

What are you doing?

- Figures and tables done?
- Cyanobacteria lab done?

Questions

- _____ is the loss of secondary and tertiary structure of a protein.
- Trypsinogen is to Trypsin as _____ is to _____
- An _____ is a category of proteases that can only cleave the internal bonds of a polypeptide chain.

Biology:

life study of

What is Life? Properties of Life

Cellular Structure: the unit of life, one or many

Metabolism: ~~photosynthesis, respiration, fermentation,~~
~~digestion,~~ gas exchange, secretion, excretion,
circulation--processing materials and energy

Growth: cell enlargement, cell number

Movement: intracellular, movement, locomotion

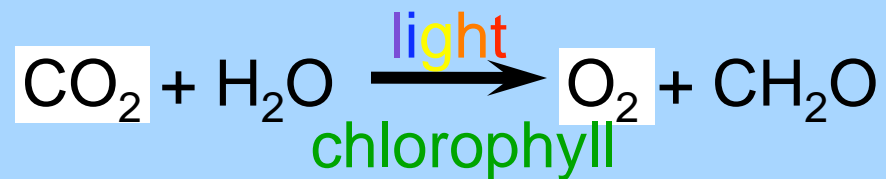
Reproduction: avoid extinction at death

Behavior: short term response to stimuli

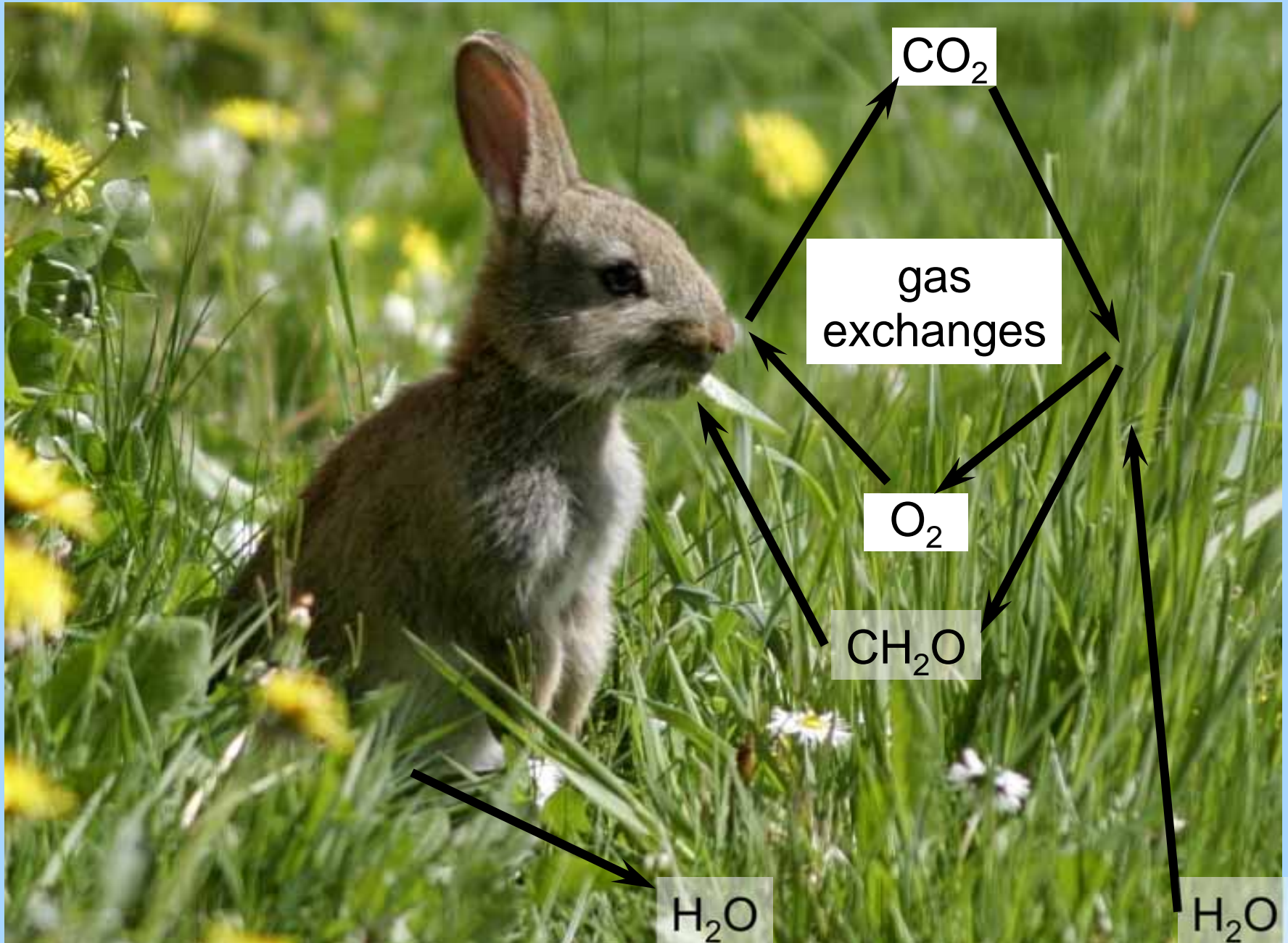
Evolution: long term adaptation

Gas Exchange

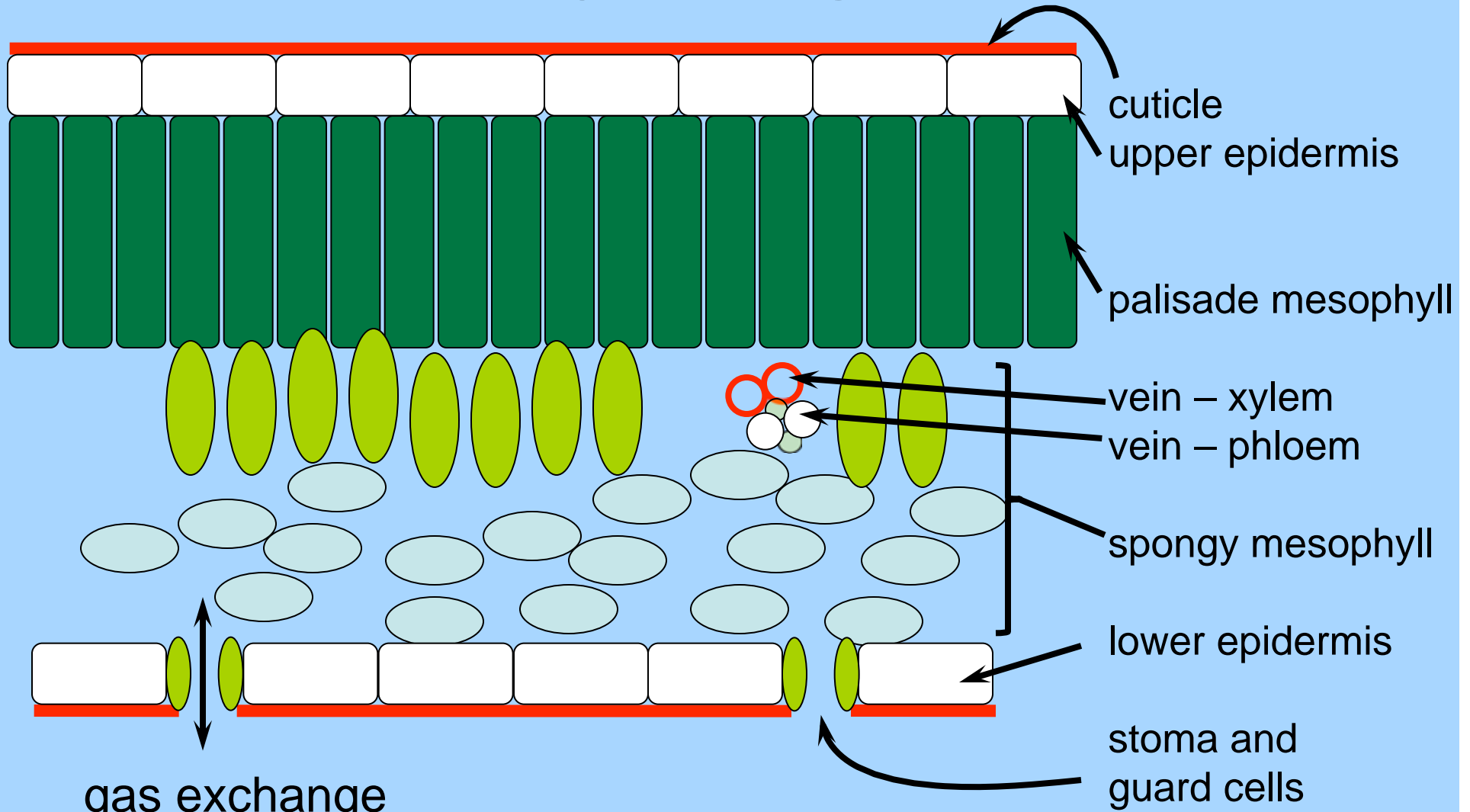
Ch. 44 pg. 978-990



The basic metabolic interdependence of terrestrial organisms

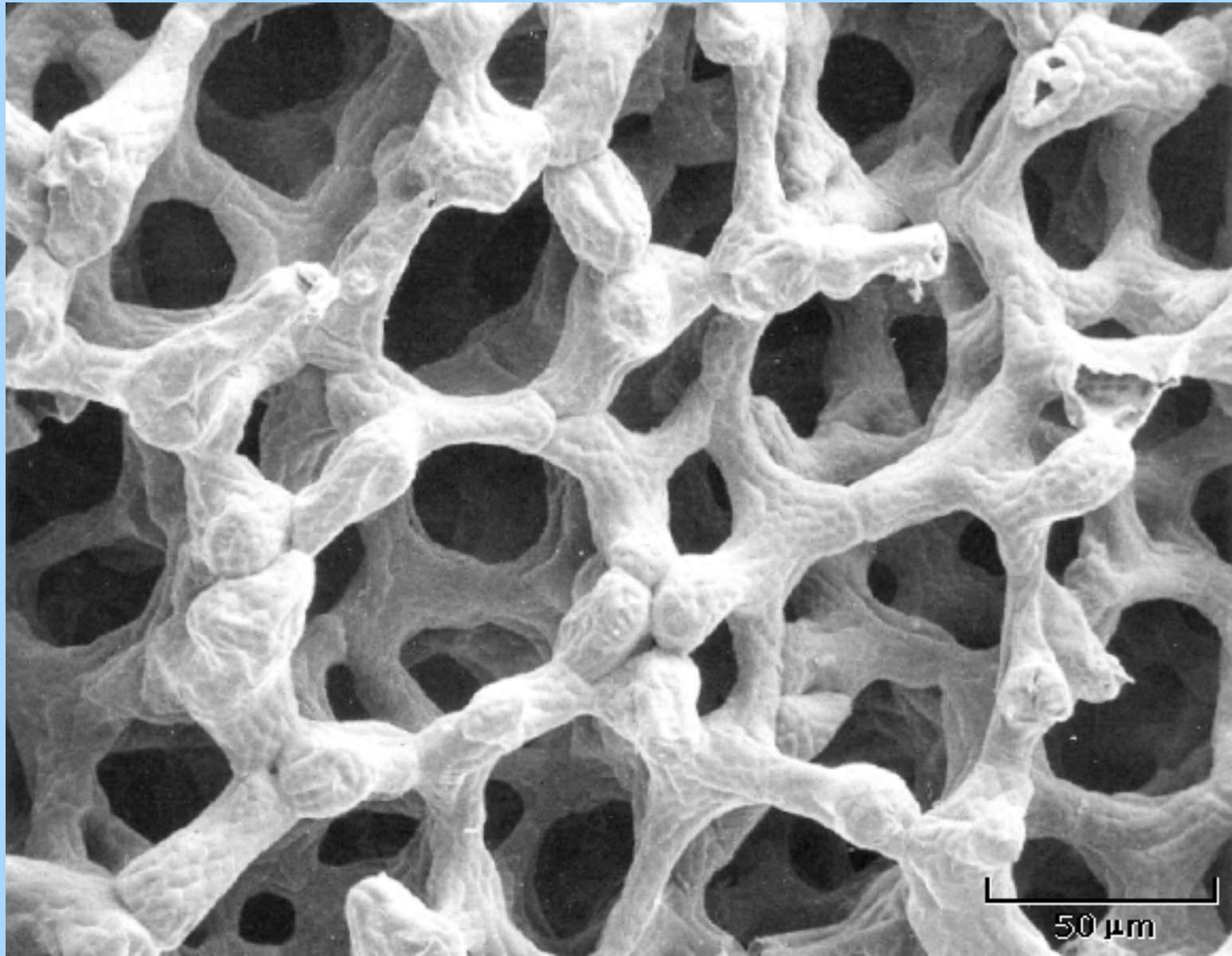


Leaf Cross Section

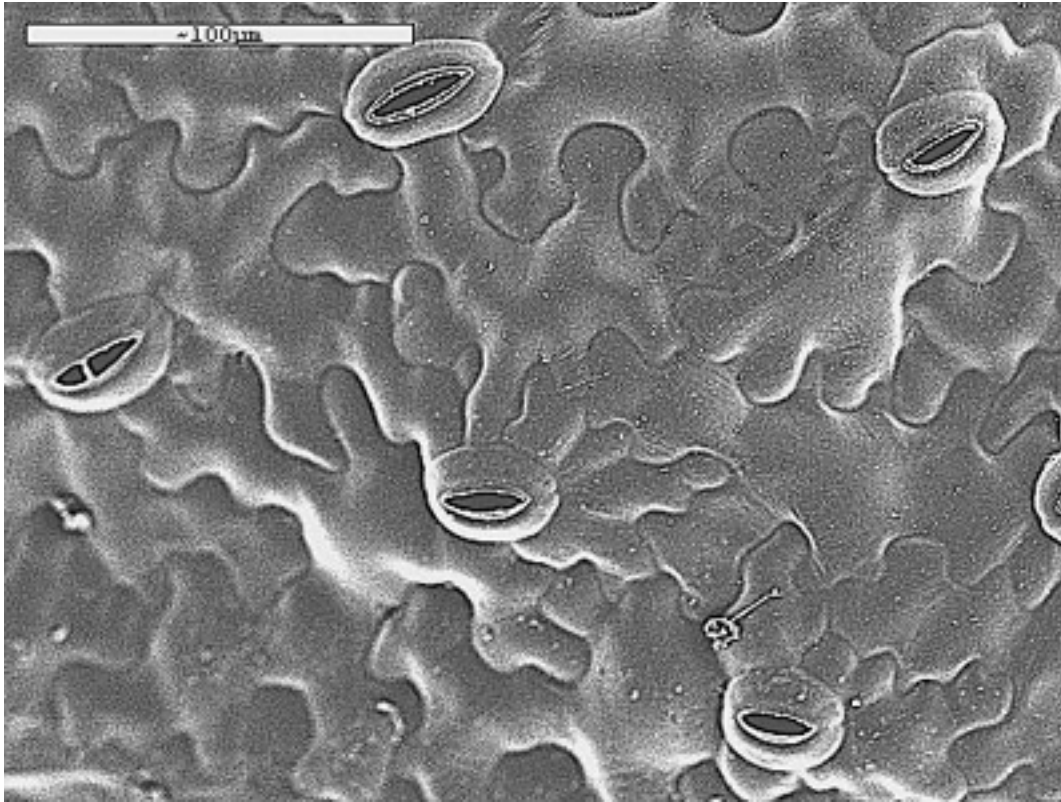


	CO ₂	O ₂	Metabolic Mode
Day	In	Out	Autotrophic
Night	Out	In	Heterotrophic

SEM of Spongy mesophyll shows each leaf cell is close to air



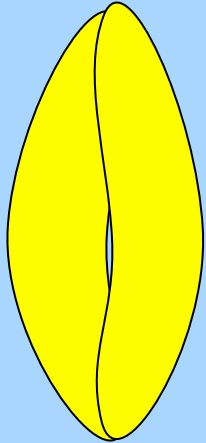
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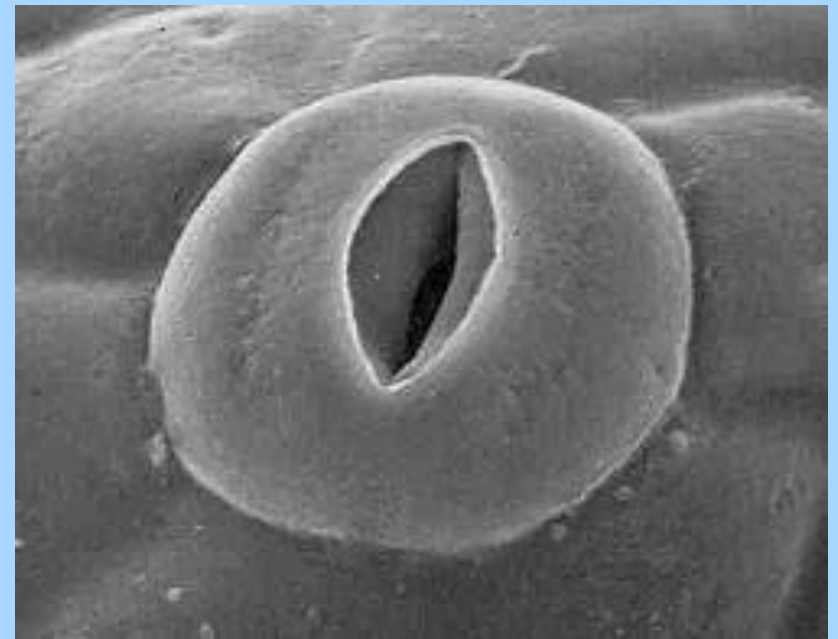
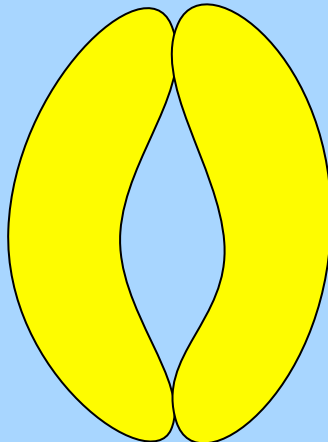
The exchange of gases is regulated by the opening size of the stoma (mouth) between the two guard cells of leaf epidermis.

<http://www.science.smith.edu/departments/SEM/pages/marina/8stoma.jpg>

flaccid



turgid

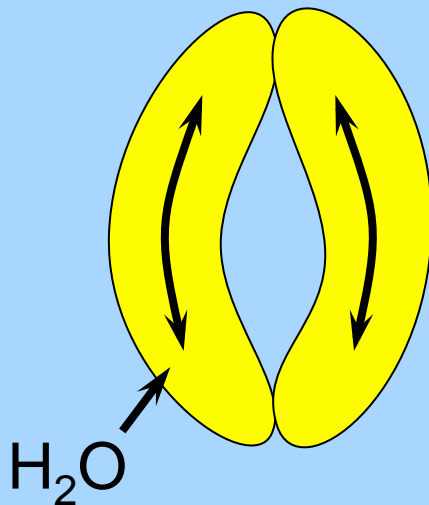


http://staffwww.fullcoll.edu/tmorris/elements_of_ecology/images/stomata_sem.jpg

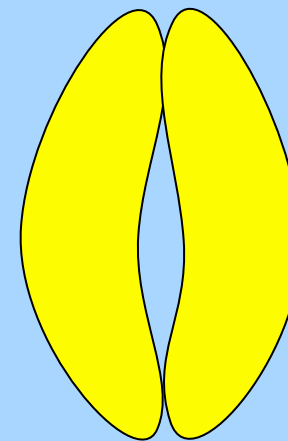
Factors influencing stomatal diameter

enlarging stoma	reducing stoma
abundant water abundant light low internal CO ₂	water deficit darkness high internal CO ₂ abscisic acid hormone

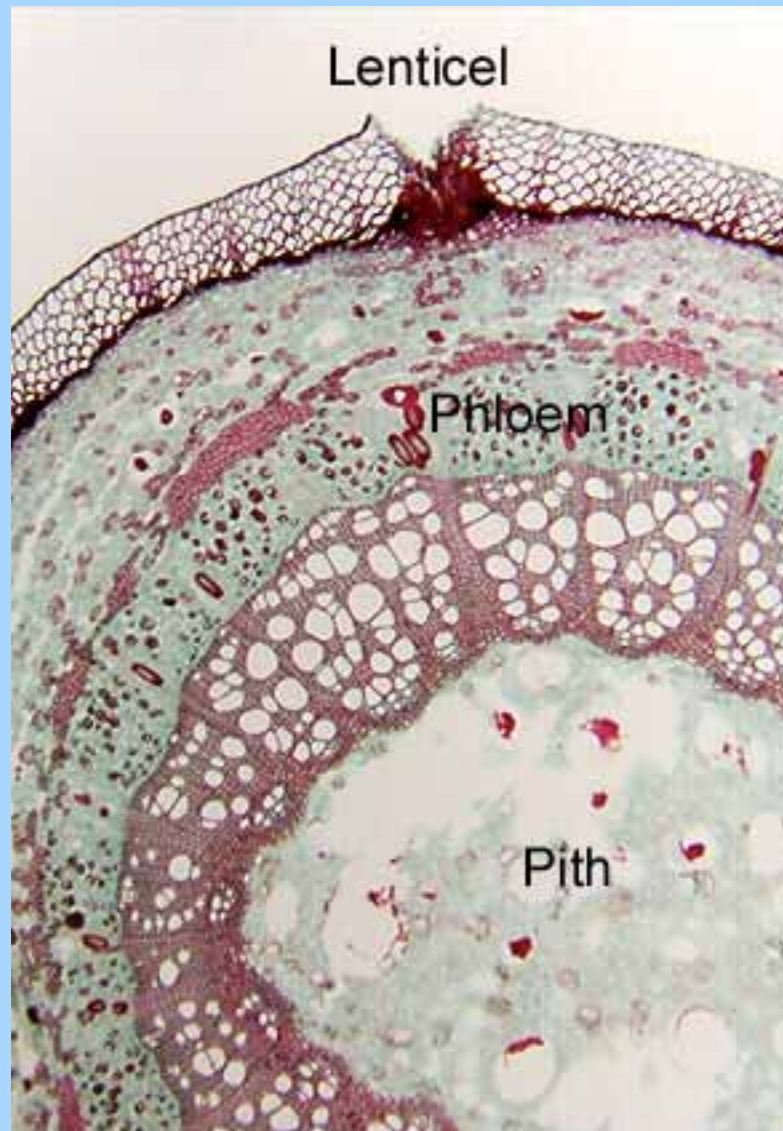
turgid



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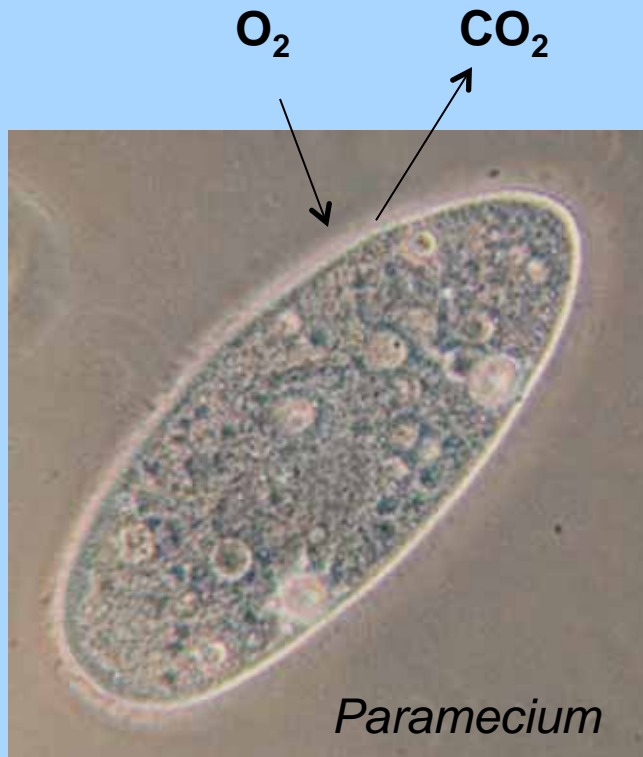


Woody stems lack stomata, so exchange gas through lenticels... openings in the bark...



http://www.bio.miami.edu/dana/226/226F09_7.html

Gas Exchange *Diffusion*



As size increases, more respiratory surface is needed



Diffusion Rate

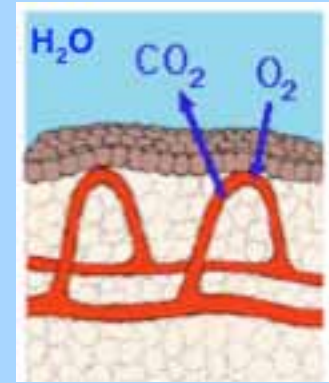
In order maximize diffusion:

1. Increase surface area
2. Decrease the thickness of the respiratory surface
3. Increase the partial pressure gradient of the gas across the surface (conc. grad.)

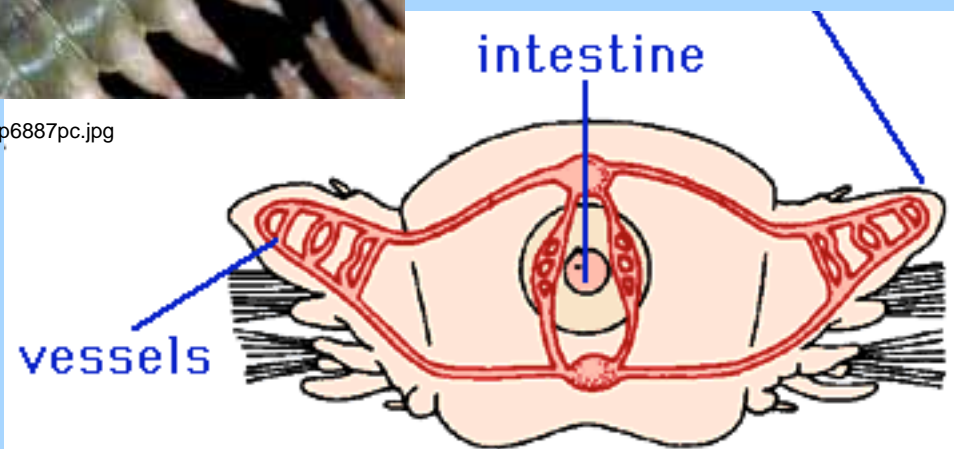


<http://www.teara.govt.nz/NR/rdonlyres/7D647087-7341-4298-A423-B3D2422B6DEF/144283/p6887pc.jpg>

Bristleworms (*Nereis*) have capillary beds in the parapodia for gas exchange

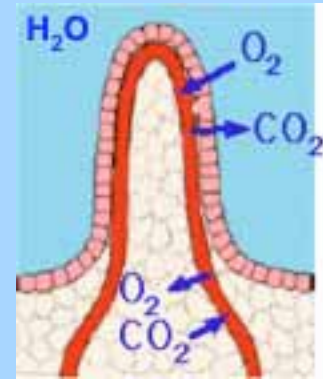


Gas exchange through diffusion requires an extensive capillary system



Gas Exchange

External Gills



Mexican Axolotl
Ambystoma mexicanum



Nudibranch



These amphibians can also exchange gasses through their skin

Gas Exchange

Internal Gills

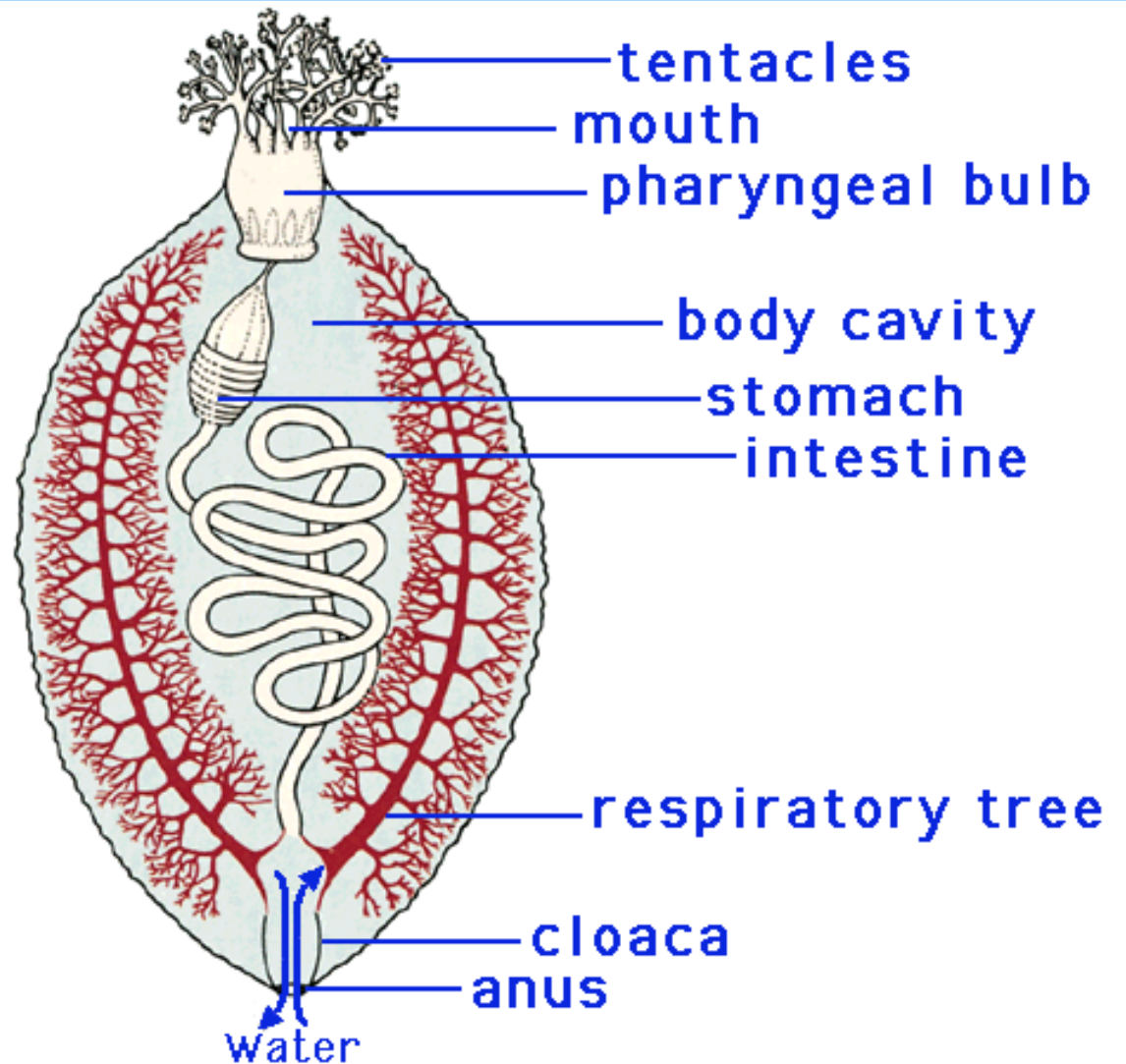
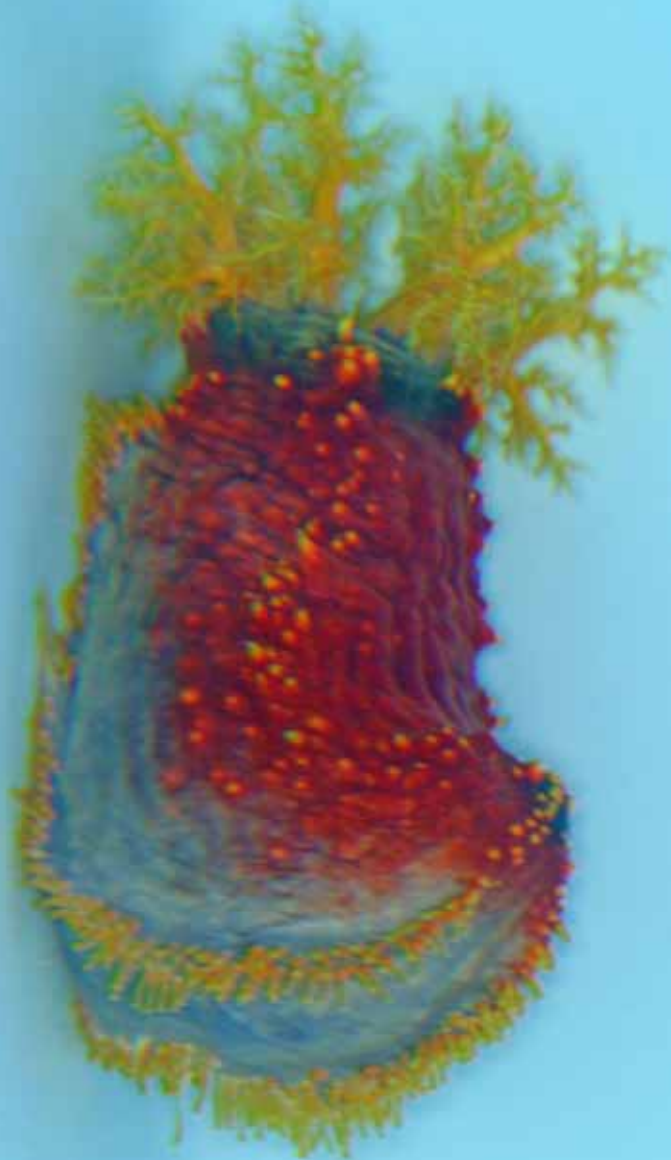
Calico scallop
Argopecten gibbus



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Ciliated surfaces move water across gills for gas exchange,
Water movement necessary in aquatic animals with internal gills

Sea cucumber Cl. Holothuroidea



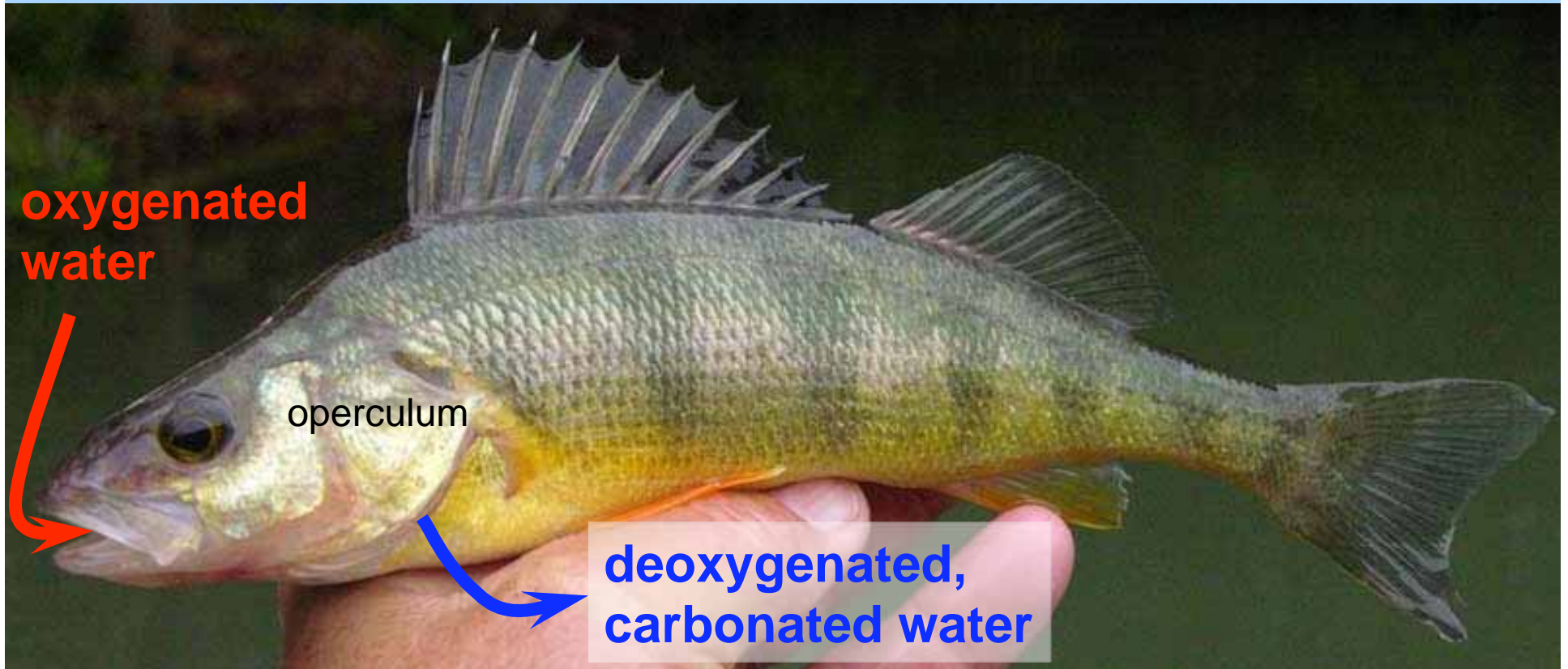
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Architeuthis Giant squid

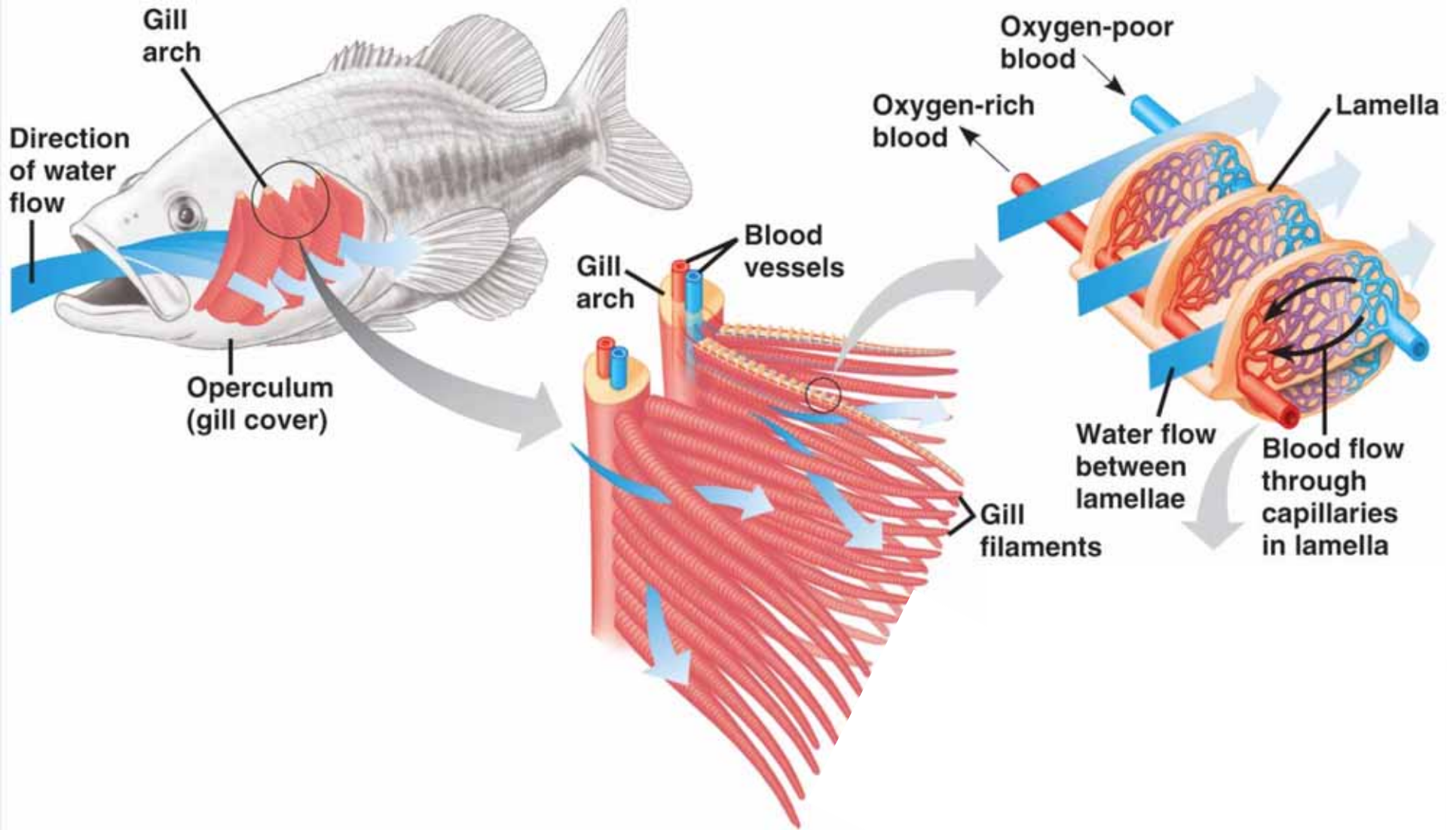
Mesonychoteuthis hamiltoni
Colossal squid



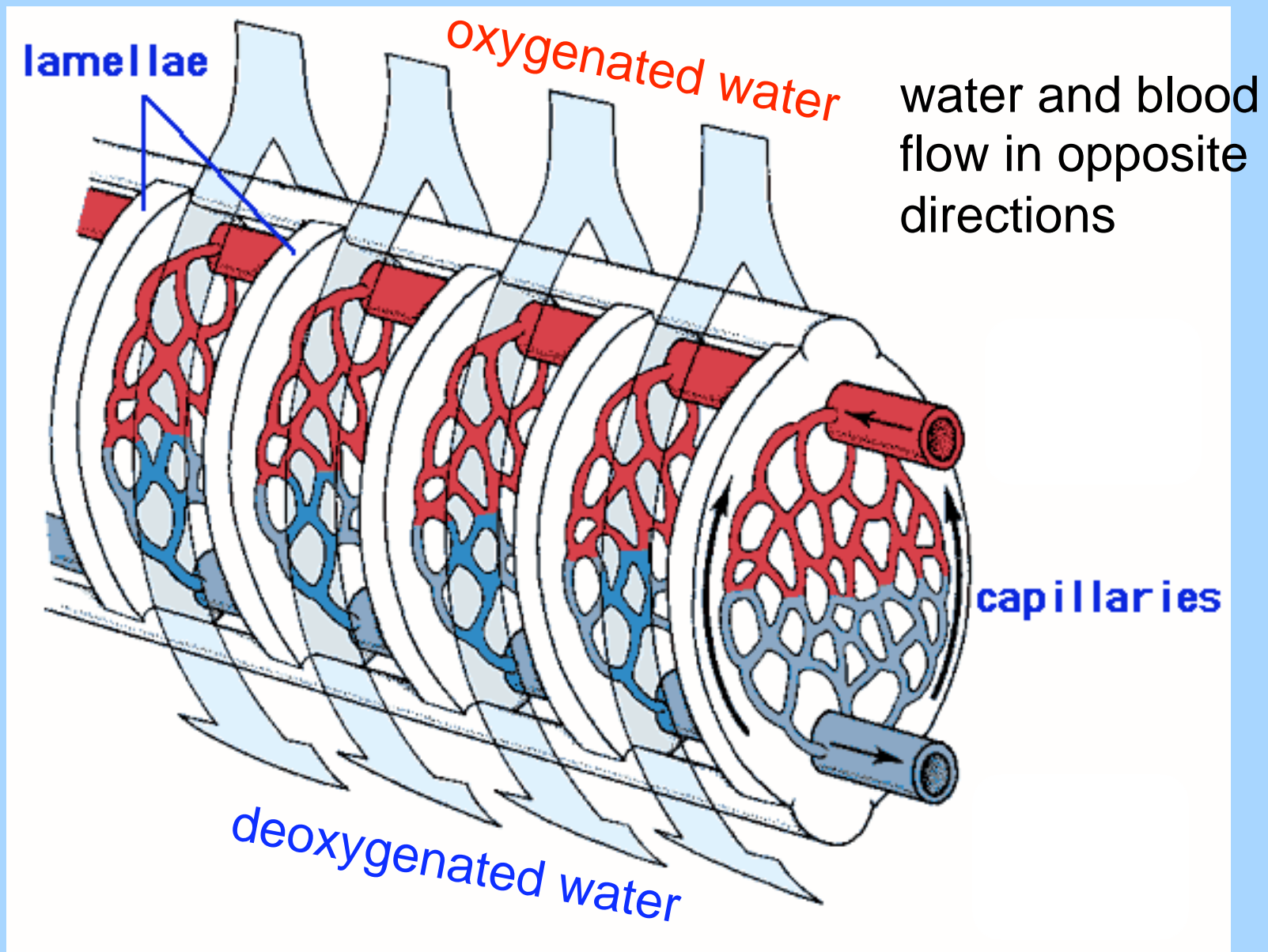
Perca flavescens http://www.tnfish.org/PhotoGalleryFish_TWRA/FishPhotoGallery_TWRA/images/YellowPerchMeltonHillNegus_.jpg



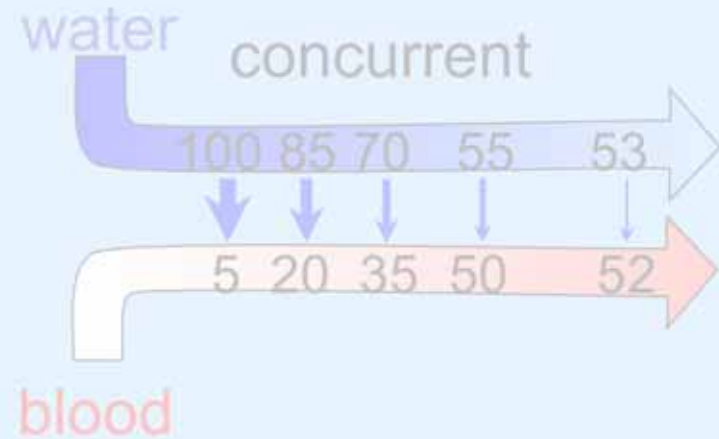
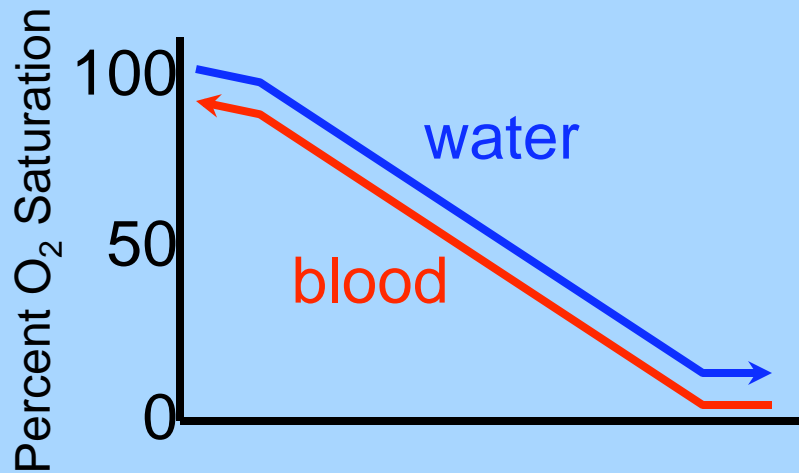
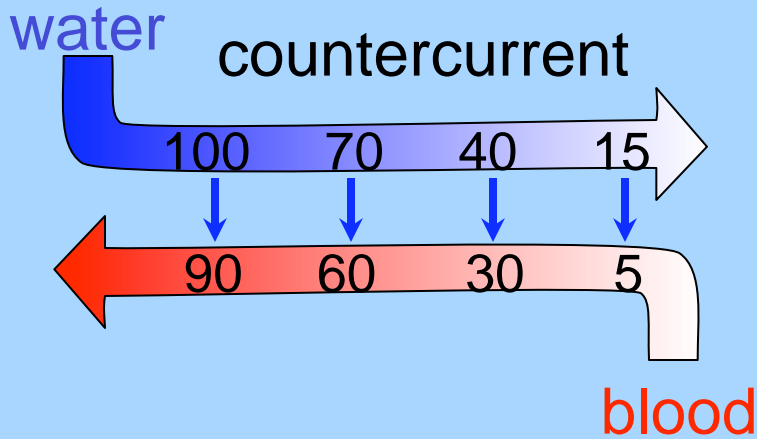
Muscular operation of operculum system moves water into mouth, over evaginated gills, and out from trailing edge of operculum



Gill filament shows countercurrent exchange design:



Countercurrent is more efficient than concurrent exchange



Countercurrent flow maximizes:

- Oxygen removal from water
- Blood oxygen content

In countercurrent exchange, there is always a difference in partial pressure, so oxygen always moves into capillaries. Not so in concurrent circulation

Questions

- Give two conditions that cause plant guard cells to open.