

INTRO TO BIOLOGY, SCIENCE, UNIFYING THEMES

Revised 22 August 2016

Campbell 7th: pp. 1-25, Sadava et al, pp 1-19, Campbell 10th: 1-14

Is biology relevant? Why do antibiotics lose their effectiveness with time?
AT THE END OF THIS QUARTER When you drink milk, and you get gas or diarrhea. Explain the physiology.
YOU WILL BE ABLE TO ANSWER: Why does cooking oil, exposed to the air, become rancid?
 Can vegans get proper protein in their diet?
 Why do your plants wilt when they need water?
 Why does your swollen ankle go down when you soak it in warm Epsom salts?
 Why do your muscles “burn” after intense exercise?
 What makes bread smell so sweet when it is baking?

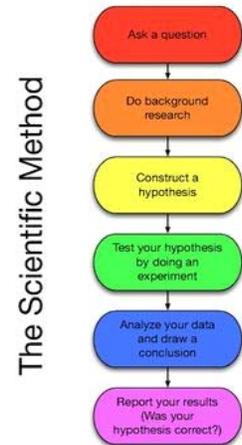
Science is an *endeavor*, by which we refine our understanding of truth.
 It relies on *experimental* evidence, nothing is off limits for questions

Science is a process to refine knowledge, by an established method: (Duh... *scientific method*)

p. 19 You see something happen! **collect your observations** of the “phenomena”
 Research and try to explain your observations **propose a testable hypothesis**

Perform a two part experiment: 1) **control:** should give a predictable outcome
 2) **experimental:** NOTE: vary *one and only one* parameter

Collect and record the data noting **any differences** in the two outcomes
Interpret results, discard or support hypothesis
 (NOTE: hypothesis is never proven *absolutely*)



What have we learned over the centuries by applying the scientific method?

Material hierarchy: at each stage, complexity manifests new traits: p. 4-5

atoms	organ
molecules	organ system
organelles	organism
cells	ecosystem-biosphere
tissues	

Unifying themes in Biology

structure and function	form follows function (eg: Anatomy and Physiology) : increased surface area!	(nb)
self assembly	intrinsic molecular properties direct confirmation and molecular associations	
cell theory	the cell is the basic unit of life (p 8)	
heritable information	genetic material encodes our traits, passes them on to our progeny (p 9)	
interaction with environment	regulation/homeostasis, maintains a stable internal environment	
energy flow in systems	catabolism makes ATP, anabolism uses it for synthesis (p 7)	
evolution	natural selection exerted on a heterogeneous population (p 14)	

Characteristics of Living Organisms: p. 2

Highly organized, consisting of one or more cells
 Contain genetic information (p 8)
 Reproduce own kind
 Grow and develop
 Take in environment molecules from, transform to own ends
 Can extract energy fr the environment to perform work (p 6)
 Respond to stimuli from environment
 Adapt to the environment
 Homeostasis: negative feedback (p 11)

