Properties of Life

Having biological molecules that contain instructions for building other molecules

Gather energy and material from surroundings to build new biological molecules, grow in size, maintain and repair their parts, and produce offspring

respond to environmental changes by altering their chemistry and activity in ways that allow them to survive

Structure and functions of living organisms often change over generations: evolution

Definitions chapter 2

Matter	Anything that occupies space and has a mass composed of elements and combinations of elements
Atoms	Elements are composed of atoms- the smaller units that retain the chemical and physical properties of an element

Definitions chapter 2 (cont)

Molecules	are atoms combine chemically in fixed numbers and ratios of living and nonliving matter
Compounds	are molecules whose component atoms are different (carbon dioxide)
Ions	an atom or molecule with a net electric charge due to the loss or gain of one or more electrons
Cations	is a positively charged ion Na+
Anions	is a negatively charged ion Cl-
Electronegative or Positive Isotopes	are distinct forms of atoms of an element with the same number of protons but different numbers of neutrons

Specialized structures of plant cells

How are plant cells different from animal cells?

> These following structures are in plant cells: chloroplasts, a large vacuole, plant cell walls

How do we think mitochondria and chloroplasts evolved?

> from aerobic, oxygen-consuming, prokaryotes

What are the major components and functions of the cytoskeleton?

> its an interconnected system of protein fibers and tubes that extends throughout the cytoplasm. Maintains a cells characteristic shape and internal organization function in movements

Ch.3 Major biological polymers and monomers

Polysaccharides	may be linear, unbranched molecules, or may contain one or more branches with side chains of sugar units attached to a main chain. Carbohydrate polymers with more than 10 linked monosaccharide monomers are polysaccharides.

Ch.3 Major biological polymers and monomers (cont)

Proteins	are polymers of amino acid monomers, which contain both an amino and a carboxyl group. All organisms use 20 different amino acids to build proteins
Nucleic acids	are macromolecules assembled from repeating monomers called nucleotides
Dehydration	is a chemical reaction between two compounds where one of the products is water
Hydrolysis reaction	where water combines with hydroxyl. Breakdown of polymers into monomers.

Emergent Properties

What is emergent properties?

> Characteristics that depend on the level of organization, but do not exists at lower levels.

What are emergent properties of cells?

> Prokaryotes, and most protists and fungi have only a single cell.. Smallest unit with the capacity to live and reproduce, independently or as part of a multicellular organism.

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Emergent Properties (cont)

What are emergent properties of organisms?

> multicellular organisms create tissues, or group of cells to work together or perform a particular function. Individual consisting of interd-ependent cells

What are emergent properties of populations?

> Many individuals create new properties such as: size, density, dispersion structure, age, sexual distribution and genetic variations. Group of individuals of the same species living in the same area.

What are emergent properties of communities?

> Members of community can be part of a food chain. Population of all species that occupy the same area

What are emergent properties of ecosystems?

> ecosystems cycle energy and matter. They are communities interacting with their shared physical environment

Cellular Membranes

What are cell membranes primarily composed of, and how are these arranged to create a barrier?

> Composed of phospholipids and proteins and are typically described as phospholipid bi-layer.

Cellular Membranes (cont)

What does the mosaic part of the fluid mosaic model refer to?

> the cell membrane is composed of mostly lipids but also other types of molecules

What does the fluid part of the model say about cell membrane organization?

> The ability of phospholipids to remain as a bilayer, but also spin, drift, and wiggle

What keeps cell membranes fluid at low temperatures in plants and in animals?

What is the role of cholesterol in stabilizing membranes in animals?

> Cholesterol functions as a buffer, preventing lower temp. from inhibiting fluidity and preventing higher temps.

what principles govern diffusion and osmosis?

what type of molecules are cell membranes most permeable to?

what cannot pass?

Why are transport proteins necessary?

How does the cell membrane participate in exocytosis and endocytosis?

chapter 4. Definitions organelles

Mitochondria	membrane bound organelles where cellular respiration occurs
chloroplasts	are yellow-green plastids. The site of photosynthesis in plant cells

chapter 4. Definitions organelles (cont)

peroxisomes	micro bodies that produce hydrogen peroxide (h2o2) as a by product

Prokaryotic & Eukaryotic

Prokaryotic cells	Nucleoid region has no boundary membrane. Many species of bacteria have few internal membranes
Eukaryotic cells	The true nucleus is separated from the surrounding cytoplasm by membranes. Cytoplasm typically contains extensive membrane systems that form organelles
Unique to eukaryotic cells	A membrane-Bound nucleus. It contains one or more nuclei formed around the genes coding for rRNA molecules of ribosomes

Prokaryotic & Eukaryotic (cont)

Why is the surface area to volume ratio of cells important?	Its important that the surface area to the volume ratio gets smaller as the cell gets larger.

Questions Chapter 2

How is C^{14} different from C^{13} or C^12? Can they be part of biological reactions?

> Its a radioisotope. All have the same atomic number but different mass numbers.

What makes the water molecule polar?

> An uneven distribution of electron density and its shape makes it polar.

What emergent properties important to life does hydrogen bonding among water molecules cause?

> Cohesive and Adhesive, Water maintains a relatively constant temperature, a good solvent, water expands when it freezes so floats, water has a neutral pH

How does the pH scale measure dissociation of water?

> The measure of concen-tration of protons (H) in water, or essentially the strength of the proton donation reaction.

What is neutral pH?

> 7 is neutral which is pure water

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Questions Chapter 2 (cont)

What is acidic pH?

> 1-7 on the pH scale

What is basic pH?

> 7-14 on the pH scale

How does pH affect life?

> Measurment to deterinthe acidity and alkalinity of the body.

Lipids

The difference between saturated and unsaturated fatty acids	Saturated fats are solid at room temperature while unsaturated fats are liquid at room temperature. Saturated fats have no double bond between molecules, unsaturated fats have double bonds, which reads up the chain of hydrogen molecules and creates gaps.
What are phosph-olipids?	Are from cell membranes
What are steroids?	Serve as hormones that regulate cellular activites

Type of bonds

Ionic	results from electrical attractions between atoms that gain or lose valence electrons completely (ions)
Covalent	form when atoms share a pair of valence electrons rather than gaining or losing. H2=H:H
Polar	electrons are shared unequally between two atoms
Nonpolar	two atoms share a pair of electrons with each other
Van der Waals	are weak forces that develop over short distances between non polar molecules as moving electrons accumulate by chance in one part of a molecule or another
Hydrogen bonding	are attractions between partially positive hydrogen atoms and partially negative atoms sharing in a different covalent bond

Endomembrane system

Rough ER	has many ribosomes on its outer surface. Proteins made on these ribosomes enter the ER lumen, where they fold and receive chemical modifications, such as addition of carbohydrate groups to produce glycoproteins
Smooth ER	membranes have no ribosomes attached to their surfaces. Membrane lipids are synthesized in their compar-tments. Live smooth ER detoxifies drugs, poisons, and by-products
Golgi Apparatus	the golgi complex "tags" proteins for sorting to their final destinations
Lysosomes	are small membrane-bound vesicles containing hydrolytic enzymes that digest complex molecules-cells recycle the subunits of these molecules lysosomes are found in animals, but not plants.

Hierarchies of Life

Biosphere

Ecosystem

Community

Population

Multicelluar organism

Cell

Proteins

Structure of amino acids

Properties of the different amino acids groups create four levels of protein structure

Forces that hold the structure together

what happens when a protein is denatured?	Unfolding a protein from its active confor-mation so that it loses its structure and function (caused by chemicals, changes in pH, high temp)

Light microscope & electron microscope

Light microscope	Definition: use electrons to illuminate the specimen

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Light microscope & electron microscope (cont)	
Electron Microscope	Definition: use light to illuminate the specimen Magnification&-Resolution: have much higher magnification and resolutionthan Light micros-copes.

Function and Major features ch. 4	
Nucleus	Stores the cell hereditary material, coordi-nates the cells activites. only eukaryotes have a nucleus.
Plasma membrane	A bilayer made of phospholipids with embedded protein molecules
ribosomes	are a cell structure that makes protein. Protein is needed for many cell functions such as repairing damage or directing chemical processes.

Scientific Method	
Question	What does the scientist want to learn more about?
Research	Gathering inform-aation

Scientific Method (cont)	
Hypothesis	An "educated" guess of an answer to the question
Proced-ure/Metho d	Written and carefully followed step-bys-step experiment designed to test the hypothesis
Data	Information collected during the experiment
Observ-ations	Written description of what was noticed during the experiment
Conclusion	Was the hypothesis correct or incorrect?

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