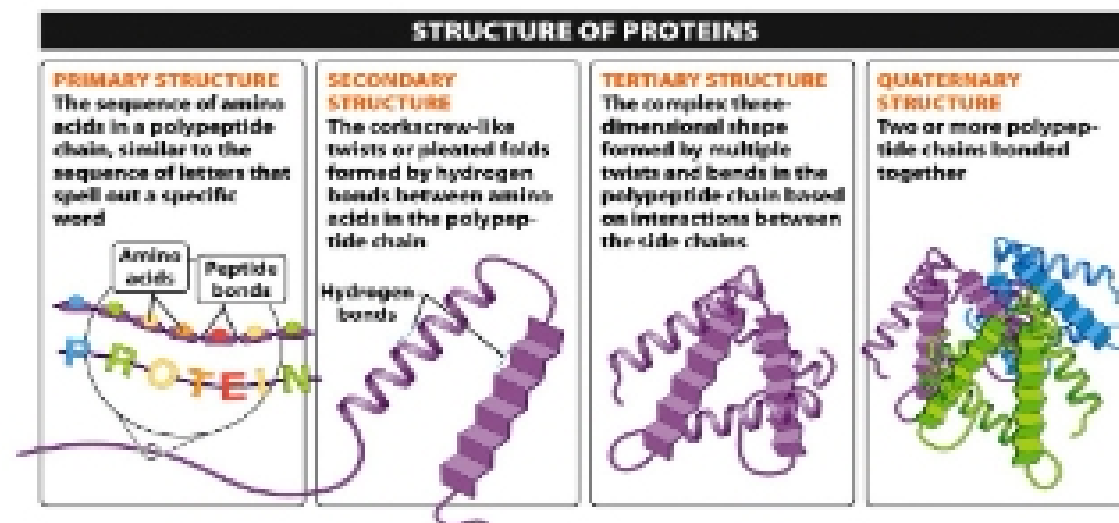


## Week 1

- Living things need and acquire energy
  - Every living thing must acquire energy to
    - Build new structures
    - Repair old structures
    - Reproduce
- Living things evolve
  - Evolution – change in the genetic makeup of a population over time
    - Natural selection is one mechanism of evolution
- All living things share these characteristics
  - 1. Organized in a specific way
  - 2. Need and acquire energy
  - 3. Maintain internal constancy
  - 4. Reproduce, grow, develop
  - 5. Populations evolve
- Scientific Method
  - How do we study the natural world?
    - Make observations
    - Make a question that relates
    - Propose a hypothesis
    - Make a prediction
    - Design and conduct an experiment
    - Analyze your results and draw conclusions
    - Submit for application
  - Design a controlled experiment
    - Sample size
    - Variables
      - Independent (manipulated) variable
      - Dependent (response) variable
      - Standardized variables
    - Control
  - Collect Data
  - Interpret and Analyze Results
  - Draw Conclusions
  - Publish Results
    - Peer review
    - Publication
- Hypothesis vs. Theory
  - Hypothesis – tentative, often narrow explanation regarding the natural world
    - Must be testable and falsifiable
  - Theory – a well substantiated explanation of some aspect of the natural world
    - Unifying explanation
    - Ideas about which we are most certain

- Organic Molecules
  - Organic molecules are compounds containing both carbon and hydrogen
  - Many are macromolecules, which are usually
    - Polymers – chains created by linking subunits called monomers
  - Types
    - Carbohydrates
    - Lipids
    - Proteins
    - Nucleic acids
- Carbohydrates
  - Simplest of the main organic molecules
  - Used as
    - A source of energy
    - Structural molecules
  - Consist of 2 main types (look at 1-(36-40))
    - Simple sugars
    - Complex carbs
- Lipids
  - All lipids are insoluble in water
  - Rich in energy, good for long term energy storage
    - Lots of C-H bonds
  - Types
    - Fats
      - Long term energy storage and insulation
    - Sterols
      - Regulate growth and development
    - Phospholipids
      - Form the membranes that enclose cells
  - Triglycerides
    - Degree of saturation is a measure of a fatty acid's hydrogen content
    - Saturated fats contain all the H's possible
      - Single bonds connect all of the carbons
      - Solid at room temperature
    - Unsaturated fats have greater than or 1 double bond between carbons
      - Double bonds create kinks on the chain
      - Liquid at room temperature
- Proteins
  - Very diverse, more functions in the cell any other type of molecule
  - Structural
    - Hair, fingernails, horns, cartilage, tendons
  - Protective
    - Help fight invading microorganisms, coagulate blood
  - Regulatory

- Control cell activity, constitute some hormones
- Contractile
  - Allow muscles to contract, heart to pump, sperm to swim
- Transport
  - Carry molecules such as oxygen around your body
- A protein is a chain of amino acids
  - 20 amino acids
  - Amino acid is a monomer and protein is a polymer
  - Fold into unique 3-D structures inside a cell



- The protein's overall shape is what determines its function
    - Each protein shape is unique
      - Explains incredible diversity
  - If the shape of the protein is modified enough to destroy its function, it has denatured
- Nucleic Acids
  - Storage and transmission of genetic information
  - Two types in cells
    - DNA (deoxyribonucleic acid)
    - RNA (ribonucleic acid)
  - Nucleotides are the monomers of the nucleic acids
  - Each nucleotide consists of
    - A 5-C sugar
      - DNA
      - RNA
    - A phosphate group
    - A nitrogenous base