Words of the Day Vocabulary Quiz # 1

Scientific Method

Control – to test or verify (a scientific experiment) by a parallel experiment or other standard of comparison

Variable – a change that is introduced into an experiment

Independent variable – a change that is purposely introduced into an experiment in order to measure a dependent variable

Dependent variable – a change that is measured as a result of the independent variable being introduced in an experiment

Hypothesis – an educated guess; a proposed, scientifically testable explanation for an observed phenomenon

Data – information measured during an experiment

Theory –an explanation of observable phenomena based on available empirical data and guided by a system of logic; provides a system of assumptions, accepted principles, and rules of procedure devised to analyze, predict, or otherwise explain the nature of behavior of a specific set of phenomenon; a hypothesis that has been tested and repeated numerous times

Law – generalizes a body of observations. At the time it is made, no exception have been found. It explains things but does not describe them; serves as a basis of scientific principles

Principle –a concept based on scientific laws where general agreement is present

Science – a body of evidence based knowledge gained through close observations and experimentation related to the natural world and technology

Introduction to Biology

Biology – the study of life

Bio- - life

Endo- - into or within

Cyto- - cell

Abiotic – nonliving or never living; never was alive

Biotic – living or was living a one time

Unicellular – one celled

Multicellular – consisting of more than one cell

Embryology – branch of biology (zoology) studying early development of living things

Genetics – study of inherited traits or characteristics

Ecology – the study of relationships between organisms and their interactions with the environment

Taxonomy – the science of classifying or grouping organism based on their structural, biochemical, or genetic similarities

Organism – any living thing; plant, animal, protist, fungus, or bacterium

Cell- the basic unit of structure and function for all living things; cells have 3 common components: genetic material, cytoplasm, and a cell membrane. Eukaryotic cells have other specialized organelles.

Prokaryotic (prokaryote) – a single celled organism that lacks a membrane bound nucleus and specialized organelles; bacteria

Eukaryotic (eukaryote)- a type of organism composed of one or more cells that contain a membrane bound nucleus, specialized organelles in the cytoplasm, and a mitotic nuclear division cycle

Organelle - a subunit within a cell that has a specialized function (e.g. mitochondria, ribosome, etc.)

Tissue – an anatomical unit composed of cells organized to perform a similar function

Organ – an anatomical unit composed of tissues serving a common function

Organ system – an anatomical unit composed of a group of organs that work together to perform a specific function or task; a set of interacting or interdependent components, real or abstract, that form an integrated whole. An open system is able to interact with its environment; a closed system is isolated from its environment

Homeostasis – the regulatory process in which an organism regulates its internal environment in order to remain in equilibrium

Homeostatic mechanism – a regulatory mechanism that contributes to maintaining a state of equilibrium (e.g. thermoregulation, water regulation, and oxygen regulation)

Environment – the total surroundings of an organism or group of organisms, both living and non living

Metabolism – the set of chemical reactions occurring in an organism that includes the breakdown and storage of energy needed to maintain life

Irritability – the ability to respond to one's environment

Adaptation – a characteristic that is beneficial to the organism that enables it to be successful in its environment

Words of the Day Vocabulary Quiz # 2

Taxonomy

Domain- contains kingdoms; broadest classification group

Kingdom-contains phyla

Phylum- contains classes

Class- contains orders

Order – contains families

Family – contains genera

Genus – contains species; first part of scientific name; always capitalized

Species – most specific classification group; second part of scientific name; always lowercase; lowest taxonomic group; organisms of same species are capable of producing fertile offspring

Binomial nomenclature – the science of assigning a 2 part name consisting of it genus and species names; Latin origins

Dichotomous key – a tool used to identify an unknown organism by choosing between 2 choices in each step of the key until the name of the organism is found

Words of the Day Vocabulary Quiz # 3

Biochemistry

Biochemistry – the study of the chemical reactions occurring in organisms

Biochemical conversions – the changing of organic matter into other chemical forms such as fuels to use for energy

Specific Heat – the measure of the heat energy required to raise 1 gram of a substance by 1 degree Celsius

Temperature – a measure of the average kinetic energy (energy of motion) of particles in a sample of matter. This physical property can determine the rate and extent to which chemical reactions can occur within living systems. Measured in degrees Fahrenheit or degrees Celsius.

pH – the measure of the acidity or alkalinity (basicity) of a solution scaling from 1 (highly acidic) to 14 (highly basic). Neutral is pH 7.

Cohesion – the intermolecular attraction between like molecules. Surface tension results from the cohesive properties of water.

Adhesion – the intermolecular attraction between unlike molecules. Capillary action results from the adhesive properties of water and the molecules that make up plant cells

Surface Tension—the elastic like force existing in the surface of a liquid, caused by asymmetries in the intermolecular forces between surface molecules

Capillary action—the movement of a liquid along the surface of a solid caused by the attraction of molecules of the liquid to the molecules of the solid.

Freezing Point—the temperature at which a liquid changes state to a solid

Organic molecules – molecules found in living things that contains carbon atoms

Inorganic molecules - molecules that are not found in living things; are usually found on the earth and ingested by living things; do not contain carbon

Atoms – the smallest unit of an element that retains the chemical and physical properties of that element

Biological macromolecules – a group of large, organic molecules found in living things; e.g. carbohydrates, lipids, proteins, and nucleic acids

Molecule – the smallest particle of a substance that retains the chemical and physical properties of the substance and is composed of 2 or more atoms held together by a chemical force or bond

Polymer – a molecule that has a large molecular mass due to the joining of several smaller subunits or monomers

Monomer – a molecule of any compound that can react with other molecules of the same or different compounds to form a polymer. Each biological macromolecule has characteristic monomers.

Nucleic acids – a biological macromolecule (DNA or RNA) composed of the elements carbon, hydrogen, oxygen, nitrogen, and phosphorus that carries genetic information

Carbohydrates – a macromolecule that contains carbon, hydrogen, and oxygen, where the H:O ratio is 2:1; are sources of energy for living things. (e.g. sugars, starches, cellulose)

Monosaccharide – simple sugars with the chemical formula of $C_6H_{12}O_6$; immediate energy source; examples are glucose, galactose, and fructose

Disaccharide – double sugars made from 2 monosaccharide monomers; general formula is $C_{12}H_{22}O_{11}$; needs to be broken down(hydrolysis) into the 2 monomers for use in the body. Examples are sucrose, maltose and lactose.

Polysaccharides – type of complex carbohydrate made from many monosaccharide monomers; requires breakdown (hydrolysis) for use by body; provides short term energy storage (~ 24 hours). Examples are starch (amylose, cellulose)

Lipids – a group of organic compounds composed of carbon, hydrogen, and oxygen, where the H:O ratio is much higher than 2:1; are insoluble in water; serve as a source of stored energy and are a component of cell membranes

Protein – a biological macromolecule that contains the principal components of organism; carbon, hydrogen, oxygen, and nitrogen; performs a variety of structural and regulatory functions for cells

Catalyst – a substance that enables a chemical reaction to proceed at an unusually faster rate or under different conditions (e.g. lower temperature) than otherwise possible without being changed by the reaction; are reusable in the body; (hormones and enzymes)

Macromolecules—any polymer with a high molecular mass

Enzymes – a type of protein that increase the rate of chemical reaction without being changed by the reaction; an organic catalyst

Hormones – a type of protein that regulates chemical reactions in the body

Hydrolysis – adding water to a molecule to break it down into smaller subunits or monomers (digestion)

Dehydration synthesis – the joining of 2 or more monomers to create a larger molecule; usually for storage purposes; a molecule of water is released to create the chemical bond between monomers to form a polymer

Enzymes

Active site –a specific region of an enzyme where a substrate binds and catalysis takes place (bonding site)

Substrate – the substance acted upon by an enzyme

Activation energy – the minimum amount of energy required to convert a normal stable molecule into a reactive molecule- also called energy of activation.

Denature- Of, or pertaining to, a molecule (such as a protein or a nucleic acid) wherein its chemical structure is altered through chemical or physical means so that some of its original properties are lost or diminished

Words of the Day Vocabulary Quiz # 4

Cell Organelles

Chromosomes- a single piece of coiled DNA and associated proteins found in linear forms in the nucleus of eukaryotic cells and in circular forms in the cytoplasm of prokaryotic cells; contains genes that encode traits. Each species has a characteristic number of chromosomes.

Endoplasmic Reticulum (ER) –an organelle containing folded membranes and sacs, responsible for the production, processing, and transportation of materials for use inside and outside a eukaryotic cell. There are 2 forms of this organelle: 1. rough ER (RER) that has surface ribosomes (bound ribosomes) and participates in the synthesis of proteins mostly destined for export by the cell and 2. Smooth ER (SER) that has no ribosomes and participates in the synthesis of lipids and steroids as well as the transport of synthesized macromolecules.

Golgi apparatus –an organelle found in eukaryotic cells responsible for the final stages of processing proteins for release by the cell.

Mitochondrion –a membrane bound organelle found in most eukaryotic cells; site of cellular respiration

Nucleus –a membrane bound organelle in eukaryotic cells functioning to maintain the integrity of the genetic material and, through the expression of that material, controlling and regulating cellular activities.

Plasma membrane –a thin, phospholipid and protein molecule bilayer that encapsulates a cell and controls the movement of materials in and out of the cell through active or passive transport.

Plastids –a group of membrane bound organelles commonly found in photosynthetic organisms and mainly responsible for the synthesis and storage of food

Chloroplast –An organelle found in plant cells and the cells of other eukaryotic photosynthetic organisms where photosynthesis occurs

Ribosome –a cellular structure composed of RNA and proteins that is the site of protein synthesis in eukaryotic and prokaryotic cells

Words of the Day Vocabulary Quiz # 5

Cell Processes: Transport

Impermeable—not permitting passage of a substance or substances

Extracellular—Located outside the cell

Intracellular—located inside a cell

Concentration—the measurement of the amount or proportions of a given substance when combined with another substance

Concentration gradient –the graduated difference in concentration of a solute per unit distance through a solution; concentration differences

Passive transport—the transportation of materials across a plasma membrane without using cellular energy

Diffusion –the movement of particles from an area of high concentration to an area of low concentration; a natural result of kinetic molecular energy; natural spreading out of molecules

Osmosis –the movement of water or another solvent through a selectively permeable membrane from an area of higher water concentration (dilute) to an area of lower water concentration (concentrated)

Facilitated diffusion—a process in which substances are transported across the plasma membrane with the concentration gradient with the aid of carrier (transport) proteins; does not required the use of cellular energy; ex- glucose into blood

Carrier (transport) protein—Proteins embedded in the plasma membrane involved in the movement of ions, small molecules, and macromolecules into and out of the cell: also known as transport proteins

Isotonic solution- where water concentration in the cell is equal to the water concentration of the surrounding solution; no net movement of water; no increase or decrease of cell size

Hypotonic solution- where water concentration in the cell is less than the water concentration of the surrounding solution; water moves into the cell causing it to expand and swell.

Hypertonic solution- where water concentration in the cell is more than the water concentration of the surrounding solution; water moves out of the cell causing cell to shrink.

Pumps (ion or molecular)—any of several molecular mechanisms in which ions or molecules are transported across a cellular membrane requiring the use of an energy source (e.g. glucose, sodium [Na^{+}], calcium [Ca^{+2}], and potassium [K^{+}])

Active Transport –the movement of particles from an area of low concentration to an area of high concentration that uses energy provided by ATP or a difference in electrical charges across the cell membrane

Endocytosis—a process in which a cell engulfs extracellular material through an inward pinching or folding in of

the plasma membrane; taking in substances from the environment; uses cellular energy

Exocytosis—a process in which a cell releases substances to the extracellular environment by fusing a vesicular membrane with the plasma membrane, separating the membrane at the point of fusion and allowing the substance to be released; the way cell release molecules into the surrounding environment; uses cellular energy

Mechanism (scientific)—the combination of components that serve a common function

Pinocytosis – a process in which a cell engulfs extracellular FLUIDS AND DISSOLVED IONS through an inward pinching or folding in of the plasma membrane to form a vesicle; uses cellular energy

Phagocytosis- a process in which a cell engulfs extracellular SOLIDS through an inward pinching or folding in of the plasma membrane to form a vesicle; uses cellular energy

Words of the Day Vocabulary Quiz # 6

Cellular Energy

Adenosine triphosphate (ATP)—a molecule that provides energy for cellular reactions and processes; ATP releases energy when one of its high energy bonds is broken to release a phosphate group

Energy transformations –a process in which energy changes from one form to another form while some of the energy is lost to the environment

Bioenergetics—the study of energy flow (energy transformations) into and within living systems

Photosynthesis and Cellular Respiration

Photosynthesis—a process in which solar radiation is chemically captured by chlorophyll molecules and through a set of controlled chemical reactions resulting in the potential energy in the bonds of carbohydrate molecules

Cellular respiration—a complex set of chemical reactions involving an energy transformation where potential chemical energy in the bonds of "food" molecules is released and partially captured in the bonds of ATP molecules

Aerobic- requiring oxygen

Anaerobic – not requiring oxygen

Fermentation- type of anaerobic respiration that creates lactic acid or ethyl alcohol as a waste product. Does not require oxygen.

Words of the Day Vocabulary Quiz # 7

The Cell Cycle/Cell Division

Cell cycle—the series of events that take place in a cell leading to its division and duplication. The main phases of the cell cycle are interphase, nuclear division (prophase, metaphase, anaphase, and telophase) and cytokinesis

Mitosis—a nuclear division resulting in the production of 2 somatic cells, having the same genetic makeup as the original cell

Somatic cell—any cells in the body of an organism, except the sex cells used in sexual reproduction (e.g. skin, blood, nerve cells)

Interphase—the longest lasting phase of the cell cycle in which a cell performs the majority of its functions, such as preparing for nuclear division and cytokinesis

Cytokinesis –the final phase of the cell cycle resulting in the division of the cytoplasm resulting in 2 new daughter cells

Meiosis—a 2 phase nuclear division that results in the eventual production of gametes (sex cells) with half the normal number of chromosomes as the original cell

Gamete—a specialized cell (egg or sperm) used in sexual reproduction containing half the normal number of chromosomes of the somatic cell

Crossing-over—an exchange of genetic material between homologous chromosomes during prophase I of meiosis; contributes to the genetic material variability in gametes and ultimately in offspring

Words of the Day Vocabulary Quiz # 8

DNA/RNA/Protein Synthesis

Deoxyribonucleic acid (DNA)—a biological macromolecule that encodes the genetic information for living organisms and is capable of self-replication and the synthesis of ribonucleic acid (RNA)

DNA replication—the process in which DNA makes a duplicate copy of itself; necessary prior to cell division

Semiconservative replication—the process in which the DNA molecule uncoils and separates into 2 strands. Each original strand becomes a template on which a new strand is constructed, resulting in 2 new DNA molecules identical to the original DNA molecule

Transcription—the process in which a strand of messenger RNA (mRNA) is synthesized by using the genetic information found on a strand of DNA as a template (pattern)

Translation—the process in which the messenger RNA (mRNA) molecule on a ribosome is decoded to produce a sequence of amino acids for protein synthesis

Protein synthesis—the process in which amino acids arrange in a linear sequence through the process of transcription of DNA and RNA and to the translation of RNA to a polypeptide chain

Polypeptide chain- a linear segment of amino acids used to form proteins

Words of the Day Vocabulary Quiz # 9

Genetics

Genotype—the genetic composition of an organism with reference to a single trait, a set of traits, or the entire complement of traits of an organism

Phenotype—the observable expression of a trait; the physical appearance

Allele—a variation of a gene's nucleotide sequence (an alternative form a of a gene)

Allele frequency—the measure of the relative frequency of an allele at a genetic locus (location on a gene) in a population; expressed as a proportion or percentage.

Gene—a sequence of nucleotides composing a segment of DNA that provides a blueprint for a specific hereditary trait

Gene expression—the process in which a nucleotide sequence of a gene is used to make a functional product such as a protein or RNA

Inheritance—the process in which genetic material is passed from parents to their offspring

Homozygous—consisting of a genotype where both genes are the same

Heterozygous- consisting of a genotype where both genes are different

Chromosomal mutation—a change in the structure of a chromosome (e.g. deletion, the loss of a segment of a chromosome and the loss of a segment containing genes; duplication, when a segment of a chromosome is duplicated and thus displayed more than once on a chromosome; inversion, where a segment of a chromosome breaks off and reattaches in reverse order, and translocation, when a segment of one chromosome breaks off and reattaches to a non-homologous chromosome)

Mutation—a permanent transmissible change in genetic material (e.g., chromosomal mutations and gene mutations)

Gene recombination—a natural process in which a nucleic acid molecule (usually DNA but can be RNA) is broken and then rejoined to a different molecule; a result of crossing over

Frame-shift mutation—the addition (insertion mutation) or removal (deletion mutation) of one or more nucleotides, that is not divisibly by three, therefore resulting in a completely different amino acid sequence than would be normal. The earlier in the sequence nucleotides are added or deleted, the more altered the protein will be.

Nondisjunction—the process in which sister chromatids fail to separate during and after mitosis or meiosis

Point mutation—a single base substitution causing the replacement of a single base nucleotide with another nucleotide (e.g., silent mutation, in which there is no change in an amino acid; missense mutation, in which there is a different amino acid; and nonsense mutation, in which there is an insertion of a stop codon in the amino acid sequence which stops protein synthesis)

Translocation-the process in which a segment of a chromosome breaks off and attaches to another chromosome

Cloning—the process in which a cell, cell product, or organism is copied from an original source (e.g. DNA cloning is the transfer of a DNA fragment from one organism to a self-replicating genetic element such as a bacterial plasmid; reproductive cloning is the transfer of genetic material from the nucleus of a donor adult cell to an egg cell that has had its nucleus removed for the purpose of creating an embryo that can produce an exact genetic copy of the donor organism, or therapeutic cloning is the process of taking undifferentiated embryonic cells [stem cells] for use in medical research)

Dominant inheritance—a pattern of inheritance in which the phenotypic effect of one allele is completely expressed within a homozygous and heterozygous genotype

Recessive inheritance—a pattern of inheritance in which the phenotypic effect of one allele is only expressed within a homozygous genotype; in a heterozygous genotype with a dominant allele, it is not expressed in the phenotype

Incomplete dominance—a pattern of inheritance in which 2 alleles, inherited from the parents, are neither dominant nor recessive; the resulting offspring have a phenotype that is a blending of the parental traits.

Co-dominance—a pattern of inheritance in which the phenotypic effect of 2 alleles in a heterozygous genotype expresses each phenotype of each allele fully and equally; a phenotype which would not be expressed in any other type of inheritance (e.g. blood types)

Multiple alleles—more than 2 forms of a gene controlling the expression of a trait; means co-dominance (e.g. blood types)

Polygenic trait—a trait in which the phenotype is controlled by 2 or more different genes at different loci on different chromosomes (height, skin color, weight)

Sex-linked trait—a trait, associated with a gene that is carried by either the male or female (on the X chromosome) parent (color blindness and sickle cell anemia)

Genetic engineering—a technology that includes the process of manipulating or altering the genetic material of a cell resulting in desirable functions or outcomes that would not occur naturally

Biotechnology—any procedure or methodology that uses biological systems or living organisms to develop or modify either products or processes for specific use; This term is commonly associated with genetic engineering, which is one of many applications

Genetically modified organism—an organism whose genetic material has been altered through some genetic engineering technology or technique

Gene splicing—a type of gene recombination in which DNA is intentionally broken and recombined using laboratory techniques

Gene therapy—the intentional insertion, alteration, or deletion of genes within an individual's cells and tissues for the purpose of treating a disease

Selective breeding—the process of breeding organisms that results in offspring with desired genetic traits

Words of the Day Vocabulary Quiz # 10

Evolution

Evolution—a process in which new species develop from preexisting species (biological evolution or macroevolution); a change in the allele frequencies of a a population of organisms from generation to generation (genetic evolution or microevolution)

Extinction—a term that typically describes a species that no longer has any known living individuals

Genetic drift—a change in the allele frequency of a population as a result of chance events rather than natural selection

Founder effect—a decrease in genetic variation caused by the formation of a new population by a small number of individuals from a larger population

Migration (genetic) –the permanent movement of genes into or out of a population resulting in a change in allele frequency

Analogous structure—a physical structure, present in multiple species, that is similar in function but different in form and inheritance (e.g., wings of fly and wings of bird)

Homologous structures—a physical characteristic in different organisms that is similar because it was inherited from a common ancestor; similar in structure but not necessarily in function (e.g., arm of a human and forelimb of a dog)

Endosymbiosis—a theorized process in which early eukaryotic cells were formed from simpler prokaryotic cells

Forensics—the science of tests and techniques used during investigation of crimes

Fossils—the preserved remains or traces of organisms that once lived on Earth

Gradualism—a proposed explanation in evolutionary biology stating that new species arise from the result of slight modifications (mutations and resulting phenotypic changes) over many generations

Punctuated equilibrium—a proposed explanation in evolutionary biology stating that species are generally stable for long periods of time; occasionally there are rapid changes that affect some species which can quickly result in a new species

Isolating mechanisms—features of behaviors, morphology, or genetics which serve to prevent mating or breeding between 2 different species (e.g., temporal isolation in which individuals are active at different times of the day, seasons, or mating periods; ecological isolation, in which individuals only mate in their specific habitat; behavioral isolation, when there are no sexual cues between representatives of the species; mechanical isolation, when there is no sperm transfer during an attempted mating; and gametic isolation, when there is sperm transferred without fertilization occurring.)

If mating can take place, there are 4 factors that prevent hybrid viability: zygomatic mortality (fertilization but no zygote), hybrid inviability (embryo is not viable), hybrid sterility (resulting adult is sterile), and hybrid breakdown (first generation is viable but future generations are not).

Speciation—a process typically caused by the genetic isolation from a main population resulting in a new genetically distinct species

Vestigial structures—a physical characteristic in organisms that appears to have lost its original function as a species has changed over time (e.g., human appendix)

Words of the Day Vocabulary Quiz # 11

Ecology

Population—a group of individuals of the same species living in a specific geographic area at any given time; must be able to reproduce with one another

Community—different populations of organism interacting in a shared environment

Ecosystem—a system composed of organisms and nonliving components of an environment

Biome—a large area or geographic region with distinct plant and animal groups adapted to that environment

Biosphere—the zone of life on Earth; sum total of all ecosystems on Earth

Population dynamics—the study of short and long term changes in the number of individuals for a given population, as affected by birth, death, immigration, and emigration

Habitat—an area that provides an organism with its basic needs for survival; place in which an organism lives

Competition—when individuals or groups of organisms compete for similar resources such as territory, mates, water, and food in the same environment

Succession—a series of predictable and orderly changes within an ecosystem over time

Producers (autotroph)—an organism that uses a primary energy source to conduct photosynthesis or chemosynthesis

Consumer (heterotroph)—an organism that obtains energy by feeding on other organisms or their remains

Decomposer (heterotroph)—an organism that obtains nutrients by consuming dead and decaying organic matter which allows nutrients to be accessible to other organisms

Trophic levels—the position of an organism in relation to the flow of energy and inorganic nutrients through an ecosystem (e.g., producer, consumer, decomposer)

Food chain—a simplified path showing the passing of potential energy (food) from one organism to another organism

Food web—a complex arrangement of interrelated food chains illustrating the flow of energy between interdependent organisms

Energy pyramid—a model that illustrates the biomass productivity at multiple trophic levels in a given ecosystem

Symbiotic relationship (symbiosis)—a relationship between 2 organisms where one organism benefits from the living arrangement

Mutualism—type of symbiotic relationship where both organisms benefit in the living arrangement

Parasitism—type of symbiotic relationship where one organism benefits and the other organism is harmed in the living arrangement

Commensalism—type of symbiotic relationship where one organism benefits and the other organism is neither helped nor harmed in the living arrangement

Biogeochemical cycles—the movement of abiotic factors between the living and nonliving components within an ecosystem; also known as nutrient cycles (i.e. water cycle, carbon cycle, oxygen cycle, nitrogen cycle, phosphorus cycle)

Agriculture—the artificial cultivation of food, fiber, and other goods by the systematic growing and harvesting of various organisms

Endemic species—a species that is found in its originating location and is generally restricted to that geographic area

Nonnative species—a species normally living outside a distribution range that has been introduced through either deliberate or accidental human activity; also can be known as introduced, invasive, alien, nonindigenous, or exotic species

Aquatic—a term that describes an organism associated with a water environment

Terrestrial—a term that describe an organism associated with a land environment