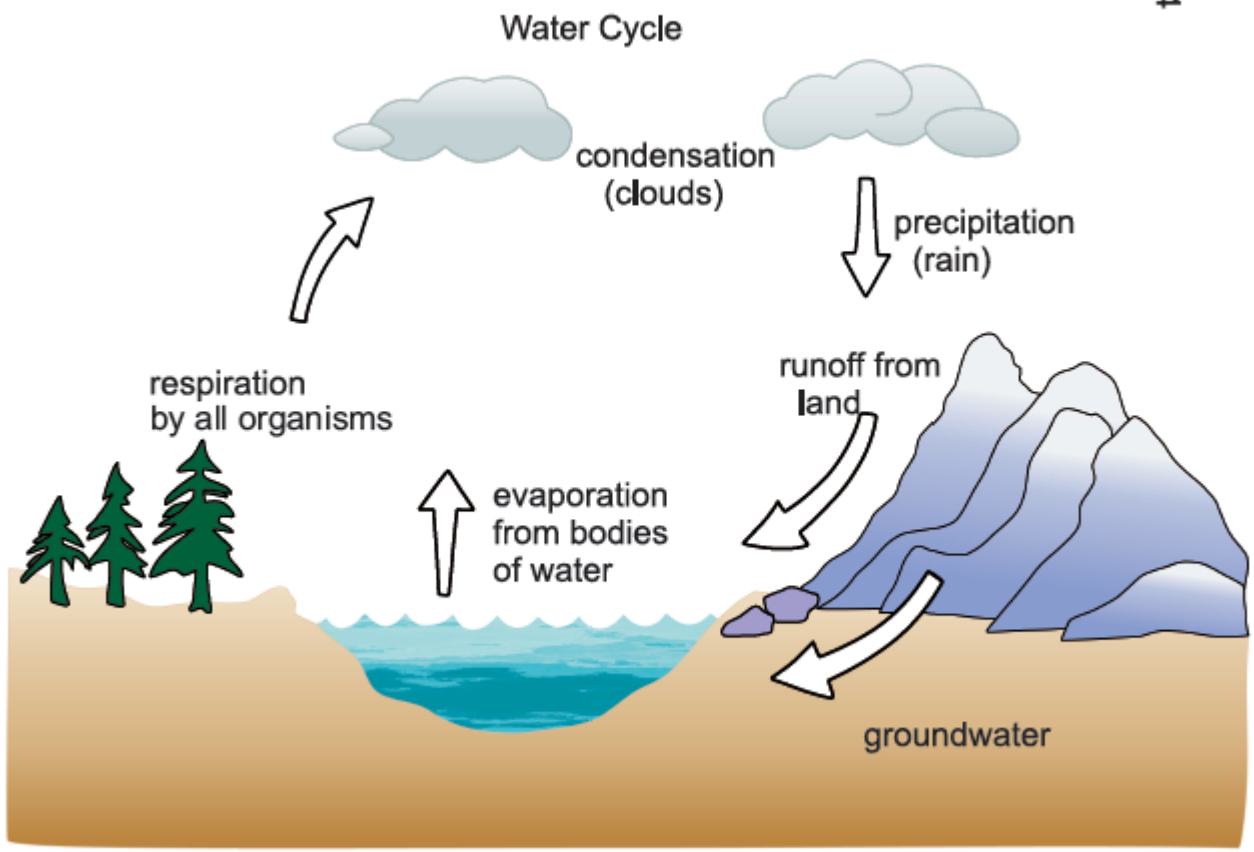
Vertebra

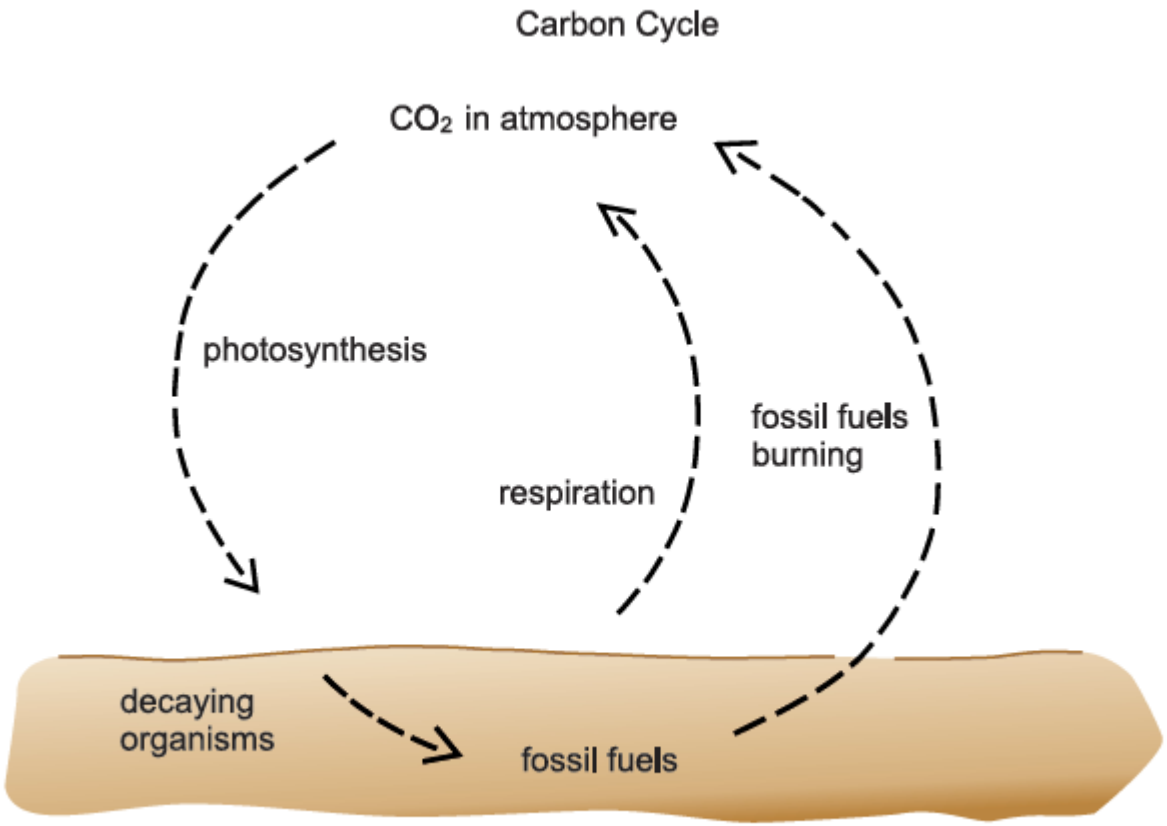



Amniotic Egg
amnion
embryo
albumen
yolk sac
membrane
allantois
air space
shell

Bird Flight Adaptations




Water Cycle
condensation
(clouds)
precipitation
(rain)
runoff from
land
respiration
by all organisms
evaporation
from bodies
of water
groundwater


Carbon Cycle
CO_2 in atmosphere
photosynthesis
respiration
fossil fuels burning
decaying organisms
fossil fuels

Food Web