$x^{(.3}$

Scientific Thinking

(45039) > Science: collection of facts + process

> Scientists = curious, ask q's, seek Ans

> Power of Sci. = predict future behaviors

> Scientists must be objective; no political/personal beliefs

> Result & Conclusions derived from data; contrary to human brain's way of working

- How do you know that is the true?

✻ > Scientific Method

1. Observation   3. Devise testable prediction   5. Draw Conclusions &

2. Formulate hypothesis   4. Conduct critical exp.   make revisions

> Observation: looking for patterns

> Hypothesis: proposed explanation

- must provide alt. explanations

- testable predictions must be possible

(8-21-12) > Devise a testable prediction

- Tests will show if your hyp = right/wrong

> Conduct critical experiment

- Most experiments have:

  ° Treatment: applied exp. condition of any kind

  ° Experimental Grp: exposure to particular treatment

  ° Control Group: not exposed to treatment

  ° Variables

- Double-blind studies

- Randomization

> Conclusion

- Make revisions

Bio 3 (cont.)

8-21-12 > Statistics: allow us to differentiate b/w real/incorrect

(45039) - Confidence interval: how confident are we that we caught all possible var. avail

- Scientifically we should be @ 95% + positive of our results

> Causation v. Correlation: simply b/c something is correlated doesn't mean it is the cause

* - one of the biggest q's of scientists

° (e.g. if Irish pop. increases so does Global Warming)

- Exp. test: results can be used to revise hypotheses & explain the world more accurately

> Repeatable experiments; increase confidence

- repeatability = validity

(8-23-12) The Game of Biology - How to Win

> Live forever (e.g. produce viable offspring)

- done thru passing on DNA

> Somatic Cells: most cells of body

- chromosomes - long chains of DNA

> Gametes

- sex cells (sperm & egg)

° both have only 1 copy of ea chromosome

° each gamete has 50% of your chro.

> To win you need the 'Best mate'; hardwired behaviors

- Whoever controls the best territory gets the chicks!

> Sexual selection

- Women devote the most resources

- Size shows having more calories, resources, etc. (men)

> Selecting for Novelty
- Having a genetic distinction may become the one thing that allows your DNA to survive (e.g. genetic anamoly that might cause others to die)

> FAT
- fat = 3x as much cals as an equal wt of sugar
- fat storage = energy = survival
  ° females need it to support fetus growth
  ° males need it for hunting/gathering
- Reubenesque (Peter Paul Ruben

> Evolution ≠ directed process
- simply selects the traits most suited for current environment/conditions

> Change in humans
- invention of agriculture
- genes are still in energy storage mode
- too many calories available
  ° causing diabetes, HBP, etc

> Element: substance that can't be broken down into another substance

> Atom: smallest substance that can't be broken down w/o losing its essential props.

> 25 elements in our body

- 96% +: Oxygen, Carbon, Hydrogen, Nitrogen

Water

> Cohesion & Adhesion; Large heat capacity; Low density as a solid; Good solvent

- Cohesion / Adhesion:
  ° Cohesion: sticking w/ like molecules
  ° Adhesion: sticks to unlike molecules.

* Life depends on 2 chem reactions:

- Photosynthesis: turning sun energy into energy for life
  ° chloroplast: absorb
    ˣ needs: Light, H_2O, CO_2
    ˣ out: O_2 + Sugar

cont >

-High heat capacity: takes more energy to heat water (than O_2 or others)

-Low Density (as solid): floats unlike other substances; when solid is
  within itself (liquid)
    ° B/C ice floats the water freezes at the top (not from the
      bottom up) essentially protecting life below

- A good solvent: allows chemicals to move throughout your body
    ° dissolves chemicals to use/move chems.

9-4-12   ## Carbs

> Carbs = primary fuel for organisms

- Cellular Respiration
  ° Mitochondria: energy factory; need O_2 + Sugar

1	2
glucose	maltose
fructose	sucrose
galactose	lactose

- ATP = form of energy the body uses; created from O_2 + Sugar
  - ° Output = CO_2 and H_2O
  - ° Can become glycogen (muscle/liver storage) or fat (fat storage)
> Carb-loading
- 1oz glycogen ≈ 4oz H_2O attached

<u>Starches</u>
> ≥ 100's glucose molecules joined
- glycogen = "animal starch"
> <u>Non-digestable starches</u>
- Chitin (e.g. lobster, hair, fingernails)
- Cellulose (e.g. wood)

<u>Lipids (fats/oils)</u>
> Fats, Sterols, Phospholipids
- Fats = solid (room temp)
- Oil = liquid (room temp)
- Glycerol = head of fat   → Triglycerides
- Fatty Acids = Carbon tails
> Saturated fats (solid) have single bonds
> Unsaturated fats (liquid) have double bonds
> Partially hydrogenated veg. oils   9-6-12
- "Trans fats"
  - ° gives better shelf-life
> Unsaturated (cis) ≀
- + H_2 = ≀ (trans)
> Olestra: passes thru w/o being digested
> Not all lipids = fats   *

> Sterols
- Cholesterol: important component of most cell membranes
  ° cells naturally produce

Proteins
> The building blocks of body
- Structural, Protective, Regulatory, Contractile, Transport
> $^8/_{20}$ = essential AA's
- Complete proteins contain all 8 AA's; Incomplete prots don't
- Complementary proteins (e.g. beans + rice); some AA's from 1 food and some from another to = complete (e.g. potatoes + milk)
> DNA dictates shape of proteins
- Proteins = shaped w/ AA's
* ° Shape of protein = specific for specific job
> Proteins = for growth, repair, replacement

(9-12-12) Enzymes
> Proteins that intiate/speed up chemical reactions
* - Sugars end in -ose (e.g. lactose)
- Enzymes end in -ase (e.g. lactase)
  ° Lactase breaks up Lactose into: glucose + galactose
> Misshapen proteins = incorrect AA sequence
- Active site disruptions
- PKU disease
- Lactose intolerant = enzymes not built right to breakdown Lactose
> Enzymes can be used multi times

Nucleic Acids (contain instructions on how to build & run the body)

- Nuc. Acids = macromolecules that store info
- DNA: determined by its sequence of bases (backbone)
  - bases have AA's attached
  - double helix: made up of phosphate backbones
- Example of DNA

CCCCTTAGGAACC complimentary strand = GGGGAATCCTTGG
  -
  - because { A + T attach
            { C + G attach