

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

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.

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

Ch.3 Major biological polymers and monomers (cont)

Hydrolysis reaction where water combines with hydroxyl. Breakdown of polymers into monomers.

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

Emergent Properties

What is emergent properties?

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

Emergent Properties (cont)

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.

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 interdependent 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

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 concentration 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

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.

Prokaryotic & Eukaryotic

Prokar-yotic 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

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.

chapter 4. Definitions organelles

Mitoch ondria membrane bound organelles where cellular respiration occurs

chloro plasts are yellow-green plastids. The site of photosynthesis in plant cells

peroxi somes micro bodies that produce hydrogen peroxide (H_2O_2) as a by product

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.

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?

Cellular Membranes (cont)

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?

Hierarchies of Life

Biosphere

Ecosystem

Community

Population

Multicellular organism

Cell

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

Type of bonds (cont)

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

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.

Lipids (cont)

What are phospholipids? Are from cell membranes

What are steroids? Serve as hormones that regulate cellular activities

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 compartments. Live smooth ER detoxifies drugs, poisons, and by-products

Golgi Apparatus the golgi complex "tags" proteins for sorting to their final destinations

Endomembrane system (cont)

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.

Scientific Method

Question What does the scientist want to learn more about?

Research Gathering information

Hypothesis An "educated" guess of an answer to the question

Procedure/Method Written and carefully followed step-by-step experiment designed to test the hypothesis

Data Information collected during the experiment

Observations Written description of what was noticed during the experiment

Conclusion Was the hypothesis correct or incorrect?

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 conformation so that it loses its structure and function (caused by chemicals, changes in pH, high temp)
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Function and Major features ch. 4 (cont)

Plasma membrane	A bilayer made of phospholipids with embedded protein molecules
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ribosomes	are a cell structure that makes protein. Protein is needed for many cell functions such as repairing damage or directing chemical processes.
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Light microscope & electron microscope

Light microscope	Definition: use electrons to illuminate the specimen
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Electron Microscope	Definition: use light to illuminate the specimen Magnification&Resolution: have much higher magnification and resolution than Light microscopes.
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Function and Major features ch. 4

Nucleus	Stores the cell hereditary material, coordinates the cells activities. only eukaryotes have a nucleus.
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