Earth's changing biodiversity:

in Ma (mega-annum (a million years)) before present

Hadean eon (4550-3800Ma)

- **4550Ma- Birth of solar system, escaping gases build early atmosphere**
- **4500Ma- Meteorite bombardment**
- **4400Ma- Earth's core forms**
- **4200Ma- Great ocean forms**
- **4055Ma- Oldest known rocks**
- **3850Ma- Evidence of life**
- **3800Ma- Bacteria diversify**

Adhesion: The joining of *two different* substances due to attractive forces that hold them; water- keeps water drops on surfaces of leaves and flowers in place; Binding of a cell to another cell i.e. malarial protozoan cell binding to a liver cell (still *two different* cells binding)

Archaean eon: Comes after Hadean Eon (3800-2500Ma); Anaerobic bacterial life (singled celled procaryote bacteria), oxygen starts to accumulate

Biomonomers: A simple carbon molecule

Biopolymers: (Macromolecules- large complex molecule i.e. nucleic acids, proteins, carbohydrates, lipids) Arose from small organic molecules; Macromolecules are proteins, nucleic acids, carbohydrates, lipids; Also Plasma Membrane

Building phase of the earth: When asteroids still pummelled the earth heavily prior to and during the late heavy bombardment

Carbon: Important to organic evolution; Is central to life, carbon atoms link in chains and bind with other atoms to make the array of organic chemicals that constitutes life itself; So ideal because of tetrad valence electrons; Versatile; Planet dominated by water and by carbon

Cenozoic: Part of Phanerozoic Era; (65Ma to present); Mass extinction of dinosaurs, mammals and bird; End of age of reptiles; Age of mammals

Central dogma: Flow of genetic information from DNA to RNA to make a protein; DNA is coding information for production for all protein synthesis; 1) Replication 2) Transcription 3) Translation

Chemical evolution: (an origin of life); The formation of complex organic molecules from simpler organic molecules through chemical reactions; happened in the ocean; lasted less than a billion years; Primitive earth>inorganic chemicals>small organic molecules>macromolecules & plasma membrane

Clays: Collective term for large group of minerals found in great abundance in extremely fine-grained sediments; Mineral deposits of high charged elements; Elements in a clay interact in a clay according to their charges; When formed, special form of sedimentation; Interact with each other; All interactions occur in levels; Ionic interact between particles;

Cohesion: The sticking together of alike molecules i.e. water molecules want to stick to each other; Important in capillary action combined with cohesiveness of water

Crystal lattice of water: Geometric arrangement of the points of atoms, molecules, or ions; Water when it's ice (not sure if it is for liquid water??)

Emergence: More than the sum of the parts; Organicists (1930)- vital force replaced by genetic program and importance of emergence; Hemoglobin (4) is faster than Myoglobin (1)

Eras: System of chronological notation computed from a given date as bases;
Eukaryote: A single-celled or multicellular organism that has a distinct, membrane-bound nucleus; Known for having cytoplasmic organelles apart from the mitochondria, chloroplasts, and Golgi bodies; Has energy transforming organelles, mitochondria and chloroplasts
Evaporation: Process of substance in liquid state changing to gaseous state due to increase in temperature and/or pressure; Fundamental part of water cycle
Geological time scale: System of chronological dating that relates geological strata to time; Created by Lyell and his colleagues (palaeontologists); Used to describe timing and relationships of events that have occurred during Earth's history; Divides earth's history into 4 eons made up of eras and periods
Goldilocks zone: Refer to Habitable Zone
Green house gases: Any of the gaseous compounds (i.e. CO2) that absorb infrared radiation, trap heat in atmosphere, and contribute to greenhouse effect
Habitable zone: Because of Late Heavy Bombardment, planet masses became final and in fixed orbits; where gravitational forces of planet can maintain atmosphere and far enough away from sun to not boil water or to freeze it.
Hadean eon: Formation of solar system and planet (4600-3800Ma); building phase and stabilizing phase-> built planets, scrubbed asteroids out, and stabilized everything; Absence of oxygen
Hydrogen bond: Electromagnetic attraction between polar molecules in which hydrogen is bound to a larger atom i.e. oxygen or nitrogen; Attraction between positive and negative poles of charged atoms
Hydrophilic: Water loving (polar)
Hydrophobic: Water hating (nonpolar)
Hydrothermal vents: Fissure on the sea floor from which flows water that was heated by underlying magma; Water contains dissolved minerals (small organic molecules) that can precipitate out of it upon contact with the cold seawater building a stack of minerals; Mark edges of ruptures that occur on the edges of continental plates
Interstellar organic compounds: Interstellar molecules formed by chemical reactions within very sparse interstellar or circumstellar clouds of dust and gas; Formed by molecule being ionized as the result of an interaction with a cosmic ray; Dust plays critical role of shielding molecules from ionizing effect of uv rays emitted by stars; Frozen water with prebiotic/organic filled soup came on interstellar thing, so our prebiotic soup arose from it which came from somewhere else that there's already prebiotic soup
Interstellar space dust: Space between starts filled with atomic and molecular gas (hydrogen and helium) and tiny pieces of solid particles or dust (carbon, silicon, oxygen); In some places it's very dense forming nebulas
Late heavy bombardment: (4.1-3.8 billion years ago); large amounts of asteroids collided with early terrestrial planets including Mercury, Venus, Earth, and Mars; Made planet masses bigger as planets absorbed them, which caused the planet orbits to expand; Jupiter and Saturn orbits ratio 2:1 meaning they aligned at some point and this jiggled the asteroid belt (because of gravitation being heavy on one side of solar system)->Saturn and Jupiter discarded asteroids between planets (took out dangerous asteroids because of that weird harmonic) and potentially

flipped orbits of neptune and uranus; cause of craters on planets; as a result at one point planets were bombarded, then super bombarded during late heavy bombardment phase; and then they were never disturbed again; Asteroids carry lots of water and carbon

Liposome: (Bubble hypothesis for cells) Spherical vesicle having at least one lipid bilayer; Prepared by disrupting biological membranes; Waves breaking on shore create delicate foam composed of bubbles, making it possible that organic molecules were concentrated on the shorelines - the shallow coastal waters tend to be warmer, further concentrating molecules through evaporation - oily bubbles more stable - phospholipids contain a hydrophilic head on one end, and hydrophobic tail on the other, they have tendency to spontaneously form lipid membranes in water - a lipid bilayer bubble can contain water, and was a likely precursor to the modern cell membrane - if a protein came along that increased the integrity of its parent bubble, then that bubble had an advantage, and was placed at the top of the natural selection list - when bubbles burst, once enough of the "right stuff" released into the medium, the development of the first prokaryotes, eukaryotes, and multicellular organisms could be achieved

Mesozoic: Part of Phanerozoic Era (251-65Ma); plants and animals come to land and become more efficient in their reproduction, dinosaurs appear and more insects; Comes to end and dinosaurs disappear due to another global catastrophic event; Development of flying reptiles, birds, and flowering plants, more insects

Micelles: (Bubble hypothesis for cells) (Are a liposome) Lipid molecules that arrange themselves into spherical form in aq solution; have internal pocket of water surrounded by single layer of lipid

Miller-Urey experiment: Tried to break conundrum of where small organic molecules came from; Placed CH4, NH3, H20, and H2 into bulb with induced electric sparks and water vapour to create small organic molecules; Found that carbon molecules were starting to build into organic molecules and it was happening spontaneously; With time molecule complexity grew

Nice model: A scenario for the dynamical evolution of the Solar System; Proposes migration of giant planets from an initial compact configuration into their present positions, long after the dissipation of the initial pro planetary gas disk; used to explain the Late Heavy Bombardment of the inner Solar System

Nonpolar compound: Compound comprised of molecules linked through chemical bonds (charges are symmetrical); Will not readily dissolve in water

Organic molecules: Molecules composed of carbon atoms in rings or long chains, to which other atoms are attached such as hydrogen, oxygen, nitrogen; Sugars, aa, nucleotides, small lipid chains; stitched together to make macromolecules; Made in hydrothermal vents, lightning not necessary

Paleozic: Part of Phanerozoic Era; (543-251Ma); Marine invertebrates make appearance in ocean, algae becoming prominent photosynthetic forms in the ocean, “Cambrian explosion (explosion of animals at that time)” (all animals of this day can be traced back to those initial guys), first land plants and insects; All of this disappears in a global catastrophic event

Panspermia: (an origin of life) (Extraterrestrial origins) Something came along and seeded the planet from another planet; Asteroids hit the planet and they carry bacteria which could’ve given life on the planet; One type of bacterium arrived and everything on earth evolved from it

Periods: Particular length of time with a beginning and end is Era

Phanerozoic eon: Comes after Proterozoic Eon (543Ma-present); Multicellular organisms; Shortest; Single large super continent broke apart and plates drifted on fluid surface of earth's core; Organisms in continental shelves and land masses above water have been mixed, modified, and isolated from each other; Divided into 3 major eras:Cambrian explosion (550Ma)- tremendous diversification of animal life in oceans and they fed on abundance of protists that populated ancient seas, Palaeozoic (550-250Ma)- oceans populated with animals and some first attempts by plants and animals to rise onto land and disappears in a global catastrophic event where 90% of marine diversity disappears, Mesozoic (245-65Ma)- invasion of land by animals a success and increase in numbers and variety global diversity recovers, comes to an end with the disappearance of dinosaurs (end of age of reptiles as global catastrophe eliminates them), Cenzoic- age of mammals

Polar compound: Compound made of molecules joined by asymmetrical polar bonds; Water (Oxygen big enough that it pulls some of the electrons away from the hydrogen, therefore positive charge at hydrogens and negative charge at oxygen); Like a magnet and so the molecules stick together

Prebiotic soup: Lightning and volcanic gasses reacted to create a prebiotic soup consisting of simple organic compounds that was supplemented by the same compounds from deep sea hypothermal vents and even from meteorite materials; is what Miller-Urey experiment hinted at; Oceans filling with organic molecules

Prokaryote: Microscopic, single-celled organism which has neither a distinct nuclear with a membrane or other specialized organelles; Includes bacteria and cyanobacteria

Proteins first hypothesis: An origin of life; Protein interactions were first form of self-reproducing life and nucleic acids evolved later as memory molecules; When proteins were the only known enzymatic catalysts; In the mix of proteins formed, one was special and duplicated other proteins; Proteins are better catalysts; troubling finding is that small peptides or nucleotide chains are usually insoluble in aqueous solution; they need all those monomeric charged groups to dissolve in polar water; Protein catalysts are long chains and necessary to create the unique pockets and folded structure, means the RNA chain must also be long

Proterozoic eon: Comes after Archaean Eon (2500-543Ma); Atmosphere has oxygen, aerobic single celled organisms pop up; Single celled eukaryotes

Protobionts: (Are protocells) Possibly the precursor to prokaryotic cells; Lipid bilayer of life;

Protocells: (Are protobionts) Must be able to self-maintain through metabolism and internal biochem reactions, self reproduce, and to be able to change of evolve; Have been host to variety of biochem interactions including biosynthesis of DNA RNA; RNA got translated into protein in artificial protocells; Self-organized spherical collection of lipids proposed as a stepping-stone to the origin of life

Reducing atmosphere: For origin of life carbon existed in the reduced gasses (NH_3, CH_4) in atmosphere, not in oxidized form (CO) or fully oxidized (CO_2); Atmospheric condition in which oxidation is prevented by removal of oxygen and other oxidizing gases or vapours

Reverse transcriptase: Enzyme that permits DNA to be made, using RNA as template i.e. HIV

Ribozymes: RNA enzymes that catalyst certain biochem reactions; Occurs in ribosome; Observed to participate in viral replication

RNA world: RNA strands also have autocalyctic abilities; Folded RNA strand (ribosome) capable of duplicating linear RNA then there's replication; Modified version of ribosome may start sticking aa together using pieces of TNA that's bound to aa (first RNA translation system); Ability for RNA to replicate RNA was the bases for the ribozymes and the proposal of an RNA world
Spontaneous origins: (Spontaneous generation) (Origin of Life); Hypothetical process where living organisms develop from nonliving matter; Archaic theory utilized this process to explain origin of life
Stabilizing phase of the earth: Stability occurred and various components had a chance to "settle"; Dense core of the earth remained molten and hot and the lighter gasses escaped; Earth's gravitational field held onto the escaping gases and the first atmosphere surrounded the planet; Surface formed a crust through as planet cooled which vented the various gases from the molten central core (out gassing); Water vapor turned to liquid rains began to fall and cover the earth with its first water blanket
Surface tension: Water molecules at the surface that can't interact in all directions (stronger interact to molecules next to them), so surface of water is impenetrable to small objects; Waterbug; Water molecules aren't exerting exerting forces equally in all directions, more to adjacent molecules
Surfactant: Compounds that lower surface tension between two liquids or between liquid and solid; May act as detergents, wetting agents, emulsifiers, foaming agents, and dispersants
Vesicles: Small structure in cell consisting of fluid enclosed by lipid bilayer
Volcanic outgassing: As surface formed a crust, various gasses vented through it from the molten core called out gassing; Volcanic outgassing combined with lightning reacted to create prebiotic soup of simple organic compounds that was supplemented by the same compounds from deep sea hydrothermal vents and even from meteorite materials
Eons: Largest division of geologic time, comprising 2 or more eras; Hadean, Archaean, Protozoic, Phanerozoic

What is life:
Organized- with cells as the fundamental unit
Metabolizing- capturing and releasing energy
Selfregulating- Delicate balance between supply and demand
Reproduce- Life only comes from life
Evolving- Adapting and changing
Responding- Sensing and interact with the surrounding world
Growth- Increase in size (Prof disagrees bc not a big deal in unicellular organisms)

Archean eon (3800-2500Ma) (Age of bacteria, starts with anaerobic forms and finishes with aerobic forms at end)

- **3700Ma- Photosynthesizing bacteria**
- **3500Ma- Oldest fossils**
- **3400Ma- Small continents form**
- **3100Ma- Continents begin shifting**
- **2700Ma- First eukaryotes**
- **2600Ma- Bacteria on land**
- **2500Ma- Banded iron formation**

Absorptive heterotroph: Organism that secretes enzymes externally into enviro to digest organic materials which are then absorbed i.e. fungi, many protists and monera; The enzymes assist in reactions by lowering activation energy

Aerobic: Requires air/free oxygen for life,survival; Especially refers to aerobic bacteria; Respiration occurring in the presence of oxygen

Algae: Group of photosynthetic organisms that possess pigments such as chlorophyll but lack true roots, stems, and leaves (that terrestrial plants have)

Anaerobic: Lack of molecular oxygen; An organism/cell that can function without air (oxygen)

Animalia: Ingestive heterotroph; Have multicellular eukaryotic organisms; All animal motile, meaning they can move spontaneously and independently at some point in their lives

Antibody: Y-shaped gamma globulin proteins found in blood or lymph, produced by B cells as immune defence against foreign agents (antigens); Antibodies have a specific region that binds to a particular antigen; Neutralizes the antigen

Antigen: Any of the various substances that when recognized as non-self by the adaptive immune system triggers an immune response, stimulating the production of an antibody that specifically reacts with it; H-antigens important in recognizing host cell and attaching the virus so the genome can move into the host cell; N-antigens involved in the escape from the host cell when the virus has completed replication

Antibiotic resistance: Ability of a microorganism to withstand the effects of an antibiotic; Specific type of drug resistance; Antibiotic resistance evolves naturally via natural selection through random mutation, but it could also be engineered by applying an evolutionary stress on a population

Archaea: Any of the unicellular microorganisms that are genetically distinct from bacteria and eukaryotes, often inhabit extreme environments; Derived from simple bacteria; Would be candidate for panspermia, but it is derived from bacteria (issue; KISS principle); Fall into broad categories: methanogens (methane producers- anaerobic conditions), extreme halophiles (salt loving), and extreme thermophiles (loving extreme temperatures either hot or cold); Unique lipid composition of the plasma membrane and these changes are no doubt the result of the extreme conditions under which these prokaryotes live

ATP synthase: Enzyme consists of two major segments: Fo portion, the transmembrane proton channel and F1 portion, the catalytic component; Proton channel component allows the diffusion of protons (hydrogen ions) from an area where there are more hydrogen ions to an area where there are less hydrogen ions due to a proton gradient; As the proton (H+ ion) moves down the

concentration gradient this moves the enzyme in a spinning motion, which brings ADP and inorganic phosphate together to form a bond, thus creating ATP molecule; Resulting ATP molecule is released so that a new ADP molecule can enter for another phosphorylation
Autotroph: Metabolic process capable of building organic carbon by using atmospheric carbon dioxide; Provide heterotroph with organic carbon that heterotroph's build with
Bacteria (Eubacteria): True bacteria, all bacteria except for archaebacteria; From domain Bacteria, previously called Eubacteria; Characterized by size, shape, mobility, and metabolism, but it was fooling scientist because large of genomic variance between organisms that looked the same, so gave them numeric identification (on surface of bacteria a proteins that are important for toxicity); Started protein coding in plasm and flagellum
Bacterial Cytoplasm: Lacks endomembrane system or organelles, but is rich in 70S ribosomes consisting of 50S and 30S subunits of a genome located in specialized region of cytoplasm referred to as the nucleoid
Bacterial flagellum: Allows bacteria to move around, has nano mother made of 40 proteins; Protein in flagellum is part of name of bacteria (with the numbers assignment to it)
Bacteriophage: Virus that takes over bacterial cell and kills them during lytic phase of viral life cycle; Virus takes over host cells' replication, transcription, and translation machinery and uses it to replicate its genome and produce proteins of the viral case that are encoded in the viral genome
Bacterial Importance: Disease (airborne, arthropod, direct contact, food or waterborne), Nitrogen fixation, Decomposition, Unique biochemical pathways, Extremophiles (Archea)
Binary fission: Type of asexual reproduction common among prokaryotes wherein a cell divides giving rise to two cells, each having the potential to grow to the size of the original cell; (bacterial reproduction) Single celled chromosome haploid, subject to mutation
Capsid protein: Combined, creates a coiled polyhedral structure composed of proteins surrounding the nucleic acid of a virus; Protein coat of a virus
Capsule: Cell capsule is a very large structure of some prokaryotic cells, such as bacterial cells; Polysaccharide layer that lies outside the cell envelope of bacteria, and is thus deemed part of the outer envelope of a bacterial cell
Carbon: Organic or inorganic; Organic carbon is incorporated into carbon-carbon bonds, inorganic carbon atmospheric carbon i.e. CO_2
Cell wall: In bacteria; Maintains integrity of the cell under varying osmotic conditions; Peptidoglycan layer with cellulose
Chemolithoheterotroph: Heterotroph; Uses minerals as source of high energy electrons and organic carbon as carbon source
Chemolithotrophs: Autotrophic; Mineral source of high energy electrons, and CO_2 as carbon source
Chemoorganoheterotrophs: Heterotroph; An organism that uses organic compounds as sources of energy, electrons, and carbon
Chemoorganotrophs: Autotroph; Use organic carbon as source of high energy electrons, and CO_2 as carbon source;

Chitin: Tough, semitransparent substance that is main component of the exoskeletons of arthropods (ie shells of crustaceans and the outer coverings of insects); Chitin is a carbohydrate and is also found in the cell walls of certain fungi and algae
Circular genome: Don't have 5' or 3' ends, they are resistant to exonuclease-mediated degradation and are presumably more stable than most linear RNAs in cells; Ability to rearrange the order of genomic information, protection from exonucleases, and constraints on RNA folding; Can function as templates for viroid and viral replication, as intermediates in RNA processing reactions, as regulators of transcription
Conjugation: Form of horizontal gene transfer; Bacterium with pilli encounters one without, they become connected, and a single stranded copy of the plasmid DNA is transferred from the F-positive (with fertility factor) bacterium to the F-negative (without fertility factor) bacterial cell; Complementary strand is produced and the bacterial cell now contains a plasmid that may include genes for antibiotic resistance or unique metabolic pathways; Results in a new plasmid with all the original plasmid gene sequences plus some from the host bacterial cell; When modified plasmid starts to replicate it produces pilli on the surface of its host and when conjugation occurs it passes all of the DNA contained in the plasmid to the other cell and the recipient cell receives both plasmid and bacterial DNA (a form of horizontal gene transfer)
Cyanobacteria: Transformed planet to the oxygen rich aerobic environment ; $CO2+H2O+light \rightarrow (CH2O)n+H2O+O2$; Invention of photosynthesis
Daughter cell: Either of the two cells formed when a cell undergoes cell division by mitosis; Daughter cells are genetically identical to the parent cell because they contain the same number and type of chromosomes
Domains: Higher than Linnaeus' kingdom; LUCA-> Bacteria, Archaea, Eukarya
Electron donor: Chemical entity that donates electrons to another compound. It is a reducing agent that, by virtue of its donating electrons, is itself oxidized in the process
Electron receptor: Molecule that receives or accepts electrons from another molecule during a redox reaction; Is an oxidizing agent and is itself reduced during the process of redox reaction (ie oxygen, nitrate, iron (III), manganese (IV), sulfate, carbon dioxide, etc)
Electron transport chain: Group of compounds that pass electron from one to another via redox reactions coupled with the transfer of proton across a membrane to create a proton gradient that drives ATP synthesis
Endospore: Involved in reproduction, but its not reproduction; Bacterial cells that have gone into arrested/dormant development; Can carry bacteria over in time; Dormant, tough, and non-reproductive structure produced by certain bacteria from the Firmicute phylum
Enveloped virus: Virus that has an outer wrapping or envelope. This envelope comes from the infected cell, or host, in a process called "budding off." During the budding process, newly formed virus particles become "enveloped" or wrapped in an outer coat that is made from a small piece of the cell's plasma membrane; Has H and N antigens: H-antigens important in recognizing host cell and attaching the virus so the genome can move into the host cell, N-antigens involved in the escape from the host cell when the virus has completed replication; During the replication cycles, the virus created the membrane proteins that are added to the mix of proteins already in the host's plasma membrane. When the virus escapes it buds from the surface of the host cell and as it buds it wraps itself in the host cell membrane

Eukaryota: Domain comprised of eukaryotes/organisms whose cells contain true nucleus; One of 3-domain system of biological classification introduced by Carl Woese (1990)
Extremophiles (Archea): Organism that thrives in physically or geochemically extreme conditions that are detrimental to most life on Earth; i.e. Archaea
Flagellar hook: Coupling between flagellum and motor; Polymerization of thousands of copies of one proteins from the flagellum; Elbow bend
Flagellar motor: Includes series of proteins that span the plasma membrane to form things (because of aa composition); Number of rings depends on bacterium being Gram-positive/-negative, with pair of rings associated with each membrane; Driven by proton gradient-hydrolysis of ATP moves proton across inner membrane and as proton gradient accumulates-only way for proton to move down concentration gradient is to pass through opening in motor proteins, as the pass, that energy is used to create a conformational change in motor proteins that moves the central rotor attached to hook that spins inside the rings embedded in the plasma membrane
Fungi: Eukaryotic single-celled or multinucleate organisms that live by decomposing and absorbing organic material in which they grow (mushrooms, molds, mildews, smuts, rusts, yeasts) classified in the kingdom Fungi
Gram-negative bacteria: Peptidoglycan layer is thinner layer sandwiched between an inner and outer plasma membrane (Gram-negative bacteria have two plasma membranes with periplasm between); Additional outer plasma membrane prevents the staining of the peptidoglycan layer; Often pathogenic and outer lipid layer contains the endotoxins (complex lipopolysaccharides) that make the bacteria toxic; Outer layer prevents penicillin from damaging peptidoglycan; 2 plasma membrane; Most of bacteria, other than Gram-positive bacteria
Gram-Positive bacteria: Peptidoglycan layer is thick, and on outermost surface of the bacterium is stained; Peptidoglycan can easily be damaged; Treatable by penicillin; Non living outer cell wall; 2 doughnuts in flagellum
Halophiles: Love salt and as you might guess you'll find them living in some of the saltiest places on earth, the Dead Sea, the Great Salt Lake and the salt flats where ocean water is evaporated to crystalline sea salt
Heterotroph: Build carbon that already exists as a part of an organic carbon-carbon bond; First form of life on planet because of mitochondria (it occurs first in evolution); break down glucose; Autotrophs supply the organic carbon that heterotrophs build with
Histones: Highly alkaline proteins found in eukaryotic cell nuclei that package and order the DNA into structural units called nucleosomes; Are the chief protein components of chromatin, acting as spools around which DNA winds; Play a role in gene regulation
Horizontal gene transfer: Taking piece of genome and passing it on to another bacteria (?); When modified plasmid starts to replicate it produces pilli on the surface of its host and when conjugation occurs it passes all of the DNA contained in the plasmid to the other cell and the recipient cell receives both plasmid and bacterial DNA
Ingestive heterotroph: Organism which secretes enzymes externally into its environment to digest organic materials which are then absorbed (e.g. fungi, many protists and monera)
Latent viral phase: Ability of a pathogenic virus to lie dormant (latent) within a cell, denoted as the lysogenic part of the viral life cycle

Lithotrophs: Use inorganic substrate (of mineral origin) to obtain reducing equivalents for use in biosynthesis (e.g., carbon dioxide fixation) or energy conservation (ATP production) via aerobic or anaerobic respiration
Linnaeus: Kingdoms: *Animalia, Plantae, Fungi, Protista, Monera* (*classified by being either autotrophs or heterotrophs, autotroph is plantae)*
Lysogenic cycle: The viral genome incorporates and stays in bacterial DNA and be dormant, so each time bacterium duplicates the viral copy is duplicated, and at later time lytic cycle can resume
Lytic cycle: Non-enveloped bacteriophages invade bacterial cells by attaching themselves to the host surface and inject their genome (DNA/RNA/retrovirus) which causes protein syntheses of bacterial cell to stop and only viral nuclear material be duplicated along with proteins for new capsid, then virus assembles into virions and the bacterial cell breaks open (lysis) releasing hundreds/thousands of virions
Metabolism: Ability to harness energy and use it to build living things from carbon (basic building block) using energy (high energy electrons); Divided into autotrophs and heterotrophs
Methanogens: Importance in landfill and garbage disposal; Landfills plagued with the presence of the explosive gases methane that built up under the layers of rotting garbage (an anaerobic environment and the methanogens were at work recycling organic material); Initially a problem, now sites are mined for accumulated methane tapped as fuel
Monera: Taxonomic kingdom of prokaryotic organisms that typically reproduce by asexual budding or fission and have a nutritional mode of absorption, photosynthesis, or chemosynthesis; Simplest form of life (includes all prokaryotes) absence of duplicate chromosome, absence of nucleus; Bacteria (Eubacteria) and Archea
Nitrogen fixation: Process in which nitrogen (N2) in the atmosphere is converted into ammonia (NH3); Atmospheric nitrogen or molecular dinitrogen (N2) is relatively inert (doesn't easily react with other chemicals to form new compounds; Fixation process frees nitrogen atoms from their triply bonded diatomic form, N≡N, to be used in other ways; Through chemical and especially biological action; N2+8H++8e- -16ATP -> 2NH3+H2+16ADP+16Pi
Nonenveloped virus: Proteins contained in the capsid itself are used to identify the different viral forms and the capsid proteins are important in recognizing the host cell and assist with the transfer of the viral genome into the host
Nucleoid: No chromosomes in bacteria, instead genome consists of one circular piece of double strand DNA (sometimes a linear piece that loops, folds, and supercoils on itself and is compact in cytoplasm; Bacterial cells are haploid
Oxidized: Combination of oxygen with a substance, forming oxide; Chemical reaction in which there is the loss of electrons (or gain of oxygen), resulting in an increase in oxidation state by a molecule, atom or ion.
Pandemic: Epidemic of infectious disease that has spread through human populations across a large region; for instance multiple continents, or even worldwide
Pathogen: Infectious agent; Biological agent that causes disease or illness to its host; Can infect unicellular organisms from all of the biological kingdoms
Penicillin: Antibiotic drug obtained from molds especially of the genus Penicillium or produced synthetically; Used to treat infections caused by gram-positive bacteria

Peptidoglycan: Composed of two different sugars that form a dimer and these dimers are then strung together; Does not involve linear repetition of a single monomer; Every second sugar (one sugar of the dimer) has a four amino peptide attached to; This small peptide chain is the key for allowing two different peptidoglycan fibres to interact; Enzyme will form covalent linkages between the two terminal amino acids of the small peptide of two different peptidoglycan molecules, which when repeated, is the basis for the peptidoglycan layer's strength and rigidity
Periplasm: Region in a gram-negative bacterium between the plasma membrane and an outer surrounding membrane that has enzymes and a thin layer of peptidoglycan
Phage: Bacteriophages which are viruses that infect bacteria
Photoheterotrophs: Heterotroph; Light energy is source of high energy electrons, and organic carbon is carbon source
Photosynthesis: Process by which green plants and some other organisms use sunlight to synthesize foods from carbon dioxide and water. Photosynthesis in plants generally involves the green pigment chlorophyll and generates oxygen as a byproduct; Formation of carbohydrates from carbon dioxide and a source of hydrogen (as water) in the chlorophyll-containing cells (as of green plants) exposed to light
Phototrophs: Autotroph; Light energy is source of high energy electrons, and CO_2 is carbon source
Pilli: Small hairlike projections on outer surface of many bacteria which are important for conjugation (form of reproduction); Allows bacteria to exchange cytoplasm between each other (can move (DNA)
Plantae: Taxonomic kingdom comprising all living or extinct plants; autotrophs
Plasmid: Additional piece of circular DNA in cytoplasm; Duplicate independently of bacterial cell; Important in initiating conjugation by producing pilli, play role in horizontal gene transfer during transformation; Implicated in antibiotic resistance and toxin production
Prions: Small proteins existing in 2 configurations: properly folded (normal) form, and misfolded form; If a misfolded version of the prion contacts a normal one it converts the normal one into a misfolded prion (results in exponential growth in the number of misfolded prions); Common on surface of cell membranes; Believed to be involved in cell-to cell interactions, possible adhesion or communication; When misfolded they can form fibres and add more of the altered prions at the tip, growing the fibre, fibres often break and the number of growing points increases and as the fibres enlarge they create aggregates that appear as spongy holes in brain tissue ("mad cow disease" and in humans Creutzfeldt–Jakob disease); Very stable and hard to destroy/indestructible
Prokaryote: Single celled-organism with neither a distinct nucleus with a membrane nor other specialized organelles; Two types- Archea and Bacteria (Eubacteria); Break down organic matter
Protista: Former taxonomic kingston made up of eukaryotic, unicellular organisms; Members of it now belong to Protoctista; (several groups of unicellular eukaryotes); Comprised of animal-like (protozoa) and plant-like (algea) eukaryotes; Divided into several phyla; Most live in aquatic habitats, simple eukaryotes lacking specialized tissue organization, many single-celled, though are protists that form colonies or are multicellular; Bacterial cells become the plastids of the photosynthetic eukaryotes

Proton gradients: Product of the electron transport chain; Higher concentration of protons outside the inner membrane of the mitochondria than inside the membrane, is driving force behind ATP synthesis
Protozoa: Diverse group of unicellular eukaryotic organisms. Historically, protozoa were defined as single-celled organisms with animal-like behaviors, such as motility and predation
Reduced: Gain of electrons in redox reaction
Reverse transcriptase: Enzyme that permits DNA to be made, using RNA as the template. A retrovirus, such as the HIV virus, can propagate itself by converting its RNA into DNA with it
Ribosome: A sphere-shaped structure within the cytoplasm of a cell that is composed of RNA and protein and is the site of protein synthesis; Are free in the cytoplasm and often attached to the membrane of the endoplasmic reticulum; Exist in both eukaryotic and prokaryotic cells
Saprophytic: An organism (esp fungus or bacterium), that lives on/gets its nourishment from dead organisms or decaying organic material; They recycle organic material in the soil, breaking it down into in simpler compounds that can be taken up by other organisms
Stromatolites: Dome-shaped structure consisting of alternating layers of carbonate or silicate sediment and fossilized algal mats; Produced over geologic time by the trapping, binding, or precipitating of sediment by groups of microorganisms, primarily cyanobacteria; “Cushions of layers of bacteria”
Surface/volume ratio: Increase in cell size leads to increase in demand for chemical reactions -> more substances needed in and more substances needing to be removed; Surface area affects the rate at which particles enter and exit the cell; Volume affects the rate of the chemical activities; As the cell gets larger, its surface area to volume ratio gets smaller; If the ratio gets too small, particles will not be able to enter and exit the cell fast enough; Results in accumulation of waste products and overheating of the cell: THINK SUPPLY AND DEMAND
Thermophiles: Adore heat or extreme cold; Some aerobic and others anaerobic but most make use of sulphur in their main energy pathways therefore usually found in sulphur rich water (ie geysers, hot springs and deep thermal vents at the bottom of the oceans)
Transduction: Form of horizontal gene transfer; Virus takes over the host cells’ replication, transcription and translation machinery and uses it to replicate its genome and produce the proteins of the viral case that are encoded in the viral genome; Assemble the virus by encapsulating a copy of the viral genome that is floating in the bacterial cytoplasm in the viral case. Normally the DNA of the bacteria disappears during viral infections but occasionally a piece may remain intact and when the assembly step for the new viral particles is initiated, it may be encapsulated instead of the viral copy of the genome. This results in a bacteriophage containing a piece of bacterial DNA, not viral DNA; Consequence is the bacterium has a piece of bacterial genome that it may then incorporate it its genome
Transformation: Form of horizontal gene transfer; Bacterium can absorb DNA strand from external environment and place it into own genome; Another example of gene swapping; Key strategy in creating genetic variations in these little organisms; Sometime successful and new gene sequence inserted and becomes active, if fails then DNA degrade and salvaged for nucleotide building blocks

Vaccine: Biological preparation that improves immunity to a particular disease; Typically contains an agent that resembles a disease-causing microorganism, and is often made from weakened or killed forms of the microbe, its toxins or one of its surface proteins
Virion: Single virus particle
Viroids: Subviral particles consisting of a small piece of circular RNA that is capable of self-replication; Could consider a viroid to be a naked virus that has lost its capsid coat; RNA in Viroids do not code for proteins, but single stranded RNA copies are capable of binding to the mRNA of the host cell and when they do they silence the message which is not translated into a protein; blockers of translation
Virus: Not a cell (no bilipid layer, no synthetic machinery for protein synthesis, no mitochondria either); Consists of its genome surrounded by a protective protein coat, the capsid; Viral genetic information contains the genes required to duplicate the viral genome, manufacture the capsid proteins and assemble the capsid around the copies of the genome (lack synthetic machinery to do this) therefore take over the replication, transcription and translation machinery of another cell; Characterized by morphology (like bacteria); Two forms: non-enveloped or enveloped viruses (both have the capsid casing surrounding the genome but enveloped virus has additional lipid bilayer membrane surrounding the capsid and the genome inside); Lipid bilayer formed from plasma membrane of the host and includes host membrane proteins and additional plasma membrane proteins added by the virus; Additional viral proteins in the envelope are used to identify the virus *refer to antigen definition for virus antigens and enveloped/nonenveloped virus*; Viruses that invade bacteria are non-enveloped bacteriophages and they attach to the surface of the bacterium and inject their genome (DNA or RNA in retroviruses), result is protein synthesis of host proteins is shut down and only viral nuclear material is duplicated and proteins for the new capsid produced; morphology-helical, polyhedral, complex enveloped, enveloped

appearance of oxidized minerals in the earth's rocks identifies the end of the Achaean eon and the start of the Proterozoic. But there's more than rusting rocks. Oxygen started to accumulate in the atmosphere where it reacted to from ozone. Ozone filtered out the ultraviolet light that caused damaging mutations in organisms that lived to close the surface of the ancient oceans

Proterozoic eon (2500-543Ma)

- **2000Ma- Oxidation produces "red beds"**
- **1900Ma- Oxygen levels reach 3%**
- **1800Ma- Oldest eukaryote fossils**
- **1200Ma- True algae**
- **1100Ma- Rodinia supercontinent forms**
- **900Ma- Soft-bodied animals**
- **800Ma- Major glaciation period begins**
- **700Ma- Breakup of Rodinia supercontinent**
- **600Ma- Protective ozone layer in place**
- **543Ma- Vendian extinction, hard-shelled animals**

9+2 organization: Microtubules arranged themselves into a specific structure (9+2) allowing the cytoplasmic extension to wiggle and waggle based on microtubules in there; Origin of flagellum/ cilia; 9 doubles around centre and one dublet in centre; Dyenin motor grips to dublet above and below it and can walk around it (so dyenin motors cause flagellum or cilia to bend); Movement (helicoid: circular spinning from intrinsic structure, or a planar beat: think of "breaststroke" power stroke in one direction, collapsing stroke in the other, metachronal wave in ciliates)
Gametocyte: Cell capable of dividing to produce gametes i.e. spermatocyte or oocyte; Cell about to undergo meiosis and turn into 4 gamete cells
Alternation of generations: Meiosis and fertilization are 2 "generations" in plants; Gametophyte generation starts with spore produced by meiosis (spore is haploid, all cells derived from it also haploid) this multicellular structure produces gametes by mitosis and sexual reproduction produces diploid sporophyte generation; Sporophyte generation starts with zygote, cells containing diploid chromosome numbers- eventually cells undergo meiosis which form spores and start gametophyte generation; Multicellular plant called gametophyte, formed from spore and gives rise to haploid games; Spend life in both haplontic and diplontic states; Zygote is fertilized undergoing mitosis and produces fern (diploid) which undergoes meiosis producing a spore (n) which undergo mitosis producing a gametophyte (large multicellular vegetative state) (n) that will take haploid cell and make them into games which will fertilize to form a zygote; fern is then a sporophyte, and other things is a gametophyte
Amoeboid movement: 2 types of cytoplasm: endoplasm (actin in monomeric form) ectoplasm (actin exists in filaments) is more rigid because of the acting filaments and myosin; An extremely flexible way of locomotion
Asexual reproduction: Form of reproduction not involving meiosis, polidy reduction, or fertilization; Offspring is clone of parent (no exchange of genetic material)
Basal body (a centriole): Cylindrical organelle in cytoplasm of flagellated and ciliated cells, containing microtubules that form the base of a flagellum or cilliim; Identical internal structure to a centriole
Bikont: Has 2 flagellum because centriole can replicate itself meaning it can move in the water column it makes (where to? up to photic zone where a photosynthetic bacterium could be eaten and not digested causing symbol resulting in chloroplast in the cell); Excavate, rhizaria, plantar, chromalveolata
Cellular gliding: Centrioles send out microtubules that push again plasma membrane of cell creating a protrusion surrounded in membrane causing cell gliding along a substrate; Driving force is microtubule; Essentially shape change that caused movement

Centriole: Cylindrical organelle near nucleus; Occurs in pairs; Involved in development of spindle fibres in cell division; 9 triplets on outside connected to each other by central cylinder; All made of tubulin cylinder protein; Makes microtubules that for cytoskeleton of cell; Stays in pericentriolar space; Mature cel has 2 oriented in right-angle position (can self-catalyze and other stuff, so protein first world is maybe a no?); Can self-replicate; Lays out all microtubules cytoskeleton; Starting to realize that cancer might be because centrioles fail to organize cell; Can spindle out microtubules that push against plasma membrane causing gliding of the cell across a substrate (CELL CREEPING/CELL GLIDING, NOT AMEBOID MOVEMENT); First role to be a transportation system that allowed it to enlarge; Looks like event that occurred only once in evolution
Centrosomes (a centriole): Organelle near nucleus containing centrioles from which spindle fibres develop in cell division
Chloroplast: Structure in plant cells that is site of photosynthesis; Inside has thylakoids (disk-shaped structures) that function as site of photosynthesis; Thylakoid membrane consists of proteins & light-absorbing pigments (chlorophyll- green pigment)
Choanoflagellate: Group of free-living unicellular and colonial flagellate eukaryotes considered to be closest living relatives of animals; Possess protoplasmic collar around base of flagellum
Cilia: Hairlike organelles (identical structure to flagella); Line surface of some cells and beat in rhythmic waves providing locomotion to ciliate protozoans and moving liquids; Ciliar locomotion based on 9+2 organization of microtubules (similar architecture as flagellar locomotion); Hundreds of thousands bb flagella on surface of cell; Use metachronal wave to move around
Cirrus (pl. cirri): Cilia that are fused together to work as composite structures
Contractile vacuole: Specialized vacuole of eukaryote cells, esp protozoa; Fills with water from cytoplasm then discharges it externally by opening a permanent narrow neck; For osmoregularity; As water is placed in, it goes into endomembrane system (by ATP) until the water causes it to swell where a small channel opens and expels the water into the outside: Part of endomembrane system; Expels once every second;
Crossing over: Between prophase 1 and metaphase 1; Process where homologous chromosomes pair up with each other and exchange different segments of their genetic material to form recombinant chromosomes
Cytoskeleton: Made of acting filaments and microtubules; Important for cell movement, shape, growth, division, differentiation, and movement of organelles in cell; All eukaryotic cells have one
Diploid: A cell/organism that has 2 sets of chromosomes; 2n; Animal kingdom ; 2 Gametes fertilize producing a zygote that goes through mitosis developing into the animal form
Diplontic: Life cycle- an algae or lower plant that has a life cycle where main form is diploid (aside from gametes)
Dyenin molecular motor: Burn atp and travel along mictrotuble fibres; Carry to centriole
Ectoplasm: Outer, non-granulated part of cell cytoplasm; Varying consistency of endoplasm and ectoplasm useful for formation of pseudopods used for locomotion

Endomembrane system: Collection of internal membranes dividing cell into structural and functional regions: nuclear envelope, ER, Golgi complex; Hypothesized that derived from infolding plasma membrane
Endoplasm: Inner granule-rich, dense part of cytoplasm of cell; Varying consistency of endoplasm and ectoplasm useful for formation of pseudopods used for locomotion
Endosymbiosis: Mitochondrion thought to have originated from an aerobic prokaryote that lived as an endosymbiont within an anaerobic prokaryote; Chloroplast thought to have originated from a photosynthetic prokaryote that because an endosymbiont within an aerobic cell that had mitochondria; Support- *Morphology* (shape of mitochondria and chloroplasts similar to bacteria and archaea), *Reproduction* (mitochondria and chloroplasts derived from pre-existing mitochondria and chloroplasts- they divide by binary fission, which is how bacteria and archaea divide), *Genetic information* (both mitochondria and chloroplasts contain their own DNA which contains protein-coding genes essential for organelle function like it should be if they were ancestors of free living cells (DNA in mitochondria and chloroplast circular as with bacteria and archaea, and DNA in nucleus is linear)), *Transcription & Translation* (chloroplasts and mitochondria contain transcription and translation machinery (genes encoded by organelle genomes translated into mRNA translated to ribosomes, mRNA and tRNA necessary for protein syntheses encoded by their DNA—ribosomes in mitochondria and chloroplast similar to that in bacteria), *Electron transport* (mitochondria and chloroplasts have electron transport changes (ETCs) to generate chemical energy, found in inner membrane of double membrane which corresponds to ETCs being in plasma membrane of bacteria and archaea that were swallowed by endosymbiosis making it inside the membrane of endocytic vesicle, *Sequence analysis* (RNA sequencing of ribosomes in mitochondria and chloroplasts shows they belong in bacterial branch, chloroplast ribosomal RNA similar to cyanobacteria, mitochondria ribosomal RNA similar to proteobacteria, All eukaryotic cells contain mitochondria, only plants and algae contain both m and c therefore eukaryotic cells with ability to respirate became photosynthetic after taking up cyanobacteria evolving into plants and algae
Eukaryote autapomorphies: Nuclear envelope(), Endomembrane system(), Mitochondria(), Multiple chromosomes and diploidy (Each linear unit has it's own replication point, cutting down time to replicate it; 2nd chromosome acts as a buffer/protector against mutation/error; chromosomes segregate randomly in a gamete, and if you add crossing over then even more variation), Centrosomes (A centriole/Basal Body)
Formylmethione: Specialized aa that's first incorporated into polypeptide chain in synthesis of proteins in prokaryotes
Flagellum: First made by plasma membrane surrounding the microtubules pushing against the cell membrane; Amoeba don't have them, unikonts, bikonts, cilia; Flagellar locomotion based on 9+2 organization of microtubules (similar locomotion structure as cilia locomotion); With a flagellum you're either a unkind or bikont
Gametophyte: Life cycle- in plants with alternating generations, the gamete-producing and usually haploid phase, producing zygote from which sporophyte arises; Dominant form in bryophytes
Haplontic: A life cycle- in algae of lower plant, a life cycle where main form is haploid, with diploid zygote formed only briefly; Most of the Fungi; Multicellular structure breaks off a

haploid cell that undergoes a structural change (morphological change) and fertilizes with another one producing a cell which undergoes meiosis returning to haploid state (called a spore), germinates, and forms a gametophythe (the multicellular haploid result)
Histone proteins: Highly alkaline proteins found in eukaryote cell nuclei that package and order DNA into structural units (into nucleosomes); Main protein component in chromatin, act as spools around which DNA winds, have role in gene regulation
Host: Organist that harbours a parasitic, mutual, or commensal symbiont; Provides nourishment and shelter
Kynesin molecular motor: Burn ATP to travel along microtubule fivers; Carry away from centriole;
Life cycles: Haplontic (fungal-like protists), Alteration of generations (plant-like protists), Diplontic (animal-like protists), Parasitic
Macrogametocyte: Female gametocyte
Macronucleus: Larger type of nucleus involved in non-reproductive functions; Only occurs in ciliates of it's their distinctive feature
Malaria: An infection disease caused by protozoan parasites (Plasmodium family); Transmitted by bite of mosquito, contaminated needle, or transfusion; Mosquito ingests infected blood which has gametocytes that enter the stomach which triggers the developments of the gametocytes into their adult form (gametes)-leads to fertilization and forms a zygote; Zygote embeds itself into the wall of the mosquito and undergoes meiosis which become spores (this cycle is called sporogony), keep replicating, undergo morphological change to be able to swim, and therefore swim through mosquito blood up to its salivary glands; When the mosquito bites the host, it releases saliva containing anticoagulants so it can eat as well, as sporozoites, and those sporozoites set up shop in a liver cell undergoing further meiotic division becoming 2nd vegetative stage in human host causing a schizont; When the liver cell bursts, the schizonts are released into the blood and are able to survive (now called merozoites because they can swim in the blood) that look to invade red blood cells; Merozoites invade RBC, undergo morphological change to become a trophozoite, that eats away hemoglobin in RBC (while doing this increases numbers by mitotic division) so RBC fills with parasites and then explodes; All infected cells explode at same time; You get fever, which causes more CO_2 produced, sweating, and heat, which mosquitos love.
Meiosis: Cell division resulting in 4 daughter cells each with half the chromosomes of parent cell; Production of gametes and plant spores
Merozoite: Stage in life cycle of plasmodium (malaria parasite); Invade other cells when release; Are formed during asexual division
Metachronal wave: Metachronal rhythm done by cilia produces appearance of a wave; Wavy movements produced by sequential action (as opposed to synchronized) of cilia; Uses the planar flagellar motion but recovery stroke in right-angled direction; Coordinating cilia on membrane to be so agile
Methionine: Alpha amino acid part of constructing microtubules
Micronucleus: Small nucleus that forms when chromosome or fragment of chromosome not incorporated into one of daughter nuclei in cell division
Microgametocyte: Male gametocyte

Microtubules (spindle fibers): Cytoplasmic tubule of alpha and beta tubulin dimers; Structural component of cytoskeleton, cilia, and eukaryotic flagella; Has polarity; Makes up cytoskeleton of cell; Pull DNA and line it up in the middle of the cell-pulls chromosomes apart in division; Roadway along which molecular motors (dyenin, kinesin, myosin) move; Contain information that places all organelles in same spot in all cells.
Mitochondria: Elongated organelle in cytoplasm of eukaryotic cells; Contains genetic material and many enzymes important for cell metabolism (those responsible for conversion of food to usable energy); Mitochondrial DNA only moved through female linage; Endosymbiosis only occurred once that was successful-all eukaryotes are related to each other because of this event; Mitochondria came before chloroplasts but they happened the same way
Mitosis: Process in cell division where nucleus divides, consisting of four stages, (prophase, metaphase, anaphase, and telophase), normally resulting in two new nuclei which contain a complete copy of the parental chromosomes
Molecular motors: Burn ATP and travel along microtubules (spindlefibers); Have a set of "tiny feet" that land on 1 of mictrotubulins that catalyze reaction to burn ATP, and when it burns ATP it causes conformational change in the shape of the protein foot causing other foot to be swung forward etc; Have two "arms" that hold onto things and transporting them; Do transport and supply in a cell; Allows for a cell to survive because simply by diffusion cell would die if a chemical needed to be diffuses in a cell from a vesicle; Fundamental to achieve large sizes of eukaryote cells, were laid down by centrioles, and that that increase transportation perfected itself to the point where it got used to move chromosomes during meiosis and mitosis
Myosin molecular motor: Different from other molecular motors because it doesn't run along a microtubule tract; Run along a track of actin fibres, actin is like tubulin (exists as a globular protein and can assemble itself into strands), and when it's in strands myosin motors move to or fro (any direction) along these actin fibres
Nuclear envelope: Phospholipid bilayer membrane surrounding genetic material and nucleolus in eukaryotic cells
Nutritional strategies: Ingestive- SLIDE 33
Operon genes: A segment of DNA containing adjacent genes including structural genes, and operator gene, and a regulatory gene, A functional unit of transcription and genetic regulation; Genes transcribed under control of operator gene
Origin of cellular motility:
Parasite: Organism that obtains nourishment and shelter from other organism, potentially causing harm/disease to host; Generally smaller than host
Pericentriolar material: Amorphous (no clearly defined shape) mass of protein making up part of animal centrosome that surrounds the 2 centrioles; Contains proteins responsible for microtubule nucleation and anchoring
Phagocytosis: Process by which a cell (often a phagocyte or a protist) engulfs a solid particle to form an internal vesicle known as a phagosome; Encloses in a vacuole
Phytoplankton: Autotrophic (self-feeding) components of plankton community; Key parts of oceans, seas, and freshwater basin ecosystems; Floats around in water synthesizing glucose from sun

Pinocytosis: Mode of endocytosis where small particles are brought into the cell, forming an invagination, and then suspended within small vesicles; Encloses in vesicle; Nutrients dissolved in water
Planar flagellar beat: Power stroke in one direction and a collapsing stroke in the other direction, think breaststroke
Plankton: Small plants and animals floating/drifting/weakly swimming in bodies of fresh or salt water; Defined by ecological niche rather than phylogenic or taxonomic classification
Plasmodium: Parasitic protozoan of genus that includes those causing malaria; Form within life cycle of some simple organisms such as slime molds, typically consisting of a mass of naked protoplasm containing many nuclei
Plastid -chloroplast: Organelle found in cells of plants, green algae, red algae and some other protists; Have an inner and outer membrane, contain own DNA and ribosomes; Some (i.e. in plants) contain pigment; Origin of plastid is not a monophyletic event; Some plastids in algal cells have 4 plasma membranes because they were engulfed by a non-photosynthetic eukaryote cell (eukaryote eats eukaryote) which results in that number of membranes
Polygenomic classification: Classification of organisms based on assumed evolutionary histories and relationships???
Primary consumers: Zooplankton; Are small in ocean because primary producers are small; Have to capture food which is a dilute particulate material suspended in water (have to filter water to eat their food) so oceans have more trophic levels; On land primary producers bis (multicellular plants) so primary consumers are big; terrestrial trophic levels are smaller because you start with big things, so if something gets damaged it collapses very quickly on land vs in ocean
Primary endosymbiosis: Process that involves engulfment of prokaryote by another living cell; Engulfed organism may be used as advantage, supplying larger cell with its products
Protist (perimesium): Good Sa/V; Creates water current that goes into gullet (cytostome) with the help of specialized cilia; Through phagocytosis absorb nutrients; The food vacuole gets transported around cell thanks to molecular motors; Starts with acidic digestion, then alkaline digestion, and undigestible material will be removed from paramecium at cytoproch (the cell anus); Has 2 nuclei (one large macronucleus, one small micronucleus); Macronucleus diploid (housekeeping, day to day functioning), micronucleus ploidy (for replication/reproduction as is germ cell); Has no cell wall so has contractile vacuole (part of endomembrane system)
Primary producers: Phytoplankton; Produce biomass from inorganic compounds (autotrophs); Capturing of light energy in the ocean carried out by single celled algae (protists); On land primary producers are large multicellular plants, so herbivores are all large and multicellular;
Pseudopod (Pseudopodium): Temporary cytoplasmic projections of cell membrane in certain unicellular protists such as amoeba; “False foot”; Associated with locomotion
RNA polymerase (simple and complex): Simple: synthesizes formation of RNA from DNA template during transcription; Special RNA polymerase (primase) forms primer sequence of nucleotides complimentary to nucleotides in DNA strand to be copied
Secondary endosymbiosis: When a living cell engulfs another eukaryote that has already undergone primary endosymbiosis; Product of primary endosymbiosis is engulfed and retained by another free living eukaryote; i.e. chloroplasts of red algae, green algae

Sexual reproduction: Production of new living organisms by combining genetic info from 2 individuals of deferent sexes
Spiral flagellar beat: Helicoid beat; Dyenin motors working in sequence around periphery causing distortion in shape of flagellum so that it ends up spiralling; Different from molecular motor because the tail isn't spinning from base, rather spinning it by distortion of plasma membrane and 1 microtubule relative to the other
Spore: Unit of asexual reproduction that may be adapted for dispersal and survival (often for extended periods of time) in unfavourable conditions; Form part of life cycles of many plants, algae, fungi, and protozoa
Sporophyte: Diploid multicellular individual or generation of plant with alternation of generations that begins from a diploid zygote and produces haploid spores by meiotic division
Sporozoite: An infective body or group of cells released from spore in many sporozoans formed by division of a zygote; The infective stage of the malaria parasite
Supergroup: Hierarchy of biological classification's eight major taxonomic ranks
Trophozoite: The active motile feeding stage of sporozoan parasiteFeeding stage of a protozoan (distinct from reproductive or encysted stages);
True algae: Group of photosynthetic organisms generally possessing pigments such as chlorophyll lacking true roots, stems, and leaves (lacking characteristics of terrestrial plants)
Tubulin (Tubulin dimers):
Unikont: Sits in substrate, has one flagellum which waves it around causing an unlimited water current running over its surface containing organic material that can be absorbed as a nutrient; amoeba, choanozoa, animalia, fungi; All algal organisms and plant things; Doesn't swim, bikonts do
Zooplankton: Heterotrophic plankton (organisms drifting in oceans, seas, and bodies of fresh water)
Zygote: Cell formed by union of male sex cell and female sex cell; Developes into embryo; Constitutes fertilization

All living organisms can be divided into two groups — prokaryotes and eukaryotes — which are distinguished by the relative complexity of their cells. In contrast to prokaryotic cells, eukaryotic cells are highly organized. Bacteria and archaea are prokaryotes, while all other living organisms — protists, plants, animals and fungi — are eukaryotes.

a chromosome translocation is a chromosome abnormality caused by rearrangement of parts between nonhomologous chromosomes. A gene fusion may be created when the translocation joins two otherwise-separated genes

polyploidy: contains more than 2 homologous sets of chromosomes

alloploidy: hybrid individual or cell having two or more sets of chromosomes derived from two different species

autopolyploidy: having more than two sets of chromosomes all derived from the same species

genome: the haploid set of chromosomes in a gamete or microorganism, or in each cell of a multicellular organism

genotype: genetic constitution of an individual organism

phenotype: set of observable characteristics of an individual resulting from the interaction of its genotype with the environment